

## IV.—THE ROMAN BATH HOUSE AT RED HOUSE, BEAUFRONT, NEAR CORBRIDGE.

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### INTRODUCTION.

The bath house is situated 1,100 yards west of the Roman site at Corbridge and 200 yards south-east of Red House farm, Beaufront Castle.<sup>1</sup> The river-terrace which carries the Corbridge site continues westwards from the Cor Burn under the modern name of Shorden Brae, but where it is interrupted by the Red House Burn, also called Short Burn, it forms a sub-terrace several hundred feet long and some 160 feet wide from north to south, before continuing westwards at full-height behind the small house named Prior Thorns. This sub-terrace is high enough to be clear of the river floods which until recent times and the construction of an adequate floodbank, used to occur annually, but is low enough to be sheltered from the north, west and east.<sup>2</sup> To the east the stream has cut back into the river-terrace and formed a small valley, which could easily have been dammed to provide a water supply. There will have been no shortage of wood in the area; the site, therefore, possessed all the requirements necessary for a bath house in the eyes of a Roman planner (fig. 1).

The name of the farm, Red House, seemed singularly

<sup>1</sup> 1 inch to 1 mile OS map, 7 series, Sheet 77, NY 972651.

<sup>2</sup> "*Primum eligendus locus est quam calidissimus, id est aversus ab septentrione et equilione.*" Vitruvius, V x i. A list of the abbreviations employed appears at the very end of the paper, Appendix VII.

appropriate to the site of a bath building, and an investigation was made to see if the derivation could be discovered. The name comes from the relatively modern farm buildings, the earliest of which is a *seventeenth-century* dovecot. If earlier still it had been applied to the stream the case for connecting it specifically with the Roman ruins would be hopeful. However, the other, and older, name of the stream is Short Dean Burn (hence Shorden, or Shordon, Braes to the east), and Red House is a relatively modern title for both it and the farm.

The bath house was discovered during the laying of a drain from some newly constructed silage pits to Red House Burn, when the mechanical excavator broke through undoubted masonry at several points. The owner, Major H. D. Cuthbert of Beaufront Castle, recognized this as Roman and some preliminary investigations by his stepson Mr. Paul Bergne revealed walling of considerable thickness and promise. Major Cuthbert then informed the Durham University Excavation Committee of the discovery and readily granted permission to excavate. Accordingly, in November, 1955, the writer, then Sir James Knott research student of the Committee, was placed in charge of a trial excavation which rapidly grew in size and complexity as the nature of the building revealed itself. By Easter, 1956, it was decided to strip the thick, gravel overburden from the whole site by mechanical means and excavate the building in its entirety. Major Cuthbert again readily assented to this, and later permitted continuation of the work for many months longer than was originally envisaged, although it meant continual passage through Red House farmyard for two complete seasons, as well as the disruption of both the natural and artificial drainage of the site.

The whole excavation, which was protected from frost by a covering of straw during the winter, and the final filling in by mechanical means, took from May to October, 1956, and from May to Christmas, 1957. Had the two summers been finer—especially the second, in which rain seriously hindered





1. Bath House from north-west.



2. Bath House from south-east.

Photos. R. Wallis.

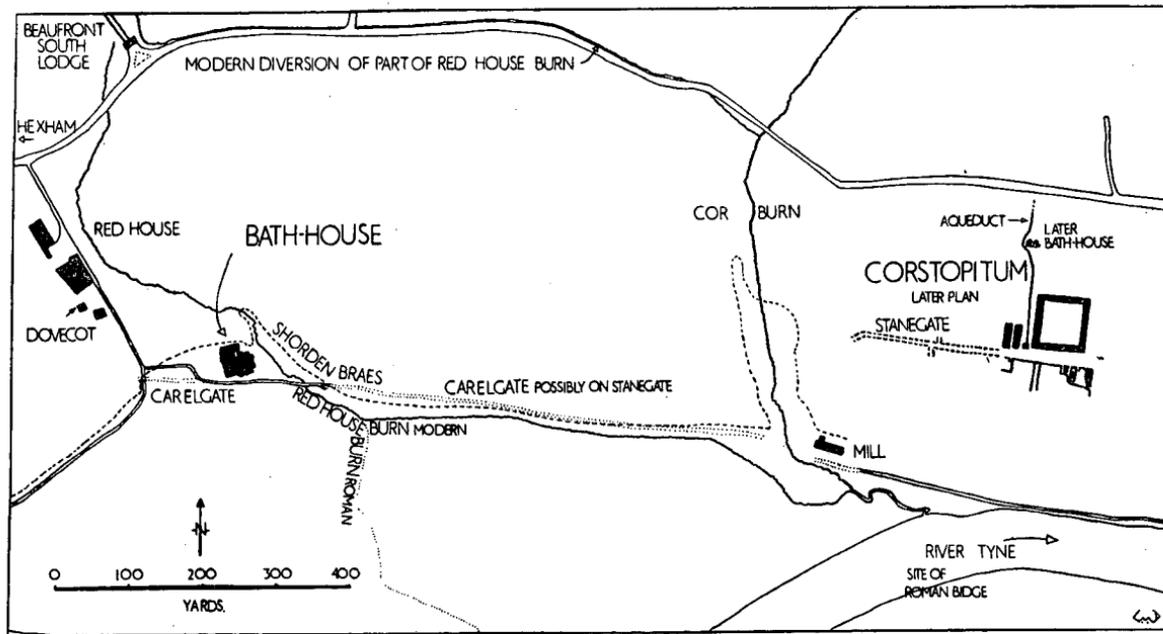


FIG. 1. THE SITE OF THE BATH HOUSE.

the final photography and recording—the operation would have taken a much shorter time.

Thanks are due to Major Cuthbert, to Mr. Harold Learman, his farm manager, and to Mrs. Learman for their continual tolerance, help and friendship. On the technical side Mr. Charles Anderson and Mr. Noel Shaw contributed much aid and advice, Mr. Shaw, in particular, being responsible for the treatment of the metal finds. Skilled labour was provided at different times by the committee's foreman, Mr. T. Batey, and Mr. R. Hall. Mr. G. E. Andrews and Mr. A. Williams, architects, gave much assistance with the surveying of the site and the illustration of the report.

Also I must thank the Members of the Excavation Committee for their help and encouragement, and in particular Professor I. A. Richmond. Finally my thanks are given to all those without whose help there would have been no excavation, but the list is too long for individual mention.

#### POSITION, TYPE AND DATE OF THE BUILDING.

As will appear, the bath house dates from the earliest Roman occupation of the Corbridge site. It lies unusually far away from the fort (fig. 1), but the reasons for this position are not difficult to decide. The first garrison was the *Ala Petriana*,<sup>3</sup> a cavalry unit which would require a considerable water supply. The most immediate source for this was the Cor Burn which runs just west of the site and could be tapped higher up its course and brought into the camp. Even if this were only a temporary measure, and the Cor Burn was ultimately replaced by a more carefully selected source, the problem of finding a water supply for the bath house would still have to be solved. The next nearest stream is the Red House Burn, 1,100 yards west of the fort, from which a sufficient supply could certainly be drawn by the damming

<sup>3</sup> EE VII, 995, and AA<sup>4</sup>, XXXI, 220.

of the Burn's narrow valley.<sup>4</sup> As the site cannot have been far from the Stanegate, which is likely to be beneath the later Carelgate at this point, and as the unit was cavalry, the disadvantage of distance was lessened.<sup>5</sup>

The building itself measures 160 feet by 140 feet overall. Its courtyard and coldroom occupy the northern or inner edge of the terrace and the heated rooms and stokeholes the outer edge, using the lie of the land to facilitate the construction of the basements for the hypocaust chambers and to give the heated rooms a southerly aspect.<sup>6</sup> The building was entered through a monumental Portico (I) on the west side of a large Courtyard (II) with an internal peristyle. Opening from this courtyard was: a second, smaller Yard (XI) with the Latrine (XII) in it; and the Coldroom or *Frigidarium* (III) with its Annexe (IIIc), *Labrum* or Basin (IIIb), and Cold Bath (IIIa). Opening off the coldroom were the two ranges of heated rooms: the Circular, hot, dry-room or *Laconicum* (IX)<sup>7</sup> with its own stokehole and *Praefurnium* or Furnace chamber (X); and the Warm steam-room or *Tepidarium* (IV) also with its own stokehole and *Praefurnium* (V). This warm room led to the Hot steam-room, or *Caldarium* (VI), with two Baths, one moderately hot (VIa) and one extremely hot (VIb). The main *Praefurnium* (VII) with its stokehole was attached to the west side of the *caldarium*, and an additional room, probably an extra Fuel store (VIII), finished the sequence.

The disposition of the building is important, for its size was not a result of complexity or duplication, but springs simply from the dimensions of the four main rooms and of a courtyard which was an integral part of the plan and not

<sup>4</sup> The modern Red House Burn now runs at half its true volume owing to the diversion of much of its water to the Beaufront estate.

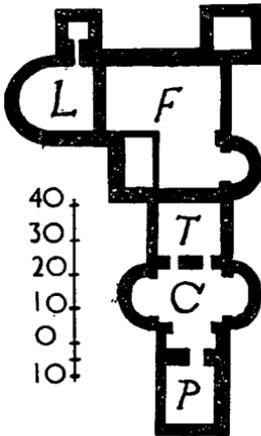
<sup>5</sup> Contrast Chesters, Benwell etc.; even Housesteads is only 200 yards across the Knag Burn.

<sup>6</sup> "*Ipsa autem caldaria tepidariaque lumen habeant ab occidente hiberno, sin autem natura loci impedierit, utique a meridie . . .*" Vitruvius, V x 1.

<sup>7</sup> Although the *laconicum* at Red House, like that specified by Vitruvius (V x 5), is circular in plan, the word "*laconicum*" does not imply any essential shape, and, therefore, is used below to describe the hot, dry room in a bath house, whatever its plan.

an irregular enclosed area such as adjoins the bath house at Gellygaer.

The main operative portion of military bath houses was the three room unit of *tepidarium*, *caldarium* and *praefurnium* (fig. 2, T, C, P); the *frigidarium*, *apodyterium* and *laconicum* (fig. 2, F and L) were additions to one end of this, and the multiplication of heated rooms in the Hadrianic type of bath house is only a development from it. At Red



TYPICAL REIHENTYP  
BATH-HOUSE.

INCHTUTHIL.

FIG. 2.

House, this main unit consisted of large, simple rooms bearing little resemblance to those in the small, though simple buildings constructed from mid first-century to Antonine times,<sup>8</sup> nor those in the more complex Hadrianic type of bath house found on the Wall.<sup>9</sup> The closest parallel to Red House is the *Reihentyp* bath house, as found at Inchtuthil, Castell Colleen and on the German *Limes*.<sup>10</sup> With the exception of the *tepidarium* stokehole, which is a refinement, the only difference in the basic unit between a bath house of the *Reihentyp* and Red House is that the

*frigidarium* at Red House was so placed as to preclude a second apse in the *caldarium*.

In the *Reihentyp* the *frigidarium* is the first room in the sequence, with the *laconicum* to one side of the series. At Red House, however, space necessitated the reversal of this procedure, while the courtyard, which is an unexpected

<sup>8</sup> Margidunum; Prestatyn and Gellygear I; Antonine forts in Scotland.

<sup>9</sup> Bewcastle, Netherby, Benwell, Carrawburgh, and Chesters.

<sup>10</sup> The word "*Reihentyp*" refers to the order of circulation rather than to the plan. In this report, however, it is used of that particular group of *Reihentyp* bath houses found at Stockstadt, Feldberg, Heddesdorf, Niedernberg, Castell Colleen and Inchtuthil which conform to a single plan; see fig. 2.

addition, had to be placed on one side of the building instead of forming the introduction to the sequence, as it did at Silchester and Wroxeter.<sup>11</sup> Red House has, in fact, all the requirements of the *Reihentyp* of building, but through lack of space its plan had to be altered. For the size of the rooms the closest parallel is Castell Collen, whose *caldarium* and *tepidarium* are almost identical to those found here. In the other *Reihentyp* buildings the rooms were smaller, and at Stockstadt they were little more than half the size of Red House.

The most unusual element is the peristyle courtyard, which does not occur in the bath houses of normal auxiliary units.<sup>12</sup> Elsewhere in the Empire peristyle courts are only found in legionary bath houses such as Vindonissa, Novaesium and Lambaesis, or civil bath houses such as the more elaborate buildings at Trier. In Britain, in the absence of the plan of a legionary bath house,<sup>13</sup> the only parallels are in civil buildings such as Silchester and Wroxeter. It is then legitimate to ask why Red House was given any special treatment.

The answer must be that the builders, the *Ala Petriana*, were a special unit, as the size and planning of the first fort at Corbridge seem to indicate, but as no bath house belonging to the *Ala Petriana* has been excavated elsewhere there is no material for comparison. The closest parallel to the courtyard in size, and in the provision of a water tank in the middle of the yard, is the bath house of the legionary fortress of Regensburg.<sup>14</sup>

<sup>11</sup> The Wroxeter bath house referred to throughout is the early baths; see Appendix VII.

<sup>12</sup> Gellygaer: only possessed an enclosed area. Templebrough: there is no evidence in May's report for the gravelled area J being a peristyle court. Castell Collen: at this moment Mr. Alcock's room G is highly uncertain in its use. 44 by 64 feet in size with an apparent peristyle, its floor rather indicates a *continuous* roof. It might have been a basilican hall akin to Caerwent period II.

It is significant that all these buildings originate in the first century.

<sup>13</sup> A portion of what may well be a peristyle courtyard was found at Caerleon.

<sup>14</sup> *Das Römische Regensburg*; H. Ortner (Regensburg 1909) Taf. iv.

Red House does not possess an *apodyterium*; at first it was thought that the courtyard was one<sup>15</sup> but subsequent excavations disproved the point. In fact *apodyteria* do not appear in the bath houses of auxiliary units until the Severan era,<sup>16</sup> and this building never possessed one, though its place may have been filled by the annexe to the *frigidarium* (IIIc) which could have been fitted with recesses as are the entrance halls and *tepidaria* of the Stabian and Forum bath houses at Pompeii.

The occurrence of a *laconicum* is important, for the date of these in a complete circular form is pre-Hadrianic, and more especially Flavian,<sup>17</sup> while the absence of wall jacketing is another early feature.<sup>18</sup>

Typologically, the building is early. It lacks an *apodyterium*, but it possesses a circular *laconicum*, which is at latest a Trajanic feature. Of its closest parallels Castell Collen was most probably, and Inchtuthil is almost certainly, Flavian.<sup>19</sup>

The finds in the building not only verify the early date, but give it more precision. The stratified pottery and objects are, without exception, of first-century date, while the absence of early second-century forms indicates that the building was *abandoned* by the turn of the century.

Two sections, complete from the turf line down, were left across the building when the top was stripped from it, and these record, quite clearly, the destruction of the building and the subsequent history of the site (fig. 3). The building had been systematically dismantled. Of this there can be no doubt: the roofs and vaults had been completely removed, for no trace of them remained inside the bath

<sup>15</sup> Hence the plan in JRS, XLVII, pp. 205-6.

<sup>16</sup> The point can only be stated here, being too long for discussion.

<sup>17</sup> Miss M. C. Fair: JRS, XVII, pp. 220-4; Wolff dates German examples as Flavian: *XI Bericht d. röm.-germ. Komm.* (1920), p. 83.

<sup>18</sup> Binchester is probably a refitting.

<sup>19</sup> Castell Collen: Although at this moment various dates in the fort's history are uncertain, the bath house appears reasonably certainly to be a Flavian foundation. Inchtuthil: Wroxeter Report, p. 25, *Roman and Native in North Britain* (ed. Richmond, 1958), pp. 73-4.

house, the suspended floors had been broken up and removed and the *pilae* collected.<sup>20</sup> The stone flagging of the other rooms had been lifted, and then the walls pulled down, until externally, ground level was reached, and internally the hypocaust basements were choked with rubble, broken building tiles, mortar and *opus signinum*.

The whole was then left and soon became sealed by a thin layer, or weathered crust, of crushed and weathered tile, mortar, plaster and *opus signinum*, over which in turn a thin layer of washed clay settled. Had there been any intrusion after the demolition of the building it would have been clearly shown, but, with two exceptions, there was no disturbance either of the rubble sealing the lower floors or of the layer of weathered material over it. The two exceptions were a stone robber's trench which cut across the north-east angle of the courtyard, and a smaller disturbance over the south apse. The rest lay as it was left and gradually became covered by material washed from the bank to the north.

An interesting deposit was noted in those places where the Roman floors had not been removed, namely, in the porch, the courtyard and the small yard. In every one of these there was a layer of clean sand between the rubbish left by the users and the debris from the destruction, although in some places it had been disturbed by the demolition. This can only mean that the building was abandoned some time before it was demolished, and the depth of sand, at places about three inches thick, implies a period of at least three to four years.

The Flavian fort at Corbridge was sacked some time shortly after A.D. 98,<sup>21</sup> and had the bath house been standing then it would hardly have escaped a similar fate. It had, however, been dismantled and not sacked, so that it must

<sup>20</sup> "Suspended floors" (*suspensurae*) used throughout to indicate the upper floors of heated rooms, consisting of a thick, mortar aggregate resting on underslabs. "*Pilae*" used of the tile pillars supporting the floor. Vitruvius, X v 2.

<sup>21</sup> AA<sup>4</sup>, XXXIII, 221 and 231.

already have been pulled down by the time the Flavian fort was destroyed.

The layer of sand brings the abandonment back into the nineties of the first century. If this is accepted, the only known historical event with which it can be associated is the transfer of the *Ala Petriana* sometime before the destruction of the fort. The bath house then lay abandoned for several years before being demolished, presumably to provide material for its successor, as yet undiscovered, smaller and nearer to the fort. The bath house to the north of the military area, and on the line of the aqueduct (fig. 1), is probably not an immediate successor.

On the basis of the above argument a rough outline of the building's history can be given:

Built A.D. 80 ± when Agricola's army arrived in the north of Britain. Abandoned when the *Ala Petriana* moved. Deserted for several years.

Demolished by A.D. 98 +.

The reasons for demolition are not difficult to see: the distance of bath house from fort must have been too great for comfortable use, and the defects of the site and structure were becoming obvious. A bulge in the north wall had had to be repaired once, and water must have been collecting in the hypocaust basements. Although the two years in which the excavation took place were wet ones, and although constant use would have kept the hypocaust chambers drier, water constantly drained into them from the gravel and sand terrace to the north, and the presence of an underground spring beneath the courtyard was responsible for not a little flooding. When the new unit surveyed the deserted building it would most likely be partly waterlogged.

The life of the building was, in consequence, short; the finds confirm this; they form a homogeneous group. The structure itself provides an informative picture, not only of the wear and tear and modification of a bath house in under two decades, but also an unencumbered example of the large but simple design of Flavian military baths.

# NORTH-SOUTH SECTION ACROSS EXCAVATION.

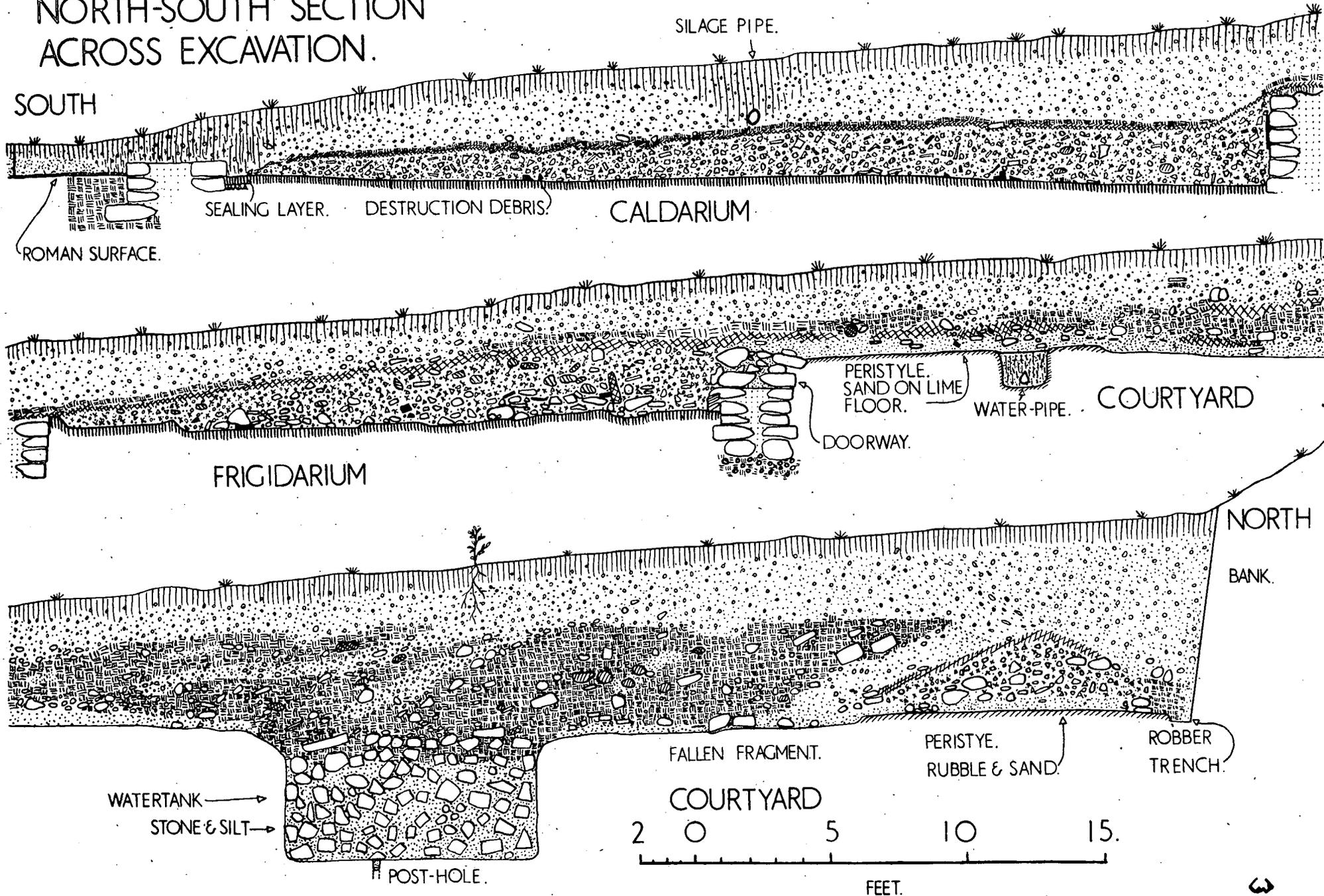


FIG. 3.





## THE EXCAVATION.

## 1. THE PORTICO (I) AND COURTYARD (II).

*(a) Portico.*

The portico ran the length of the western wall of the courtyard, but no attempt had been made to extend it further south to mask the whole western side of the building (plates VI, 1, and VII, 2). It measures 66 feet by  $14\frac{1}{2}$  feet internally and was buried under a varying amount of rubble and gravel (fig. 4).

Its front was defined by a drain and a row of pillar-bases, partly surviving, partly robbed. The two main, cruciform piers opposite the courtyard entrance had escaped complete destruction. The southern of these was 4 feet 9 inches wide by 4 feet 6 inches long below the offset. Above the offset was one course of fine ashlar set back from  $2\frac{1}{2}$  to  $6\frac{1}{2}$  inches. This measured 4 feet 2 inches by 4 feet 9 inches by 1 foot, and still had plaster adhering to it in several places (plate VIII, 1). The north pier measured 4 feet 5 inches by 5 feet  $3\frac{1}{2}$  inches below the offset; but only one block of the next course was *in situ*, and was 7 inches thick and set back from  $3\frac{1}{2}$  inches to 7 inches. It, too, still retained part of its plaster covering. The offset courses of both piers were some 10 inches deep, resting on a solid foundation of stone pitching set in clay.

Midway between the north pier and the north end of the portico was a small stone base, 16 inches square, with a dowel-hole 3 inches square in its top (plate VI, 1). The corresponding feature on the south had been completely removed, leaving only a hole and some foundations to mark its position.

As the excavation advanced southwards it became obvious that the southern limits of the portico had been destroyed; and there was no indication of any wall or respond on the outside face of either the courtyard (II) or

the small yard (XII) suggestive of an end. Here, too, the portico was crossed by the modern silage drain which was carrying a constant flow in a wet summer, and had already been diverted to the maximum possible extent. Therefore the pipe was approached as closely as was possible on the north, and a new trial-hole put in to test for the presence of a south-west corner pillar. This, too, had been removed; but sufficient clay-and-cobble foundation was recovered to indicate its former presence, if not its size (fig. 4).

The north end of the portico was marked by a wall, 3 feet thick and 14 feet 6 inches long, built as a westward continuation of the north wall of the courtyard (plate VII, 2). It was still standing to a height of 3 feet 4 inches, and had most of its southern plaster face intact. Its west end was plain, and examination showed clearly that no pilaster or engaged column had stood against its southern face. Since, however, the wall butted on to the north-west corner of the courtyard, without any bond, careful search was made for a possible earlier corner pillar. The foundations proved to be one consistent mass, with no trace of any such arrangement. A wall would in fact be most necessary, to retain the natural bank of sand and gravel which here rises steeply to the north of the building; and the lack of plaster on the north face of the wall suggests that it was actually built against the bank. The junction of the north wall of the portico and courtyard was badly constructed. The corner of the courtyard wall had been cut into the bank, and was so completely hidden that although it was not properly finished this would not be noticed. When the extension had to be made to the west, rather than rebuild the whole corner, a good face was provided to hide the bad work behind it.

Seven feet six inches from its east end the wall was pierced at floor level by a weep-drain to allow surplus water to escape from the bank. There was, however, no corresponding channel in the porch floor and the water had to make its own way into the eavesdrip drain. This drain was 12 inches wide by 18 inches deep, running from just north

# PLAN OF PORTICO & COURTYARD AS EXCAVATED

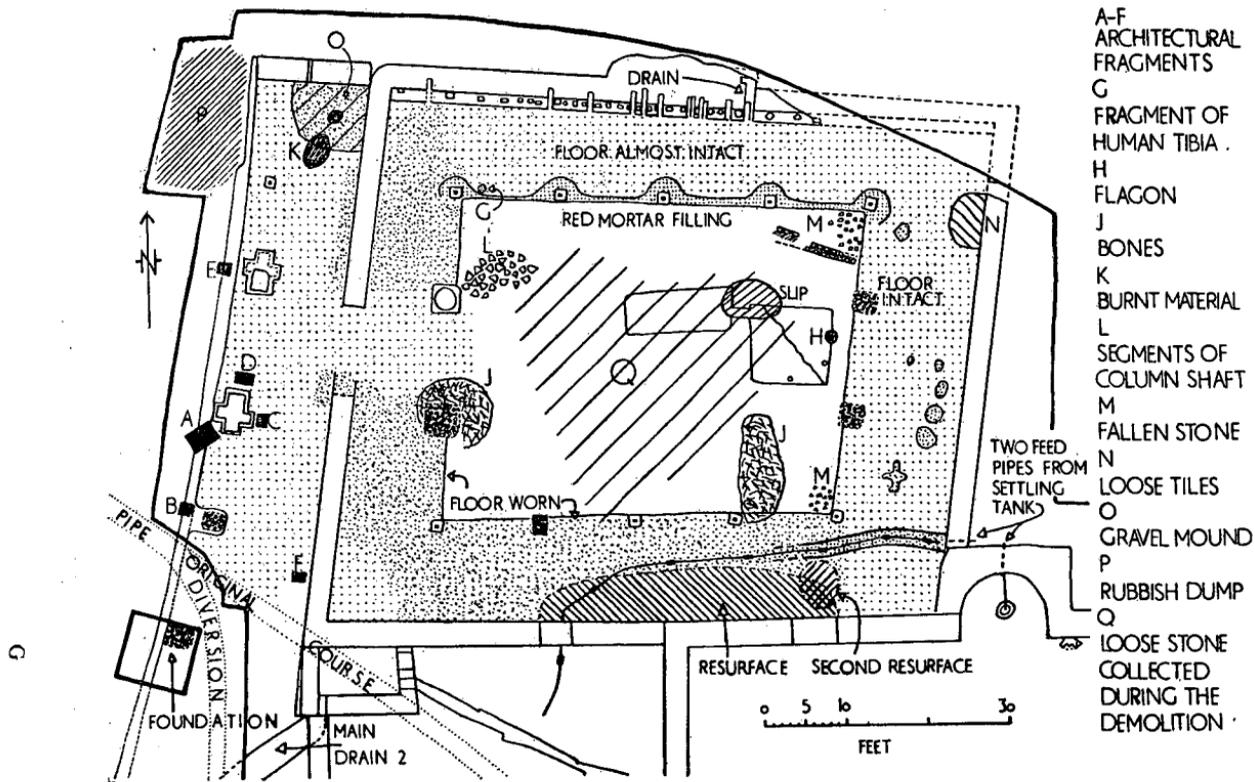


FIG. 4.

of the north wall, along the western edge of the porch, brushing the outer arms of the main piers, and running away to the south (plate VII, 2). As found, it was filled with a mixture of gravel, sand and debris, including broken tiles, food bones and a multitude of iron nails, but its sides of natural gravel were still remarkably clean and straight. Two months' rain showed that they would not have continued perpendicular in antiquity had not the channel originally held guttering of stone or timber. Traces of clay packing still adhering to the gravel sides corroborated this. The gutter itself must have been open for most of its length, although opposite the entrance slabs may have been laid across it. Since the guttering was worth lifting, it was presumably of stone.

The demolition debris in the portico was thickest along the north wall (where it lay on top of a mound of gravel), and between the main piers and the entrance to the courtyard. Here there was much stone and plaster (both loose and still sticking together), bones and nails. Several large building-stones were found (fig. 4):

A. Cornice stone. A corner stone with an external cornice of cymer moulding (fig. 5) 42 inches by 30 inches overall and  $9\frac{1}{4}$  inches thick, retaining no trace of a plaster coating. Found lying against the south-west portion of the south pier. Does not appear in any of the photographs.<sup>22</sup>

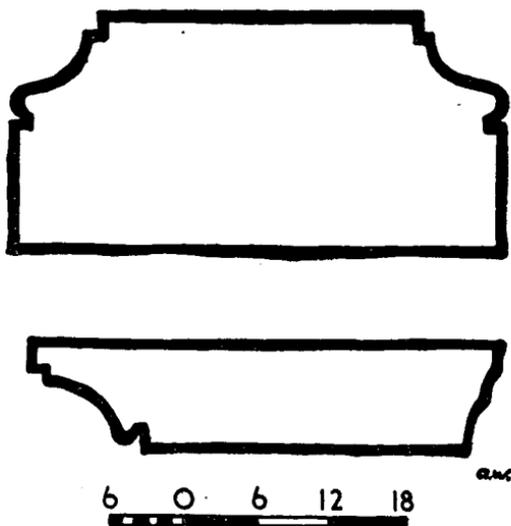
B. The stone appearing on the southern arm of the south pier (plate VIII, 1). Found in the drain where the south interval column should have been. It is 19 inches by  $17\frac{1}{2}$  inches by 1 foot high and worked on three sides. It probably came from a position similar to that in which it is seen.

C. The stone on the east arm of the south pier (plate VIII, 1). It was found immediately to the east of the east arm of the pier and measures  $9\frac{1}{2}$  inches by  $17\frac{1}{2}$  inches by  $7\frac{1}{2}$  inches in thickness. It had been cracked by its fall, but still retained plaster on three of its faces.

<sup>22</sup> Cf. the mouldings from Birrens: Proc. Soc. Ants. Scot. XXX, pl. iv, p. 112.

D. Fragments of a stone badly broken in its fall, but still retaining traces of plaster. Found and left some 14 inches north of the south pier. Its approximate size is 23 inches by 24 inches by 8 inches (plates VI, 1, and VIII, 1).

E. Found beside the north pier. It measures 23 inches by 18 inches by 1 foot in thickness and still has plaster on two of its sides. It was removed from the portico at the end of the first season and does not appear in any photograph.



INCHES.

FIG. 5.

F. A large building stone with only one dressed face, and of different dimensions from the piers.

All of these fragments, except F, were lying in the general debris, on top of a thin layer of clean sand, under which was a spread of gravel and the lime-mortar floor of the porch. It appeared that this gravel had been washed into the porch and a large mound of it lay in the north-eastern corner, separating the demolition debris from an occupation layer underneath it (fig. 4, O). The mound, while homogeneous,

was stratified. It consisted of several layers of which four at least could be counted, while several more merged with one another. As the material was the same as the water-borne gravel filling the eavesdrip, it seemed reasonable that some of the lower layers, and much of the gravel spread generally over the floor, had been washed through the north culvert. Since the mound was highest at its north-west corner, the rest could not have come in from the west, and must be regarded as having spilled over the top of the north wall, showing that the wall cannot have risen anything like so high as the eaves. It was, in fact, a low retaining-wall.

On top of the mound of gravel, amongst the debris, lay a large piece of bronze  $8\frac{1}{2}$  inches by 5 inches in size, as well as fragments of bone, nails, pottery and glass. The bronze represents the remains of scrap metal carried out to the portico before cartage away from the site. Amongst the gravel were a few fragments of pottery and a certain amount of tile, broken into small, rounded fragments as if it had been well weathered. Under the gravel there were two areas of burning (one extending beyond it to the south; fig. 4, K), some fragments of pottery and a patch of lead waste. The lead was spilt while molten, for it had stones sticking to it and embedded in it. The metal was obviously being worked, either during the construction of the building, or, more probably, for a repair to flashing or the like.

Very little trace was left of the east wall of the portico and only one jamb of the doorway into the courtyard remained. But it was clear that the wall had been plastered, and also that the principal responds of the main piers were aligned with the jambs of the doorway.

The Roman ground level outside the drain had sloped upwards as it continued west; and here, opposite the north half of the portico, a considerable amount of rubbish had been dumped (fig. 4, P), consisting of bones, charcoal, pottery, a few fragments of glass, and tiles, many of which resembled building tiles rather than *tegulae*. The area appears to be a

refuse tip from the building, comparing very closely with the rubbish in the small yard (XI). The tipping of such remains immediately outside a building is not exceptional, the Roman army could be as squalid as modern Mediterranean peasants if allowed.

(b) *Courtyard.*

The courtyard was the largest single part of the building, measuring 75 feet by 60 feet internally, with a 10 to 14 foot wide peristyle running round its sides, but either because of the bank, or through bad surveying, it was neither truly aligned to the rest of the building, nor regular in its shape (plate VI, 1). The pent-house roof of the peristyle had been supported by fourteen columns arranged five-a-side to the north and south, with two filling the gap at each end. The bases to the north and south were the same size as the interval columns in the porch, but the centre pair at each end had been larger and more elaborate. The two at the east had been removed, but one base remained on the west (plate XI, 1; fig. 5), showing that the outside piers of the porch had been matched by two columns on the inside of the courtyard.

When found, the whole area was covered to a depth varying from 4 to 8 feet, with a mixture of rubble, sand, clay and gravel (fig. 3). Most of the rubble lay close to the walls, and under it and stretching across the whole floor was a thin layer of sand, considerably disturbed in places, but remaining as a clear division between floor and rubble in the vicinity of the peristyle.

The west wall had been thoroughly robbed and little of it remained. It was built solidly the full length of the courtyard, and carried across the entrance as a sleeper-wall of two courses and an offset. Although only the north jamb of the doorway remained, the rough impression of the southern jamb showed where it had been, giving an entrance 11 feet wide.

The north wall was the most interesting (plate VIII, 2).

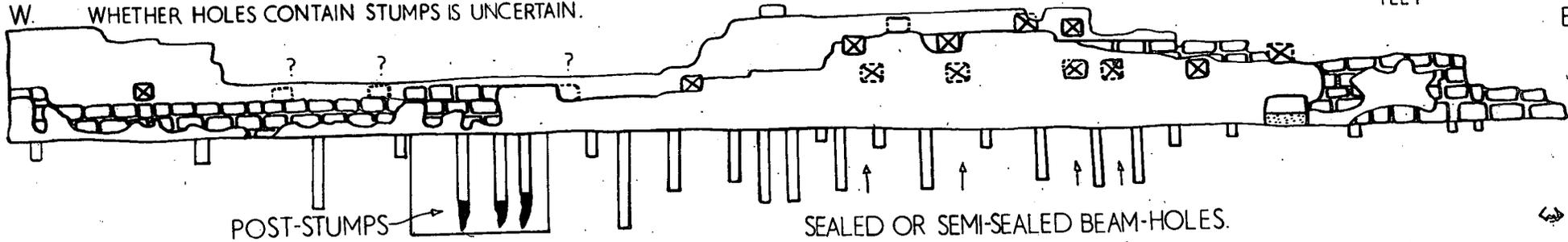
Fifty-four and a half feet of it were recovered, working from the west end. Then stone-robbers had removed it completely, and an oak tree of great size prevented working any further east. It is thus impossible to say how much of the wall remained beyond the disturbance. At highest the wall stood just over 4 feet, and some 28 feet of its length still retained its plaster coating. Originally the wall had been 3 feet in thickness and was carried down 2 feet below the courtyard surface on to a solid clay and cobble foundation with an offset on its north face. The bank side had here been cut back for some distance to provide a level area for the courtyard and much of the north face of the wall was therefore covered. In order to keep the wall dry and to drain the area behind it a large amount of loose stone and rubble had been packed behind the central portion of the wall, held together by a minimum of mortar; and at this point the north side of the wall was not faced. A weep-drain 12 inches by 4 inches in width had been built through the wall 44 feet from its western end to run off the water from the loose packing. When found this drain was half choked with clean sand of the sort covering the courtyard floor.

The pressure of the bank behind the wall must soon have exerted itself for the wall began to topple over and to belly inwards; part of it may even have collapsed. In order to remedy this, a series of strong vertical oaken posts was driven into the earth against the south face of the wall, holding back its top (fig. 7). There were twenty-seven such post holes in the surviving portion of the wall, of which only seven were in the first 20 feet, the majority coming where the bulge was most pronounced. Three of these were excavated and still retained the points of their posts, driven into the ground to a depth of 3 feet 9 inches to 4 feet 3 inches.<sup>25</sup> Figure 6a shows the depth to which ranging poles could probe each of the other holes. Whether they were then encountering stumps or sizeable pieces of post, as in the three excavated, is not known, although there is a high probability that wood

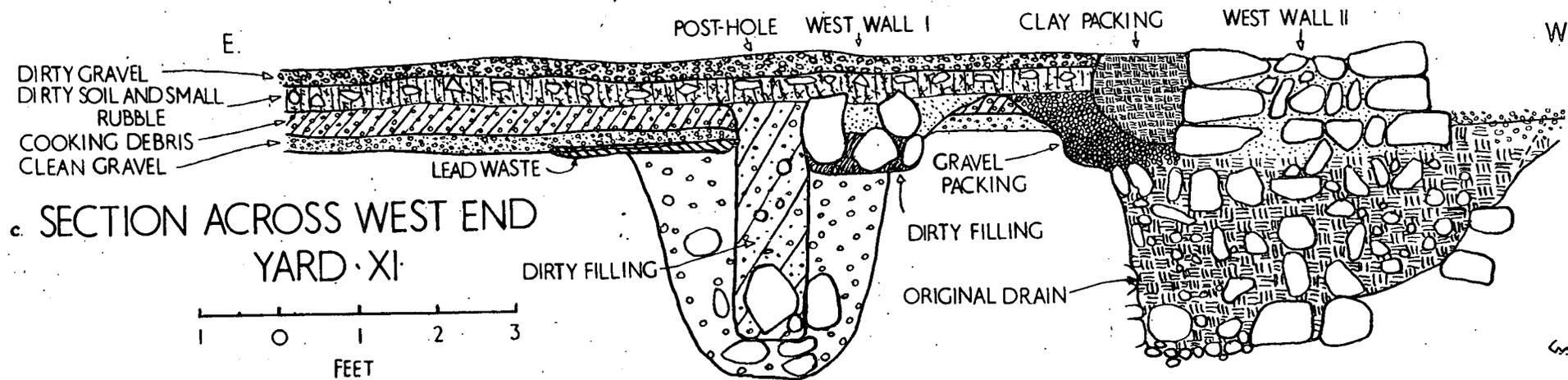
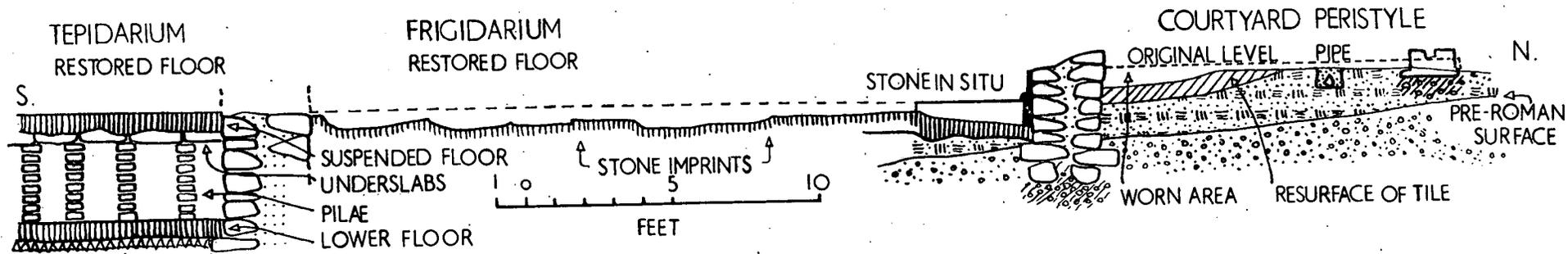
<sup>25</sup> See Appendix V, 12.

a. ELEVATION OF NORTH WALL OF COURTYARD

W. WHETHER HOLES CONTAIN STUMPS IS UNCERTAIN.



b. RESTORED SECTION ACROSS ROOMS II·III·IV



c. SECTION ACROSS WEST END YARD XI

FIG. 6.



remained in every hole. In order to mask these posts a new face 15 inches thick had been added to the old wall, but merely rested on the peristyle floor (fig. 7). The posts must have been relied upon to do the retaining, the new face being intended to give unity of design. To tie the old and new walling together a series of horizontal beams ran through from the new face into the old wall, penetrating it to a depth of about 18 inches. Twelve of these were found for certainty and possibly another four, the majority being placed in two rows where the bulge was worst. The wall had then been plastered, and when found the plaster still completely covered two beam-holes and partly covered two more, though none of the wood remained (fig. 6a). This treatment seems to have been successful in retaining the bank, for only a slight belly was visible on the new face (plate VIII, 2).

Like the northern wall, the eastern could not be completely excavated. The robbers' trench cut across it at a distance of from 51 feet to 55 feet from its southern end, but the excavation could only advance a yard further north before the oak tree brought it to a stop. However, enough was recovered to show that the courses were rising again and the corner probably remained. The wall was 3 feet thick, on a clay and cobble foundation, and still had several quite sizeable patches of plaster on it. Its maximum height was just over 4 feet, but on the side facing the court the face remained only up to half this height (plate VIII, 3). On the outside the facing stones continued the full height, but were roughly laid and had never been covered with plaster: clearly the wall had been built against the natural bank.

The side wall of the alcove in the coldroom (IIIb) formed the southern  $8\frac{3}{4}$  feet of this wall. The join was badly constructed and not bonded, for the external angle of the alcove back was not squarely built, and to attain a level face the wall of the courtyard had to project some inches at the junction.

The southern wall was 73 feet 3 inches long and 3 feet wide. It had been built in two sections: that which formed

the north wall of room III, and that which formed the north wall of rooms XI/XII. The first portion was solidly built, with a 15-inch offset, and an ample clay and cobble foundation. At  $12\frac{3}{4}$  feet from the south-east corner was the doorway to room III; at 35 feet the join in the two portions of the wall. There had been no attempt to bond the walls and the western had a much shallower foundation.

Nine and a half feet from the join was a 4-foot doorway into the small yard (XI). Four courses of stone and a solid clay and cobble foundation were carried across the doorway as a sleeper-wall, but the lower three courses had been breached for a lead pipe to cross from one yard into the other. To make both threshold and pipe secure a mass of gravel and mortar had been rammed firmly into this gap and allowed to set hard. Both this western portion of the wall and the original face of the north wall were heavily trowel pointed.<sup>26</sup>

The peristyle walk ran round the four sides of the courtyard. Its original surface, raised some 6 inches above the central gravelled area, had been of white lime-mortar resting on a red or yellow make-up of sand, tile and lime. The best remaining portion was in the south-eastern corner, but most of the east, and half of the north side were well covered, and a few traces remained in the north and south-western corners. The south side, by and large, was worn bare, but the manner of construction was visible on the north walk where the edge was best preserved. The clay subsoil had been cut back wherever a pillar base was to come; the base was given a clay and cobble foundation and the floor of red mortar brought right up to it; over this the lime finish was laid (fig. 4). The space between the two doors in the southern wall was extremely worn. At some time the depression had been filled with a mixture of broken tile and sandy gravel, in which a few fragments of pottery were found, but this too had suffered considerable wear. A section cut to the bottom of the south wall showed not only the tile filling, but also

<sup>26</sup> For trowel pointing see Inchtuthil, p. 228.

that clay and gravel had been dumped on top of the original surface so that the courtyard would be level (figs. 4 and 6b).

The most interesting discovery was the main water pipe. This ran from the join in the east wall, along the south side of the walk, underneath the doorway to room XI, and ended on the edge of the main drain: 60 feet 9 inches in all (plates IX, 2, and X, 1; fig. 4). The pipe was of purified lead<sup>27</sup> in 10-foot lengths united by large box joints; unfortunately it was unstamped. The trench in which it had been laid had become indistinct where the wear had been hardest, but close to the east wall, where the lime surface remained intact, it was quite clear that the pipe had been laid in a prepared trench, with mortar sides and bottom. It had then been covered with a mixture of sand, lime and soil. At the east wall the pipe had run perpendicularly up the face of the wall cutting through it at a height approaching external ground level (plate X, 1). This upper portion of the pipe had been torn off, but no attempt had been made to remove the rest although its trench was unmistakable.

At the entrance a low ramp between the two main pillars sloped downwards into the courtyard. On the eastern side the walk was marked in several places by the fall of heavy fragments of stone, and also where the pipe-trench cut it (plate VIII, 3).

The courtyard itself was unoccupied except for a pair of water tanks lying a little north of its long axis at the east end (plate IX, 1). The larger and easternmost was  $9\frac{1}{2}$  feet square by  $4\frac{1}{2}$  feet deep. Its north-western half had been deepened almost another foot in haphazard fashion. Two thirds of the distance south along the east side a post hole ran into the bottom of the tank, and there was another in the middle of the southern side.<sup>28</sup> The clay sides of the tank would have needed revetment and these two holes must be the remains of posts once holding a wooden frame, which

<sup>27</sup> See Appendix I.

<sup>28</sup> The remains of wooden corner-posts were found in the reservoir for the bath house at Bar Hill. They had probably supported a timber roof. Bar Hill, p. 448.

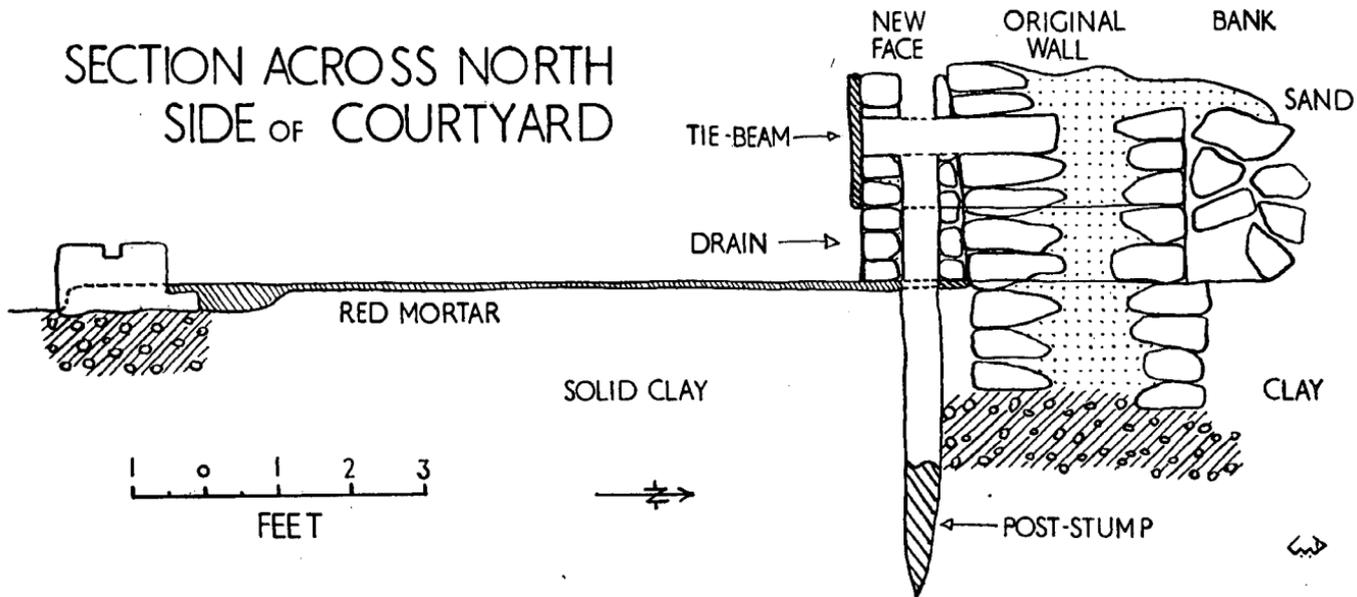
would have served adequately in the impervious clay. The smaller tank was only 1 foot deep and 13 feet by 6 feet in plan. Its sides were not always easy to define as it was full of clay scarcely distinguishable from the natural subsoil. A slip had occurred where the two tanks were closest, and joined them; but in their original state they must have been separate. Whether the more easterly had been covered or not is uncertain, but it must have been used as a dipping tank, for there was no outlet. The shallower, western tank was opposite the drain in the north wall, and it was noticed that during rain it collected most of the water from the north and west sides of the courtyard, letting it run thence into the larger tank. In its original state it would have served admirably as a filter tank, the slip having occurred where the connecting channel had been.

Both tanks had been stripped of their lining in the demolition, and the larger had become filled with loose stone, which had gradually been covered, first by grey silt and then by a sandy deposit. During the demolition a flagon of late first-century date<sup>29</sup> had been smashed against the side of the tank on its eastern lip, so that its fragments lay both on the actual lip and amongst the filling of the tank, thus sealed by and sealing the demolition rubble (fig. 4, H). Also in the tank filling, slightly higher than the flagon, was a worn *dupondius* of Vespasian (71-79).<sup>30</sup>

The columns of the peristyle have already been mentioned. The northern row of five was on the same line as the interval column-base in the porch, and the bases were of the same size. The second base from the west of the southern row was missing, but its foundation remained. Owing to the irregular shape of the courtyard, the alignment of none of the pillars was true. The two central bases of the eastern end had gone without a trace, but a solid foundation of clay and cobble, topped with cobbles set in hard, red mortar, remained in each case (plate IX, 1). The foundations were greatly superior to those for the north and south rows, but

<sup>29</sup> See Pottery Report; fig. 21, 12.

<sup>30</sup> Small finds, 1.



smaller in size than those of the western columns,<sup>31</sup> so that supports of an intermediate size will have stood there, opposite the main pair. The columns on the western side had been imposing. The surviving base consisted of a plinth 40 inches square, and a simple moulding of Tuscan or Doric order carrying a column 26 inches in diameter (plate XI, 1; fig. 5). The column itself had been built of separate small stones; a considerable portion of it had been toppled over to the north-east and left where it had fallen (fig. 4, L). The fragments were of cracked and broken tile and stone, varying from 1 inch to 4 inches in thickness, and portions of its 3-inch mortar and plaster coating. This form of composition is by no means uncommon.<sup>32</sup>

In the vicinity of the second column from the east in the southern range, and the southern of the two main columns, the sand covering the floor was thickly strewn with two large patches of broken and split food bones, deposited in their thousands (plate X, 2; fig. 4, J). The western patch was lying partly over the hole left by the missing pillar base, both covering and covered by demolition rubble, but where the bones originated or what they signified remains unsolved. Similarly the eastern patch was lying on top of the sandy layer, and covered several fragments of tile fallen from the roof of the peristyle.

One other fragment of interest was found, lying between the water tanks and the north-eastern corner pillar (fig. 4, M). It rested on the clean sand, having fallen heavily enough to impress one of its corners into the courtyard surface, and consisted of a single course of thin wall (11 feet long by approximately 1½ feet thick), plastered on its southern face.

In the central portion of the floor a large number of facing stones had been collected, as if the courtyard had been used as a dump for material during the demolition (fig. 4, Q).

<sup>31</sup> East: 36 inches square; West: 48 inches+ square.

<sup>32</sup> An illustrated example is: *Stempel-Namen römischer Töpfer von meinem Ausgrabungen in Rheinzabern* 1901-5, p. 159; and two of the pillars of the east granary portico at Corbridge are similar; AA<sup>3</sup>, VI, 204 and 210.

There was a smaller amount of broken tile lying about, either in piles or in smaller, broken pieces. One pile of square *pila* tiles lay against the north end of the east wall (plate VIII, 3; fig. 4, N), while many fragments of box tiles and water pipes lay scattered about, along with a few fragments of *tegulae* and *imbrices* from the roof of the building.

## 2. THE FRIGIDARIUM (III).

The *Frigidarium* (plate XII, 1) measured 46 feet by  $24\frac{1}{2}$  feet in size, exclusive of the *labrum* recess (IIIb) and the eastern annexe (IIIc). Its floor was approximately 12 inches lower than that of the courtyard (fig. 6b), and when found was covered by rubble, varying from 4 inches over the southern wall to 30 inches against the north (fig. 3).

The north wall was pierced by the recess for the *labrum* and the doorway to the courtyard (II). The doorway was 5 feet 8 inches wide and had a step on its southern side. It was built in the normal fashion with the lower courses of the wall carried beneath the threshold. On top of this one course of loose stone was laid to adjust the height, and the final coating of *opus signinum* served both to bond it to the rest and to render the whole with a hard, smooth surface (plate XI, 2). Few traces of the rendering remained on the threshold itself, but the width of the southern step was indicated by the broken edges of the *opus signinum* face on the *frigidarium* wall. This coating was still intact on most of the north wall rising to a maximum of  $2\frac{1}{2}$  feet above the one-time floor level. Although the floor-stones had been removed, except for a few in the north-east corner of the room, the  $\frac{1}{2}$ -inch quarter-round moulding which had sealed the gap between them and the wall still ran for some distance, before the pick-marks of the demolition squad showed where it had been broken away to enable the floor-stones to be lifted more easily (plate XIII, 1).

The south wall had been demolished thoroughly and

stood no higher than the mortar make-up of the floor, but investigation showed that its north face was carried downwards for several courses below this.

The west wall, too, had been well robbed, both where free-standing and where masked by the cold bath; its average height was hardly above 15 inches. Seven and three-quarter feet from its southern end it was pierced by the main drain. The northern 14 feet of the wall were masked by the cold bath (IIIa; plate XIII, 3). This measured 11 feet 9 inches by 7 feet 1 inch, internally, and was an unbonded insertion into the room (plate XIV, 2). Its construction, however, was clearly contemporary; its foundations were identical with those of the room; there was no trace at all of any other or previous structure; and the west wall of the room had been built with an offset to take the bath floor.<sup>34</sup> The main approach was from the east by means of three steps, the top one forming the side of the bath. Robbing had removed the details of the two upper steps, but the outline of the lowest remained in the *opus-signinum* rendering of the north wall (plate XV, 1). It had been 12 inches wide and 11 inches high—the same size as the step to the annexe, which balanced it across the room. On the inside two steps led down to the floor (plate XIV, 2).<sup>35</sup> Their treads were just over 12 inches wide and a few traces of *opus signinum* on their risers showed how the whole had originally been faced. The southern side was worse robbed than the east and only the two inner steps remained.

The floor of the bath was 9 inches thick and consisted of a coarse mortar compounded of large fragments of red and blue tile, small gravel, and lime, which had been worked to a smooth surface. A shallow offset had been built out from the west wall of the room to support the floor; under the floor was a rough packing of stones 6 inches deep. It was impossible to tell where the inlet had been: certainly no branch ran from the pipe in the courtyard, and when a nozzle and

<sup>34</sup> The cold bath at Wroxeter is also put into an existing wall framework. Wroxeter Report, p. 33.

<sup>35</sup> As in Würzburg.

loose lengths were found their position suggested that the feed had been on the west side.<sup>36</sup> The outlet was clear to see, 13 inches from the western end of the south wall. It was 9 inches wide and slightly lower than the bath floor, and its sides were still smoothly finished, leaving it uncertain whether they themselves had formed the orifice or were merely the casing for a pipe.

In the centre of the floor of the bath a rough hole was found, hacked through to the pitched foundations (plate XIII, 3). As there was no useful reason for this, one suspects that an order had been issued to the demolition squads to break up and remove all red mortar floors and collect the tiles of the *pilae* below them.<sup>37</sup> One of the squads had chosen this floor, also of red mortar, and had picked the hole which revealed that it covered no hypocaust, but a solid foundation, and caused them to work no further.

At the east end of the room, balancing the cold bath, was a small annexe (IIIc), 13 feet by 11 feet internally (plate XII, 2). Its floor was over a foot higher than that of the *frigidarium*, and its entrance doorway, 10½ feet wide, was approached by a 12-inch step similar to the lowest step of the cold bath.<sup>38</sup> Fortunately the greater part of this step, and threshold, had escaped serious damage, although there had been an attempt to remove the step in order to lift the flagstones underneath it (plate XIV, 1 and 3). One useful result of this attempted removal was that it revealed the manner of construction: the floor had been laid, and over it the step had been built, unbonded to either threshold or north wall; then the whole had been faced with a rendering of *opus signinum*. The southern door jamb was almost completely demolished, but the northern was still faced to a height of 12 inches. It is unlikely that there had ever been a frame in the doorway.

The annexe floor was level with its threshold, 15 inches

<sup>36</sup> See the small yard (XI) below.

<sup>37</sup> As was the treatment of rooms IV, VI and IX.

<sup>38</sup> Cf. the step shown in pl. LXXIX of the Silchester report.

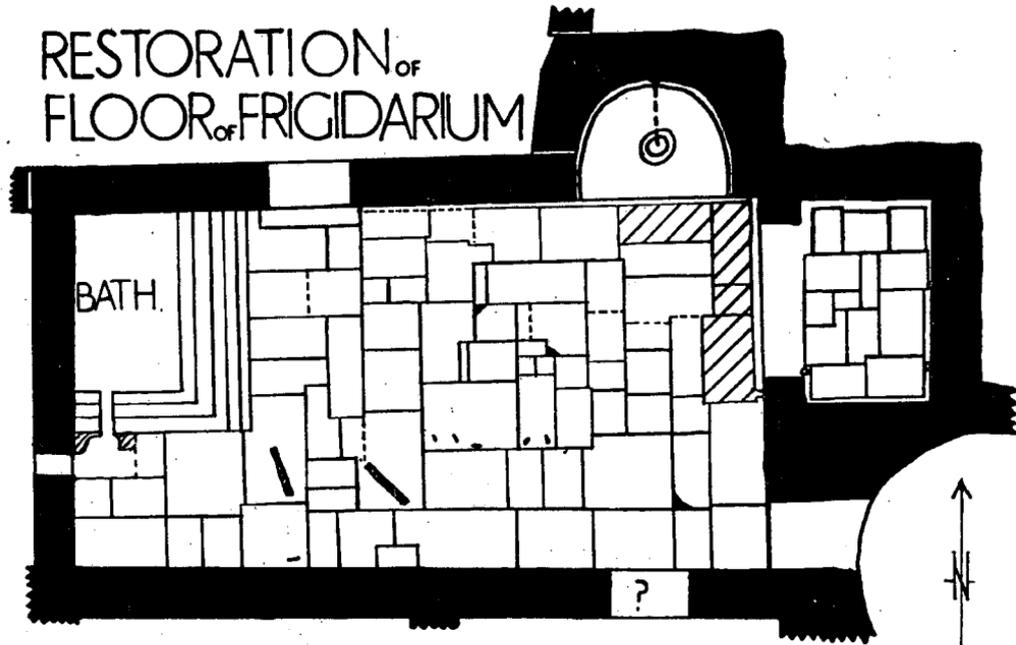
above the floor of the *frigidarium*, and had once been paved with stone flags (fig. 8), all of which had been removed in demolition (plate XII, 2). The walls were almost completely robbed, but their foundations survived, revealing a solid, mortared mass of large, roughly-dressed stone, extending some 3 feet outwards and 2 feet downwards from the bottom course of the wall; which type of foundation was also used in room IX. Two small holes, 3 inches by  $1\frac{1}{2}$  inches, were found in the floor of the room 2 feet from the south wall and  $8\frac{1}{2}$  feet apart (fig. 8). As the more easterly was half covered with mortar it seemed to date from the construction, rather than the occupation, of the building, but the more westerly clearly pierced the *opus signinum* of the floor. It is tempting to disregard the fragments of mortar sticking to the eastern hole, and, small as the holes are, to interpret them as the post holes for some piece of furniture in the annexe.

The use of the annexe is by no means certain. It has already been suggested that it may have served the task of an *apodyterium*, alternatively it may have been the place where the bathers oiled their bodies, or where oil and dirt were scraped from the skin.

In the southern half of the eastern wall of the *frigidarium* there had been a second door, connecting with the *laconicum* (IX). Whereas the doorway previously described had survived, this one was almost completely destroyed and only the actual threshold of the room remained, 30 inches above, and recessed some 5 feet back from, the edge of the cold-room's floor. Steps must have been demolished.

The final major architectural feature was the alcove and its *labrum*, or basin (IIIb), situated in the north-eastern corner of the room (plates XII, 1, XIII, 2 and XV, 2). The whole was a rectangular projection extending  $8\frac{1}{2}$  feet from the north face of the wall, and  $16\frac{1}{2}$  feet in external width. Internally it was apsidal, 11 feet 3 inches wide and 8 feet deep, in plan a stilted semicircle, opening directly into the cold-room, but raised 12 inches above its flagged floor. Its survival is due to the fact that it was recessed into the bank

# RESTORATION OF FLOOR OF FRIGIDARIUM



H

IMPRINT OF WOOD & CORNERS  
STILL EMBEDDED IN MORTAR SHOWN  
IN BLACK

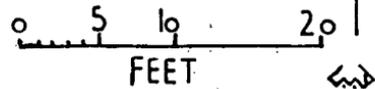


FIG. 8.

behind it, and became choked with rubble early in the demolition; rather than clear this rubble to strip the walls further the demolition squad had left it. The wall remained to a maximum height of 4 feet and its rendering, almost intact, was divided into two portions by a dado or splash-band 25 inches above the floor. The lower part was plain *opus signinum*, the upper white plaster, and the dividing band a  $3\frac{3}{4}$ -inch thick line of dark-blue paint (plate XIII, 2). A sufficient number of fragments of white plaster or blue paint were recovered to show that this treatment was common to the whole *frigidarium*, but this was the only place where the wall survived to a sufficient height to preserve it.

The coating of the wall had been applied in four layers, giving a considerable thickness: first was a rough rendering of white mortar ( $\frac{3}{10}$  inch thick), which had been trowel pointed; on top of this were two thick coats, the first ( $\frac{2}{3}$  inch thick) of reddish and the second ( $\frac{1}{2}$  inch thick) of whiter mortar, both soft and with an amount of small, black river-gravel in their aggregate; and finally came a hard, white plaster coating ( $\frac{2}{3}$  inch thick) over the upper portion of the wall and a coat of even harder *opus signinum* ( $\frac{2}{3}$  inch thick) over the lower worked to a smooth surface. The blue band was painted over the join.<sup>39</sup>

Before the upper coats of plaster had been applied the water pipe for the *labrum* had been inserted. The point at which it had come in through the wall had gone, but it had run down the wall face and across the floor. As it had been torn out during the demolition one cannot say whether it had been covered with plaster or not, but it seems likely that it and the pipe found in the courtyard joined outside the building, for they both entered the building in a similar fashion within a yard or two of each other.<sup>40</sup>

Water seeping over the northern wall of the recess, since the destruction, had washed an amount of lime out of the

<sup>39</sup> Amongst other examples of painted, or coloured plaster, mostly more elaborate: Gellygaer, Inchtuthil, Carvoran (Proc. Soc. Ants. Newcastle, 4, IX, 212), Middleham (JRS, LXVII, 208).

<sup>40</sup> Water supply, see fig. 19 and section 6 below.

plaster and deposited it upon the *opus signinum*, where it had formed a hard coating akin in nature to a stalagmitic deposit.

In the centre of the recess was the *labrum* pedestal, almost circular but slightly flattened to an elliptical plan (plate XVIII, 3; fig. 9). It consisted of a column, composed of small segments ( $6\frac{1}{2}$  inches by  $6\frac{1}{2}$  inches) bonded together with red mortar, and sealed round its base with a quarter-round moulding  $3\frac{1}{4}$  inches in size. A few, very slight traces of black or dark-blue paint adhered to the moulding, but it was not possible to say whether the whole shaft had been painted or not. The lead water pipe had originally run up the centre of the pedestal, but had been torn away where it emerged from the floor, and was so battered that its bore could not be measured. Since only  $9\frac{1}{2}$  inches of the pedestal remained, there was no indication of its original height, but, if the basin was to be used with comfort, between 3 and 4 feet would be most satisfactory.<sup>41</sup>

The basin itself had been pushed off the pedestal and lay broken, half in and half out of the recess (plate XV, 2; fig. 9). Three-quarters of it remained in all, two pieces lying on the step and one lying on the bedding of the flagging further south, and stained black.<sup>42</sup> It had been carved from a single block of freestone and measured 5 feet in diameter and approximately 9 inches deep, with a simple everted rim and a raised centre, pierced for the water pipe. Its concentric depression measured  $3\frac{3}{8}$  inches at most. Either its great weight or breakage in removal was responsible for its being abandoned. There seems to be no parallel to this particular form of alcove, although there are parallels to the basin itself in the *frigidaria* of both Civil and Military bath houses.<sup>43</sup>

<sup>41</sup>  $\pm 3$  feet 6 inches is the usual height of those in Pompeii and Herculaneum.

<sup>42</sup> All the stains found seem to be iron, whether black or yellow; see Appendix VI.

<sup>43</sup> A free-standing basin 5 feet across and 17 inches deep is recorded at Chesters, although it has now vanished, and the apse in the coldroom at Inchtuthil may signify a similar feature, although it had no trace of a basin in it. In civil buildings: Silchester (5 feet by 3 inches), sunk into the floor, and Wroxeter, by implication. Cf. Pliny (Letters, II, 17) who mentions "... duo baptisteria ..." in his Laurentium villa.

Basins also occur in the apsidal projections of the *caldaria* of both Civil and Military bath houses;<sup>44</sup> in particular it seems likely that one of the opposed apses in the *Reihentyp* of military bath house held a basin.<sup>45</sup>

The floor of the *frigidarium* had been of freestone flags (fig. 8), some of considerable thickness.<sup>46</sup> The pattern was not a regular one, but the fitting together of squared slabs of different sizes was common enough in Roman floors.<sup>47</sup>

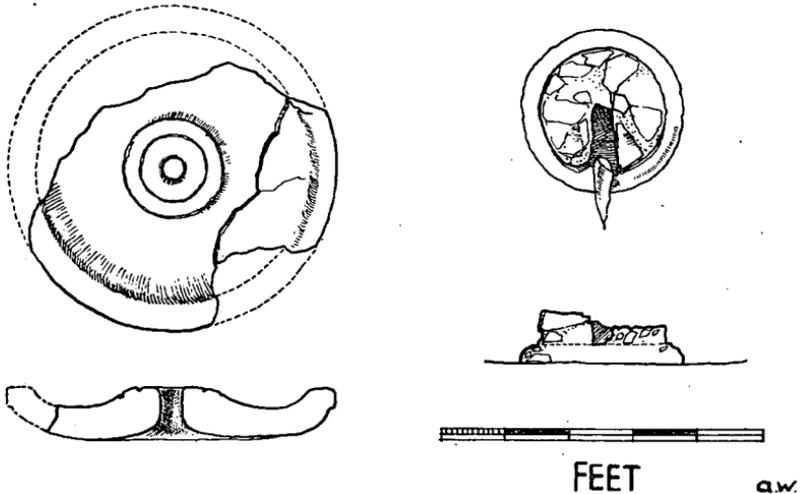


FIG. 9. PLAN AND SECTION OF BASIN AND PEDESTAL.

Four stones, the largest of which measured 4 feet by 6½ feet, remain *in situ* in the north-eastern corner of the room, one was pinned by the *labrum*, and the others by the step to the annexe. The most southerly of these had been badly broken in an unsuccessful attempt to remove it, but the rest were undamaged, although iron-stained. Fragments from two further stones, 21 inches by 10 inches by 5½ inches deep, and 13 inches by 15 inches by 6 inches deep, were found and

<sup>44</sup> Civil: Stabian and Forum Baths, Pompeii; and Wroxeter.

<sup>45</sup> *Reihentyp*, see note 10 above.

<sup>46</sup> Stone floors cf. Gellygaer, Balmuildy (annexe bath house), Inchtuthil and Caerleon.

<sup>47</sup> A fine example is the floor of the "Basilica" in Hadrian's Villa, Tivoli.

several broken corners remained in the mortar bedding. The under-sides of the flagstones were uneven in their thickness and consequently their imprints left in the mortar bedding varied greatly in depth. Several fragments of wood were imbedded in the mortar<sup>48</sup> and the imprints of at least two planks remained (fig. 8). The sight of the entire floor as left by the demolition squads presented a remarkable spectacle (plate XII, 1).

There were traces of a moulding between floor and wall along the north side of the room (plate XIII, 1), but this was not carried across the step on the east side, and whether it continued on the uninterrupted portions of the south and west walls is not known, though likely. The only drain in the room was that in the west wall, into which the cold bath emptied. The flagged floor must, therefore, either have sloped towards the west or have had at least one channel in it carrying the water from the *labrum* away in that direction.

### 3.—THE LACONICUM (IX) AND ITS PRAEFURNIUM (X).

#### (a) *The Laconicum.*

The *laconicum* was entered from the *frigidarium* (III) by a passage through the thickness of two walls, containing a doorway, the southern jamb of which was slightly recessed into the south wall of room III. Of the doorway the actual threshold and the north jamb alone remained, and although there was no trace of a wooden frame, some form of door most probably separated the two rooms, such as those recovered in such remarkable condition in the excavation of the newly found bath house at Herculaneum.

The *laconicum* was 20 feet in diameter and roughly circular. It had, however, been built by troops more skilled in basic essentials than the finer points of construction. Like the other heated rooms it had been robbed to external ground level, by which time the interior had become so

<sup>48</sup> Appendix V, 10.

choked with debris that the lower courses of the walls were left. Many fragments of the suspended floor survived, possibly because the roof collapsed before the work was complete.

The undisturbed gravel which covered the room was between  $2\frac{1}{2}$  feet and  $4\frac{1}{2}$  feet deep, and lay on a thick deposit of clay, which had gradually built up over the rubble. The 3 to 5 feet of rubble and debris which covered the basement floor comprised wall core, plaster, a few facing-stones, tiles and fragments of the hard upper floor. During the excavation the debris was removed, the portions of floor and tile were photographed where they lay, and finally only those *pilae* which were in position were left and recorded (plate XVI, 1 and 2).

The wall of the room survived to a height of  $5\frac{1}{2}$  feet above the basement floor, showing clearly where the suspended floor had come, at a height of 28 to 30 inches (plate XVII, 1). The plaster coating of the room had survived and compared favourably with that in the *frigidarium*, already described. Here, however, it was white in colour right down to the floor. The white face was applied as a final coat to several layers of rougher mortar, some 2 to 3 inches in total thickness. The precise number of coats was indeterminate, but at least two of them had been applied before the upper floor was laid, for the second was of a brown colour and had run down into the hypocaust before setting. This occurrence is noted elsewhere.<sup>49</sup>

The suspended floor could be restored with certainty. The fragments still remaining were between 5 inches and 9 inches thick, consisting of a coarse mortar-and-tile aggregate, surfaced with hard, reddish lime. Their undersides were imprinted by the stone slates and the tiles used as the under slabs, several of which were found in the debris. At maximum the total thickness of the suspended floor was almost 12 inches, at minimum about 8 inches. The *pilae*

<sup>49</sup> Sometimes basements are in fact rendered with mortar, as at Chedworth and Bath.

would, then, be between 18 inches and 22 inches in height.<sup>50</sup> They were built of tiles 7 inches square by 2 inches in thickness, although one or two were standing on broken tiles originally larger than this. Clay had been used to bond the tiles together, and there were several places where hard patches of it still stuck to the floor, marking the positions of dismantled *pilae* (plate XVI, 2).<sup>51</sup>

The basement floor was made of the same coarse mortar as the upper, but without the refined surface. It rested on a stone pitched foundation below which was solid clay.

In order to draw the hot air into the heating space, four chimneys were built into the wall at points where it stood free from the other walls of the bath house. These chimneys were vertical flues inclined slightly towards the outer face of the wall so that they would pierce it some distance below the level of the domed roof. The hot air entered them by way of four short ducts through the facing of the wall, placed immediately below the level of the suspended floor. The chimneys were made from earthenware pipes,<sup>52</sup> each one 17 inches high and tapered at the neck so as to fit into the base of the pipe above it (*tubulus lingulatus*; see plates XVII, 2, and XVIII, 4; fig. 14; Appendix IV). They were solely chimneys and in no sense intended to serve as jacketting for the inner surface of the wall.

The wall itself was 36 to 40 inches in thickness with a grouted mortar core; its outer, eastern, face still retained traces of trowel pointing. The foundations were equally solid; that on the north consisted of a mass of large, worked stones loosely mortared together, as already described under room IIIc; that to the south consisted of four offset courses resting on two layers of rough stone and a solid clay and gravel base.

<sup>50</sup> " . . . altitudinem autem pilae habeant pedes duo." Vitruvius, V x 2. Cf. Stockstadt *Laconicum*, 1 foot 9 inches; although Mumrills is 2 feet 6 inches and Neckarburken is 3 feet 6 inches.

<sup>51</sup> Some of the spacing in this was rather greater than would fit Vitruvius: "*uti bipedales tegulae possint supra esse conlocatae*" (loc. cit.).

<sup>52</sup> Fragments of almost identical pipe were found at Tassiesholm, and complete pipes, though slightly different, were found at Balmuldy and Newstead.

(b) *Stokehole and praefurnium.*

The stokehole pierced the southern wall of the *laconicum* at basement floor level (plate XVII, 1), the size of the gap in the stone wall being 5 feet. The furnace itself was a small box-like construction (fig. 10) 7 feet by 7½ feet at maximum, built upon the bare subsoil. It had a stone foundation and outer face, forming a shell, inside which there was a pack of

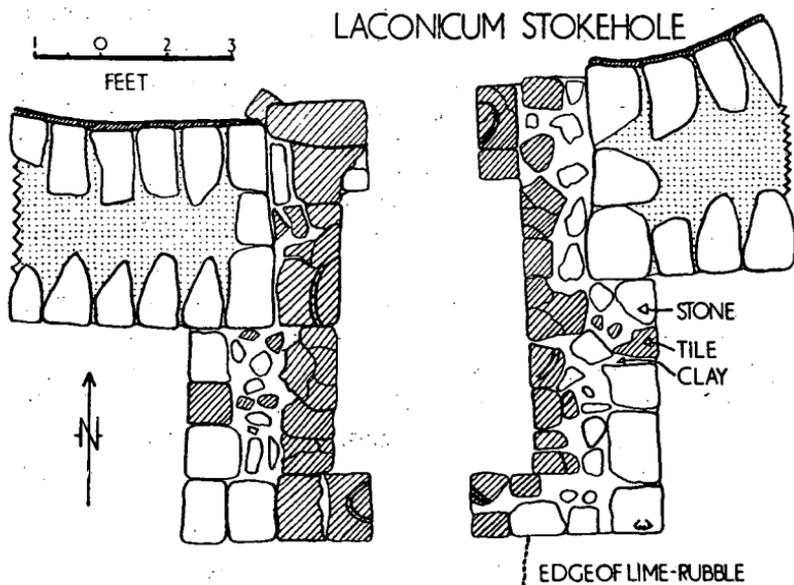


FIG. 10.

tile and clay with an inner face built up of thin 2-inch tiles (plate XVII, 3). The inner face was cracked by heat and both it and the floor were baked hard. When found, the whole was covered and choked with a mass of loose tile and clay, but still had a trace of charcoal on its floor. No portion of the top of the furnace survived, but it would have been a tile vault.<sup>53</sup> There is reason to suppose that the principal

<sup>53</sup> Cf. the more complete stokehole, built of tile and almost identical in size to this, of which the first three of the tile voussoirs remain in position. *Excav. at Clausentum*: Cotton and Gathercoal (HMSO 1958), p. 26, fig. 5.

fuel had been charcoal,<sup>54</sup> for the ash and rakings were noticeably less than in the other two stokeholes; the wear from constant raking was considerably less than elsewhere; and when the wall-flues and lower floor of the room were cleared no trace of soot was found, the only stains proving to be water-borne iron.<sup>55</sup>

The yard was 19½ feet by 14½ feet, and slightly wider at its southern than its northern end. Its walls, except for the eastern, were well robbed, but the order of construction of *laconicum* and *prae-furnium* was clear. At the eastern junction the *laconicum* foundations had been laid first and those of the furnace chamber butted against them: The straight joint ran for six courses; above this the two walls were bonded and the *laconicum* wall continued on a slightly different alignment from its foundations.

A rebuild was visible in the upper portions of the eastern wall, 7 feet from its northern end (plate XVIII, 1), but as the remainder of the wall was cracked and its eastern face had been pushed slightly westwards, the reason for the work was clear. The rebuilding copied the original very closely, even to the pointing of the joints, but its stones were slightly smaller. The position of the door is uncertain.

The floor was of trodden clay with a scatter of cobbles, which had originally been covered with a thin lime surface. The whole had been resurfaced with clay (plate XVIII, 2) but even this had worn, so that the centre presented the excavators with an indeterminate mass. Against the east wall and over the original lime floor an amount of lime and rubble had been deposited, filling the east side of the room (plate XVIII, 1). As the wall pointing did not continue below this, it must have been deposited between the laying of the floor and the finishing of the walls. This *prae-furnium* floor was the only one in the building lower than its actual stokehole, so that the hypocaust would be dry, even if this meant that its *prae-furnium* was not.

<sup>54</sup> Cf. Wroxeter Report, p. 43; Macdonald, Proc. Soc. Ants. Scot., LXIII, 457; and Appendix V below.

<sup>55</sup> Appendix VI.

The fitting of the circular room into a pre-eminently rectangular plan was solved by placing it in the angle between two rooms (III and IIIc) and filling the included space with wall core. This development is midway between a free-standing *laconicum*<sup>56</sup> and one so deeply incorporated in the building as to lose its shape.<sup>57</sup> Structurally it is akin to Gellygaer, Ribchester, Kösching and Hofheim,<sup>58</sup> although the point is one of architectural interest rather than an aid to close dating.

#### 4.—THE TEPIDIARIUM (IV) AND CALDARIUM (VI), AND THEIR PRAEFURNIA (V AND VII).

##### (a) *Tepidarium*.

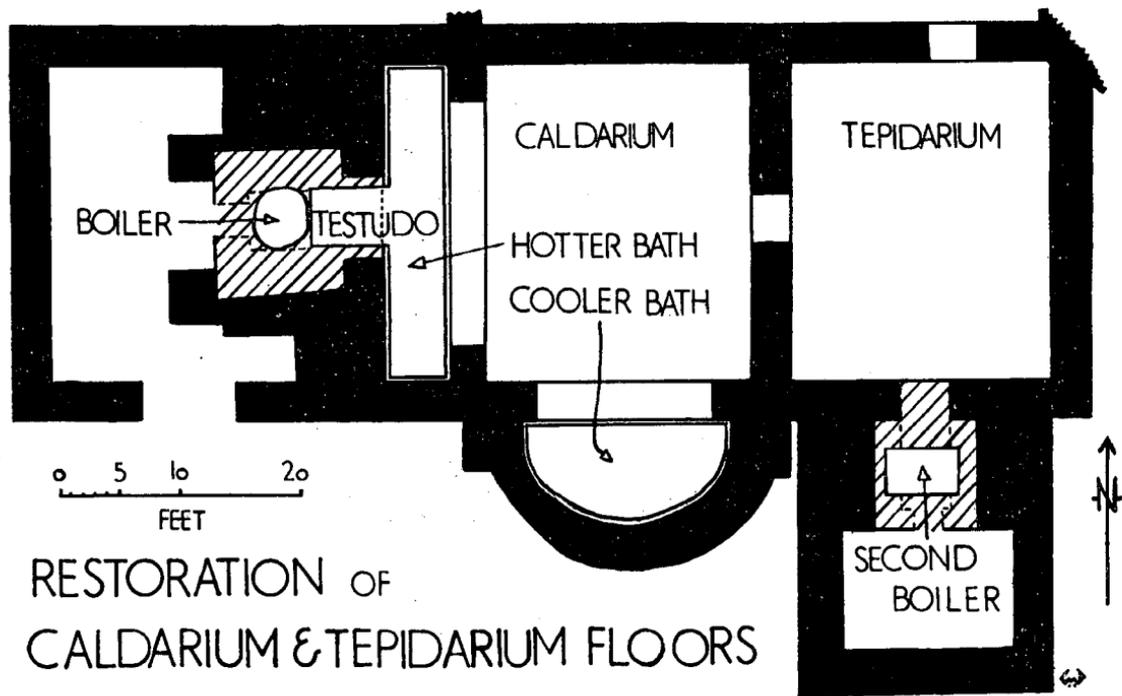
The *tepidarium* (IV) was 26 feet by 21 feet in size and was the second of the two heated rooms of the main range (plate VI, 2). Originally it was entered from the coldroom, but neither this door nor that connecting it with the *caldarium* (VI) remained. In its first phase the room was heated entirely by the hot air derived from the hypocaust of room VI, but the fact that a subsidiary stokehole had later been broken through the south wall suggests that the derivatory heat had proved insufficient.

Only the hypocaust chamber remained, although the level of the suspended floor can be restored from the *frigidarium*, which gives a height of almost 4 feet (fig. 6b). The only surviving fragment of the upper floor, 27 inches by 22 inches by 8 inches, was of hard, pinkish lime, broken tile, and gravel, with a smooth upper surface. Its underside had a layer of clay baked on to it, suggesting that the underslabs had been covered with a thin, clay seal before the aggregate

<sup>56</sup> Which tends to be the simpler, earlier arrangement: Templebrough, Binchester and Hedderheim.

<sup>57</sup> Würzburg and the Antonine forts in Scotland at Cadder and Balmuildy (annexe bath house).

<sup>58</sup> Rather than Marienfels and Caerwent—if the circular room in the latter be a *laconicum*.



of the floor was added. Several stones from this under floor—15 inches by 12 inches by 3 inches was a typical size—were recovered during the excavation, and all had been coated with clay.

The *pilae*, at most 36 inches high,<sup>59</sup> had been built of square tiles, 2 inches thick and 9 inches wide. Clay had been used to set the two tiles remaining *in situ* and many traces of it remained on the floor.<sup>60</sup>

The hypocaust chamber was filled with debris and a few stones, mostly underslabs from the floor. Almost all was stained yellow or black<sup>61</sup> and the whole was waterlogged by constant seepage from the higher parts of the site. In consequence the excavation was wet, and the floor soft.

The floor rested on a pitched stone foundation which in its turn lay on the solid clay subsoil. It varied greatly in the amount and size of the tile and stone in it, but by and large was rougher than that of the *caldarium*.

The core of the north wall stood 40 inches high, but the irregularly robbed facing only reached 36 inches at maximum. The west wall was breached by three flues in the form of regularly faced gaps in the stonework, 18 to 30 inches wide.<sup>62</sup> At highest it stood 2 feet, but was very noticeably built of alternating courses of thick and thin stone (plate XIX, 3). Like the north wall and that of the *laconicum*, it had patches of softish, brown plaster on it which had run down from above, before the upper floor was added.

The south wall was in two portions, 9½ feet and 8 feet long, on either side of the stokehole. The western half stood 2½ feet high. Its broken edge was extremely reddened and brittle, and extended further into the stokehole than the tile lining; clearly it had never been faced with tiles. This contrasts with the main stokehole, where a tile arch protected the stonework of the *caldarium* wall.

<sup>59</sup> Cf. Neckarburken 4 feet 2 inches: Mumrills (men's baths) 2 feet and Stockstadt 2 feet 9 inches; cf. note 50 above.

<sup>60</sup> See note 71 below; for spacing see note 51 above.

<sup>61</sup> See Appendix VI.

<sup>62</sup> Compare Wroxeter where the flues are tile-faced: report, p. 27.

The wall was carried across the furnace mouth as a sleeper-wall, but unlike any other in the building it was not covered with a protective layer of floor. On the eastern side the wall was completely robbed, revealing the north face of the stokehole cheek. Similarly the eastern wall of the room was completely robbed, though in both cases the offset course remained, as a step on which the floor rested.

A narrow alley, 28 feet by 3 feet, had been left between *tepidarium* and *laconicum* furnace chamber. Whether it served any useful purpose is not known, but it would have given room for the chimney flue of the *laconicum* to emerge into free air so far up the wall.

(b) *Praefurnium* and *stokehole*.

The *praefurnium* (V) measured 18 feet by  $22\frac{1}{2}$  feet overall, and had quite clearly been added to the south face of the *tepidarium* wall and was nowhere bonded with it (plate XX, 1; fig. 12). The northern third was occupied by the solid cheeks of the furnace. These were constructed in three sections: an outer packing  $5\frac{3}{4}$  feet thick, an inner packing and the stokehole linings. The west side was badly damaged by the modern silage drain, especially at its southern end, but the east had survived. It was faced on its outer, and southern sides<sup>63</sup> and consisted of layers of pitched stone with a large number of river boulders in it, bonded with clay for the first course and mortar thereafter. The space for the channel or flue between the two packs was  $8\frac{1}{4}$  feet and each had a straight, unfaced inner edge, against which the stokehole lining had been built. This consisted of a preliminary packing of stone and clay just over a foot wide, and a tile face 10 inches to 12 inches thick, built of 2-inch tiles bonded with clay, all interstices being filled with broken tile and clay.

Unlike the stokeholes of the *laconicum* and *caldarium*, this stokehole had no narrowing at the point of entry to the hypocaust, although there was one at its jaw or doorway

<sup>63</sup> The south being trowel pointed.

consisting of tiles resting on a stone foundation. One of these tiles bore the imprint of a human foot.<sup>64</sup> The floor of the stokehole was lower than that of the hypocaust basement.<sup>65</sup> Its northern 3 feet 3 inches were of laid slabs of stone, but its southern 4 feet 6 inches were merely the baked, sand subsoil, which had apparently never been covered. As can be imagined the wear owing to heat and raking was heavy and the floor dipped in the centre. There had been no attempt to drain this and as a result water constantly collected there.

The furnace chamber had simply been hollowed out of the ground, and had never been given a proper floor (plate XX, 1). Constant wear had lowered its centre several inches, and a thick layer of ash and charcoal covered everything. The walls were adequately built on a solid foundation of river boulders, so that the shape of the room was clear, although only the lowest stones remained and on the south side even these were removed by the modern silage drain.

The straight joint between the outer packing and the tile cheek has already been noted, but neither it nor any other discovery indicated work of more than one period within the *praefurnium*, and the stokehole had never been re-lined. The wear was heavy but not so heavy as to demand resurfacing of the floor at its southern end. It would, therefore, seem that either the stokehole was a late insertion, or it was not in continual use. The main furnace might have been relied upon to maintain a constant heat, only occasionally requiring assistance from this unit. The thickness of the packing round the flue must, however, be regarded as significant of some special purpose, for usually the stokehold of a *tepidarium* has walls of normal thickness only;<sup>66</sup> as, for example, has the *laconicum* stokehole here, although it had to stand at least as high a temperature as that of the *tepidarium*. If the extra mass of packing carried water tanks and

<sup>64</sup> Appendix IV and fig. 23, II.

<sup>65</sup> Vitruvius, V x 2.

<sup>66</sup> As Haltonchesters (Richmond: Handbook to Wall, XI, p. 68), Wörth, Heddesdorf, Marienfels and Walldürn. Köngen is the only parallel to Red House.

a boiler, it would add greatly to the hot water supply of the *caldarium* bath, only a few feet away (fig. 11). This is the most likely purpose, for two large hot baths in the *caldarium* must have made a very considerable demand upon supplies of hot water. The only other possibility is that a bath and *testudo*<sup>67</sup> were fitted over the stokehole, a provision not unknown in *tepidaria*,<sup>68</sup> but unsupported by any structural evidence here.

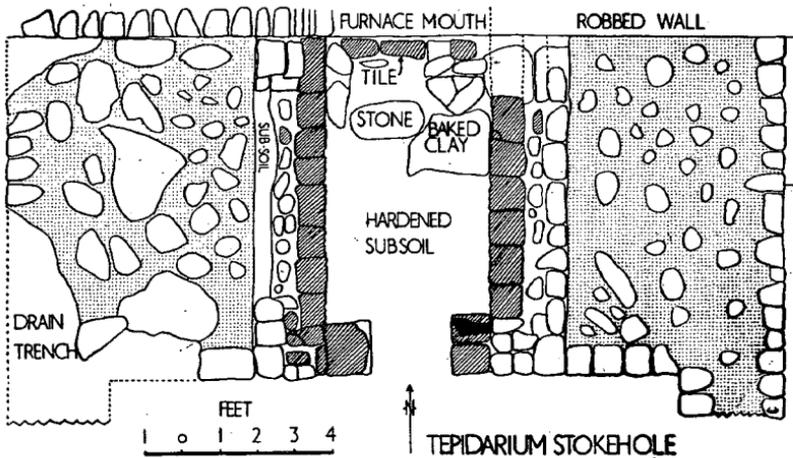


FIG. 12.

(c) *The Caldarium.*

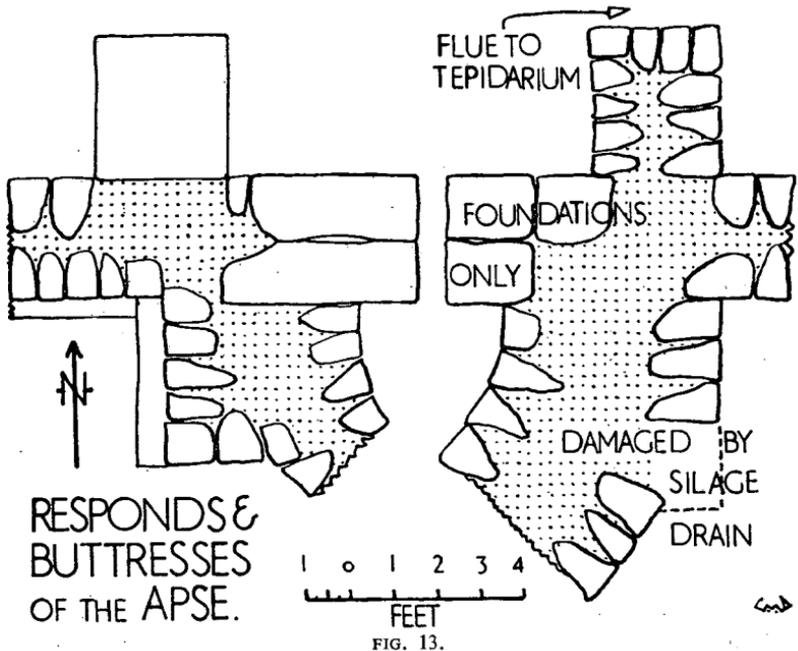
The *caldarium* (VI) lay to the west of the *tepidarium* and must have been entered from it, though no trace of the doorway remained. No portion of the suspended floor survived, but its height can be assumed to have been the same as that of the *tepidarium*. All the surviving detail was from the hypocaust basement and was covered with rubble and debris in the manner of the *tepidarium* and *laconicum* (plate XIX, 1; fig. 3).

The room falls into three parts: the main area

<sup>67</sup> For *Testudo* see note 79 below.

<sup>68</sup> As at Niedernberg, Stockstadt and Kapersburg.

(VI), its western extension (VIb), and the south apse (VIa), measuring 26 feet 6 inches by 22 feet 3 inches, 26 feet 6 inches by 5 feet 4 inches, and 22 feet 3 inches with a radius of 9 feet 6 inches, respectively. The main area was almost identical in size with the *tepidarium* (plate XXII, 1); its east wall being common to both rooms. Its north wall stood 3 feet 6 inches at maximum, and



was covered with the usual plaster drip. Symmetrically placed in it were three chimney flues (fig. 14), akin to those in the *laconicum*: only the central flue was complete, though it was clear where the eastern one had been and the position of the western one could be estimated. The surviving flue opened 2 feet above the floor and was almost 8 inches square. A fragment of the tile pipe remained *in situ*. It is not known whether these flues were a device for regulating

the temperature of the room, in addition to being a necessary feature to promote a strong through draught; each room would need its own system of chimneys. It is certain that the flues were in no sense wall-jacketting, for there is no trace of jacketting at all in the building, and the *laconicum*, the most likely room to have received it, is the room where one can be most certain of its absence.<sup>69</sup>

There had been no attempt to separate the western and southern areas from the main part of the room; instead, the maximum gaps had been left along the sides where the

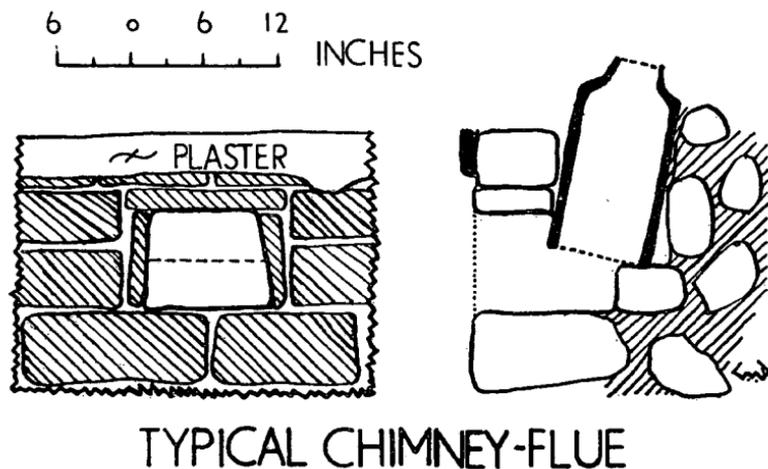


FIG. 14.

features joined, so that hot air could circulate freely through the whole of the hypocaust chamber. The points of contact were marked by large stone responds<sup>70</sup> designed to carry the vaulting and semi-dome, as well as part of the weight of the baths. The eastern respond of the apse had been robbed, but that remaining on the west consisted of two stone slabs 18 inches by 50 inches by 8 inches in size (plates XXI, 2, XXII, 1; fig. 13). The responds of the western extension both

<sup>69</sup> The absence of jacketting in Britain is, in general, an early feature, but the subject is too large to discuss here.

<sup>70</sup> Cf. Inchtuthil, Stockstadt and Wroxeter.

survived, and were identical, monolithic blocks 36 inches by 40 inches by 8 inches.

The remains of the *pilae* were represented only by seven tiles, or fragments, stuck to the floor with fine clay. Those in the main portion of the room were 9 inches square by 2 inches thick,<sup>71</sup> the northernmost being imprinted by a large dog's foot;<sup>72</sup> those in the western extension were 11 inches square by 2 inches thick.

The apse (VIa) was well planned, but its construction was less competent. Its offset, thickness and general curvature were all highly irregular. Externally it had two buttresses at the junction of its south face with the main wall, the eastern of which was destroyed by the silage drain. As expected, the south wall of the building was carried across the apse chord as a sleeper-wall, covered by the floor (plate XXI, 2).

The west wall of the room was bisected by the main stokehole (plate XIX, 1). Its southern half was standing two courses high, with a well-built termination; the northern half had been robbed to floor level. Two 11-inch *pila* tiles remained against this robbed wall, 10 inches apart.

The floor of the room was a consistent make-up of pitched stone lying on the natural clay and covered with an aggregate of lime, tile stone chips and gravel. It had a good surface, but sloped towards the north-eastern corner. Except for the apse the walls were well founded on solid clay and cobble, with an adequate offset ledge on which the basement floor of the hypocaust rested.

The function of the alcoves VIa and VIb needs some comment (fig. 11). VIb carried the hot bath; an arrangement known from Tivoli, Lepcis and Pompeii and matched in the western empire.<sup>73</sup> The system is that of a narrow bath placed immediately beyond the inner mouth of the main stokehole, which is situated in the middle either of the longer side or of one of the shorter ends. To support the extra

<sup>71</sup> ". . . *laterculus bessalibus pilae . . . struantur argilla cum capillo subacta . . .*" Vitruvius, V x 2.

<sup>72</sup> Appendix IV; fig. 23, II.

<sup>73</sup> Stockstadt, Wroxeter, Balmuldy and Chesters.

weight reinforcement is necessary, which often takes the form of elongating the stokehole flues under the bath.<sup>74</sup> The resultant exclusion of direct heat from the ends of the bath was immaterial, as the water was kept hot by the *testudo*. In some cases the bath was narrower than the full width of the room;<sup>75</sup> at Red House, however, there is no indication that it was not the full length of 26½ feet. Nor was there any sign of an elongation of the flues; instead, larger tiles were used for the *pilae* and placed more closely together than elsewhere in the heated rooms.<sup>76</sup>

The apse, too, must have contained a bath.<sup>77</sup> The only alternative is a recess for a cold *labrum*, such as is found regularly in heated rooms of civil bath houses;<sup>78</sup> there is, however, no evidence for this being the normal military procedure. Some buildings, it is true, have two opposed apses in the *caldarium*,<sup>79</sup> only one of which seems to have held a bath, but no evidence has survived of a *labrum* being incorporated to the exclusion of an apsidal bath.<sup>80</sup> In several buildings, on the other hand, there are two baths in the one room, one set in an apsidal, or rectangular recess, the other set over the stokehole.<sup>81</sup>

Possibly the two baths were of different temperatures; one was further from the source of heat than the other and the most likely reason is a variation in temperature, the water in the hotter being kept up to a constant heat by a *testudo* over the furnace, that in the cooler relying solely on the boiler.

The demand upon hot water must have been great and

<sup>74</sup> Done with tile or stone: Stockstadt, Wörth, Gellygaer and Corbridge.

<sup>75</sup> Gellygaer and Würzburg.

<sup>76</sup> 11-inch square tiles, 10 inches apart.

<sup>77</sup> Vitruvius, V x 4.

<sup>78</sup> Stabian and Forum Baths, Pompeii; the newly found baths at Herculaneum; and Wroxeter.

<sup>79</sup> Inchtuthil and Castell Collen and the normal *Reihentyp* of building.

<sup>80</sup> Kapersburg is the only possibility, but the photograph in ORL does not agree with the plan there, and one must class the building as uncertain.

<sup>81</sup> At Chesters and Risingham. Also at Caerwent (Archæologia XXXIV), although a mistaken restoration of one of the baths as a *sudatorium* was copied by John Ward in his *Romano-British buildings and earthworks* (p. 197), and has become the accepted interpretation of the feature.

the suggestion has already been made that a further boiler was placed over the *tepidarium* stokehole to meet the demand. Lack of evidence prevents the restoration being continued further.

(d) *Main furnace chamber.*

The *prae-furnium* measures  $27\frac{1}{2}$  feet by 25 feet internally, forming a continuation of the *tepidarium-caldarium* sequence and originally marking its termination (plate XIX, 1). Its walls were as deeply founded as those of the two heated rooms, but the actual building was not of very good workmanship. The courses rise and fall, in stones of assorted shapes and sizes, while the alternate thick and thin coursing noted in the wall common to rooms IV/VI, is a regular occurrence. The south wall is bonded into the south-western corner of the *caldarium*, but the north wall only butted against it, suggesting a tendency found elsewhere in the building to work round a wall in building rather than to erect all parts simultaneously.

The north wall was founded 2 feet below the floor level, with a solid offset, 18 inches wide, on its outer face. This compares favourably with the 15 inches offset noted on the north face of the north wall of the *frigidarium*, and a similar width of offset elsewhere in this room. The total height of remaining wall, above and below floor level, was 5 feet, but much of the face was hidden by a rough plaster coating.

The west wall was likewise well founded with an 18-inch offset on its inside face. It was standing 4 feet above ground level at its north end, but only 3 feet at its south, although the floor sloped steadily downwards to the south. The wall was of extremely poor workmanship, quite large stones being incorporated incongruously at random, so that the coursing became completely irregular.

A large part of the south wall lay where it had fallen immediately in front of the furnace, on top of some  $2\frac{1}{2}$  feet of rubble. Its top (western) facing stones had all been removed but the underneath (eastern) face survived. If it

were placed on the existing west wall at the nearest point it would reach a height of 9 feet, much greater than would be expected if the *prae-furnium* were not roofed.

The south wall was most heavily robbed and its offsets a mere 6 inches each. Eight feet from its western end there had been a gap of 7 feet, which at a later date had been blocked.<sup>82</sup> At each end of this gap there was an overhang 9 inches wide by 9 inches high. In its original state the gap had been open, and served as an entrance to the room. What the overhangs signify is not clear, but anything placed in them, as it were a stone or wooden threshold, had been removed some time before the blocking took place, for there was a 5 inches layer of rakings over the wall. The blocking sat on top of this quite separate from the wall underneath.

*Floor.* As there was no trace of re-lining debris in the soot under the blocking of the door in the south wall the blocking of the door must ante-date the re-lining of the stokehole. But what provision was made for entrance to the room after the blocking of the door is not clear. The floor of the room had begun as trodden subsoil upon which a thick layer of ash had accumulated. Then a rough yellow, lime mortar floor had been laid. The new floor had worn quickly, and the only traces of it were round the edges of the room. More rakings and re-lining debris had followed, covered in turn by a thick layer of charcoal and ash, and finally a top lime floor with a small amount of rakings over it. The level had risen at least 7 inches in this time, and even more directly in front of the stokehole and round the edges of the room.<sup>83</sup>

(e) *Main stokehole.*

This, the major heating unit of the building, passed through at least two main phases, marked by the re-lining of the firebox. Its floor had also been considerably raised, while the packing of the cheeks showed work of three

<sup>82</sup> There was a similar blocking of the wide furnace-chamber entrance at Silchester (period V).

<sup>83</sup> For analysis of sample of charcoal from *prae-furnium* and stokehole see Appendix V, 1.

different periods, any one of which could have gone with the alterations to the lining or floor (fig. 15).

The firebox communicated with the hypocaust chamber of the *caldarium* through a 7-foot gap. On the north side of this the bottom two courses of a tile arch were in place, and although all trace had gone on the south, its position was marked by the limits of the scorching of the floor.

The inner cheeks or actual wall of the firebox were tiled, although the calcining of the stone immediately behind the tile face was so heavy that one wondered if the stone may not once have been the face. Both tiles, and packing behind them, were bonded with clay.

*Period I* (plate XXIII, 1; figs. 15, 1, and 16). The south cheek was  $3\frac{3}{4}$  feet wide at its eastern end and  $4\frac{1}{2}$  feet at its western. Its rear packing was of stone and tiles held by clay, and faced with stone at its south side; its west end was of stone. The north cheek was 3 feet thick, its western end having been pushed out of position by a large boulder wedged behind the tile face. The north edge was well built of tile, with an occasional stone, and bonded with clay (plate XXIII, 2). On top of this tile wall sat two large roughly shaped blocks, each one several cwts. in weight. Between the tile wall and the cheek of the firebox was a packing of stones and clay. The western end was also faced with tile. Of the narrowing at the stoking end, one stone remained on each side, reducing the mouth of the furnace to  $2\frac{1}{2}$  feet. The southern was very worn and cracked. The stokehole floor was of tile or baked clay, now somewhat softened by constant soaking, and anciently worn to a depth of 5 to 6 inches at the mouth by feeding and raking. As this was the lowest part of the whole complex, it must have been a constant water trap.

*First Addition.* The first change was the addition of an outer packing on both sides (fig. 15, 2). The southern lay on an inch of rakings, over which a layer of clay had been placed to bed the stones. The packing was again clay-bonded and faced with large stones. An amount of tile was incor-

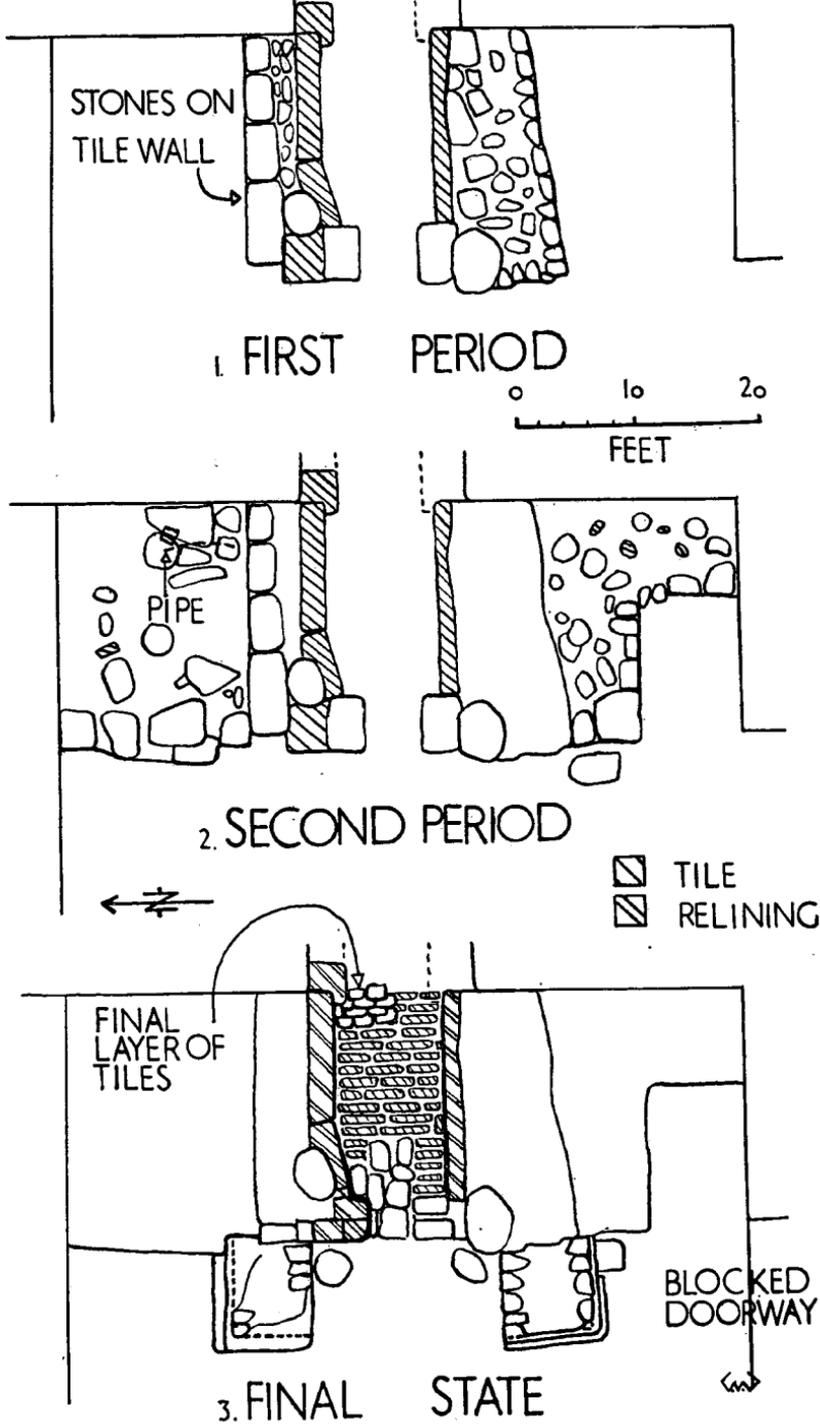
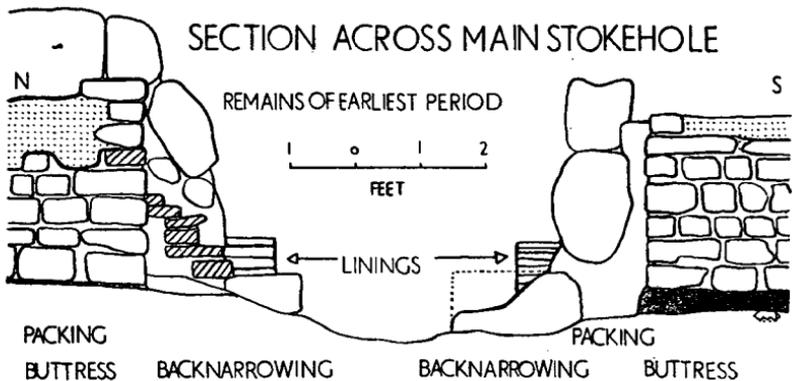


FIG. 15. PERIODS OF THE MAIN STOKEHOLE.

porated as well as several calcined stones. The north pack was largely of dirty clay, with one or two stones in it, laid on a stone foundation and given a face of large, flattish slabs on its western side. In this packing, near its south-western corner, a length of lead pipe was found, similar to that already mentioned. It was 43 inches long and very battered. Whether it was *in situ* or not is difficult to say, but it must have been part of the cold feed to the boiler, and cannot have come from very far away. The layer of burning under this packing was thinner than that at the south, but this could be expected, as the obvious direction of the raking



will have been out through the south door of the furnace chamber.

*Re-lining.* The next event was the re-lining of the stokehole. Several inches of rakings had already collected on the furnace chamber floor, on to which the reddened clay and broken tiles of the old lining had been thrown. Although some had doubtless been removed much remained, indicating a thorough refitting. Whether there had been any change to the shape of the stokehole's face as a result of this is unknown, for no trace of the original lining remained.

*Furnace floor.* Very soon after the re-lining it was decided to raise the level of the stokehole floor, which, being

6 inches lower than that of the *caldarium*,<sup>84</sup> could only have been a constant water trap. The lowest tiles of the lining were much less worn and cracked than the upper tiles, so that the raising of the floor had come relatively quickly after the re-lining.

Tiles and clay had been packed into the stokehole to make a level surface, covering a layer of 1 to 2 inches of charcoal and soot. Towards the back, where the wear was worst, a layer of stone had been used to raise the level. On top of this floor a layer of handpenned tile had been laid evenly and regularly. The total increase in height was almost a foot, and the new floor was well above that of the *caldarium*.

As found, the rear narrowing of the stokehole rested on a floor of laid stone, and it seemed as if the penned tiles had been worn or had had to be removed and part of the stokehole again re-floored, this time with stone held together by soft mortar, and kept upright simply by being dug into the thick rakings in the furnace chamber.

A new back narrowing had been built on stone and clay responds, the northern of which was found in place. As the wear on this final re-flooring was not excessive, it is probable that it had been placed there only a short time before the building went out of use, and, as such, postdated the addition of the buttresses.

*The Buttresses* (plate XXII, 2 and 3). These had been added to the western terminations of the cheeks at a late date. The ash under the southern buttress was considerable. Altogether the structure was 9 inches above the original floor, raised on ash, re-lining debris, and a second layer of ash. The northern buttress also stood on ash, but this was a thinner layer. Both buttresses were made of stone, some re-used and calcined, and occasional pieces of tile, bonded with mortar. The northern face of the north buttress was trowel pointed. Both buttresses were flush on their opposing faces, but had two offsets on their outer sides, which reduced

<sup>84</sup> Vitruvius, V x 2.

their size by almost 12 inches. They were 3 feet high and had been higher.

*Final stages* (plate XXII, 3; fig. 15, 3). Finally, another layer of regular, flatly-pitched tiles had been laid over the eastern end of the stokehole, under the *caldarium* arch. These pointed towards the west, so that raking would not be against the grain, and their uppermost edges were blackened and slightly worn by use. No trace of similarly placed tiles was found elsewhere in the stokehole, but they could be contemporary with the final stone floor at the western end.

*Boiler.* Of the boilers and tanks which the stokehole originally supported, little trace remained, although the piping in the north cheek, even if not *in situ*, must have been some part of the cold-water feed pipe. The stokehole was long enough to house both boiler and *testudo*, the former to supply hot water to the two baths, the latter to keep that in the bath directly over the stokehole mouth as hot as possible.<sup>85</sup> The fragments of bronze found in the building may be remnants of this pair cast into slabs for most convenient removal.

(f) *Fuel Store.*

The final element of the main range was the room (VIII) added to the west side of the principal *praeefurnium* (plate XXI, 1). This was rectangular,  $5\frac{1}{4}$  feet by  $36\frac{1}{4}$  feet, with a gravelled floor, and walls, now reduced to footings, of the standard 3 feet thickness, indicating that it had been roofed. A small amount of charcoal, broken pottery, and lead waste were found in it. It was clearly an addition, for it not only butted on to the end of room VII, but its west wall, like that of the yard XI, was built on top of the original main drain. Judging from its position its most likely function would be as an additional fuel store for the main furnace.

<sup>85</sup> For workings of these see: *Testudo*, *Archæologia*, 93, p. 176 (Stabian Baths illustrated). Boiler, D-S. *Thermae* and fig. 6877 (Boscocrale).

## 5.—THE SMALL YARD (XI) AND THE LATRINE (XII).

*(a) The Yard.*

In its final state the yard measured 23 feet 6 inches by 41 feet 6 inches with the latrine (XII) occupying its north-western corner. This, however, was no more than the latest and largest development of an area which underwent considerable small alterations, by no means the least of which was the laying of a modern silage pipe across it in a trench cut through to the clean sand (plate XIX, 1).

The end wall of the latrine was not bonded into the south wall of the courtyard (II), nor was the west wall of the yard (XI) bonded into the latrine. With the exception of its western  $5\frac{1}{4}$  feet the south side of the yard was bounded by the north wall of the furnace chamber, but owing to the floor of the yard being several feet higher than the furnace chamber, very little of its north face was visible. The western  $5\frac{1}{4}$  feet was an inferior piece of walling, added to fill the gap between the south and western walls. Its foundations were 2 feet deep against the face of the furnace chamber, but only 8 to 9 inches further west, while its lowest course was laid askew, north-west to south-east, so that when the upper courses were added on a truer alignment the footings gave the appearance of an irregular offset.

The east wall was very much robbed, and was crossed by the main drain 6 feet from its southern end. The north wall was still 2 feet 4 inches high at maximum and plastered, but it did not bond into the north-west angle of the bath (IIIa) and had shallower foundations. Ten and a half feet from the north-western corner the doorway from the courtyard pierced the north wall, with a drop on the southern side where a step had been removed. Under this threshold the lead water pipe entered the yard.

Before listing the changes to the yard, it is necessary to describe the main drain and the water pipe, as these were unchanging features.

The main drain ran from the gap in the west wall of the coldroom, to the south-east corner of the latrine, and had been cut against the natural gradient of the ground in order to run both downhill and northwards (plate XIX, 1). There was no trace of any earlier or later drain, so that both this and the latrine were clearly part of the original plan. As discovered, the drain was open at its top, and choked with a mixture of debris, bones and pottery. On clearing this a layer of 2 to 3 inches of silt was found in the bottom of the channel, in which were fragments of South Gaulish samian and portions of a large glass window-pane.<sup>88</sup> Thrown in on top, but carried down at least one inch into the silt by their own weight, were two pieces of lead pipe, one of which was a nozzle.

The drainage channel was 13 inches deep, 19 inches wide at its base, and 15 inches wide at its top. The manner of its construction was clear: a trench had been dug into the sand subsoil, and a base of mortar laid on it; on this the sides of the drain had been built with planks, and the space between them and the edges of the trench filled with mortar. On this the impressions of the planks were plainly visible, as were the irregularities in shape and direction resulting from their use (fig. 17). The covering had probably been of stone slabs, or the demolition gang would not have dug out its whole length, and traces of the clay sealing were still visible on the top edges of the drain. Exclusive of the cover slabs, the drain top was 15 inches below the gravel surface of the yard.

To the north of the drain lay two remnants of the lead water-supply pipe. The longer was the continuation of the pipe already mentioned in the main courtyard, running from the doorway to the edge of the main drain, where it had been cut through by the demolition gang. No trace of its southern course remained. The length lay from the main drain towards the west wall of the cold bath (IIIa). The southern end was partly buried in the gravel of the floor and ended

<sup>88</sup> See Glass Report.

on the edge of the drain trench. There was little trace of wear on the peak forming the upper surface of the pipe; and it may well have been *in situ*, for, although all the gravel to the north of it had been washed away, that to the south and round its southern end remained, and the pipe appeared still to be bedded into it. If it was in position it must have been that feeding the cold bath. If, on the other hand, it was not *in situ*, it was part of the main pipe from across the drain, flung here when it was cut through in the demolition. The mark remained where another short length of the pipe had lain on the yard floor, south of the drain, and had been removed when the silage pipe was laid (fig. 17, 3).

Most of the area north of the Roman drain was covered with a simple lime floor, while all the space south of it was gravelled. As there was a slight descent to the south the reason for the absence of gravel in the north could simply be that it had been washed thence by rain, or had been worn away by traffic passing through the yard to the latrine. The southern area seemed quite purposefully to have been covered and re-covered with gravel, either to obliterate or to accommodate a spread of cooking fires and concomitant rubbish.

*First Period.* In its very earliest state the yard appears to have been open at its western end (fig. 17, 1). In place of the wall the main drain from the latrine ran south along the western side of the main furnace chamber, as an open sewer.

Probably during the actual construction of the building the yard had had no more than a sand surface. Into this the main drain was dug, as well as one or two small pits containing lead waste, bone, tile and pottery. Fragments of builders' rubble were left on the surface, and there was ample indication of molten lead having been used, for a large patch of it had been spilt on the sand. As this was purified lead, akin to that of the pipe, it is arguable that it had been spilt when the main pipes were being laid and fitted into the building. One or two traces of mortar on the south area

of the floor may date from this time, or could be slightly later, while the northern portion most probably received the lime floor at this time.

*First Change.* Two posts were dug into the western end of the area (fig. 6c), each 13 inches by 11 inches and  $7\frac{1}{2}$  feet apart. Their purpose is not known. Then a gravel floor was laid right to the edge of the sewer and over it a layer of dirt accumulated. The latrine wall was plastered after the gravel had been laid, the plaster forming a fillet where wall and floor joined.

*Second Change.* A wall was built up against the western faces of the posts, which were then removed (fig. 17, 2). The filling of the northerly post hole was what would be expected (fig. 6c), dirty gravel and a little earth; but that of the southern was black and sooty earth and charcoal, which must have been derived from one of the cooking fires further east, and deliberately used to fill the hole. The layer from cooking and burning was 4 inches deep in places, and quite widespread. Obviously, in spite of its somewhat unsavoury connection, the yard was used as a general cooking area either by fatigue parties responsible for the maintenance of the building,<sup>91</sup> or by troops actually using it.

*Third Change.* After a time the wall just described was either pulled down or may have collapsed because its only foundation was a shallow trench. The depression where it had been became filled with dirty sand and a layer of cleaner sand was spread over the top to level the dip.

*Western Wall built.* Possibly at the time the first wall was removed a radical change occurred. The open sewer running south from the latrine can never have gone unnoticed and sooner or later someone decided to remedy the nuisance, and at the same time to give the west side of the building a unity of plan which had been hitherto lacking. The old drain was used as a foundation trench (plate XX, 2; fig. 6c):

<sup>91</sup> For which see a fragment of papyrus now in Geneva, listing various regimental duties and fatigues, and covering ten days in the month of October. Lesquier: *L'armée Romaine d'Égypte, d'Auguste à Dioclétien* (Cairo, 1918), p. 141.

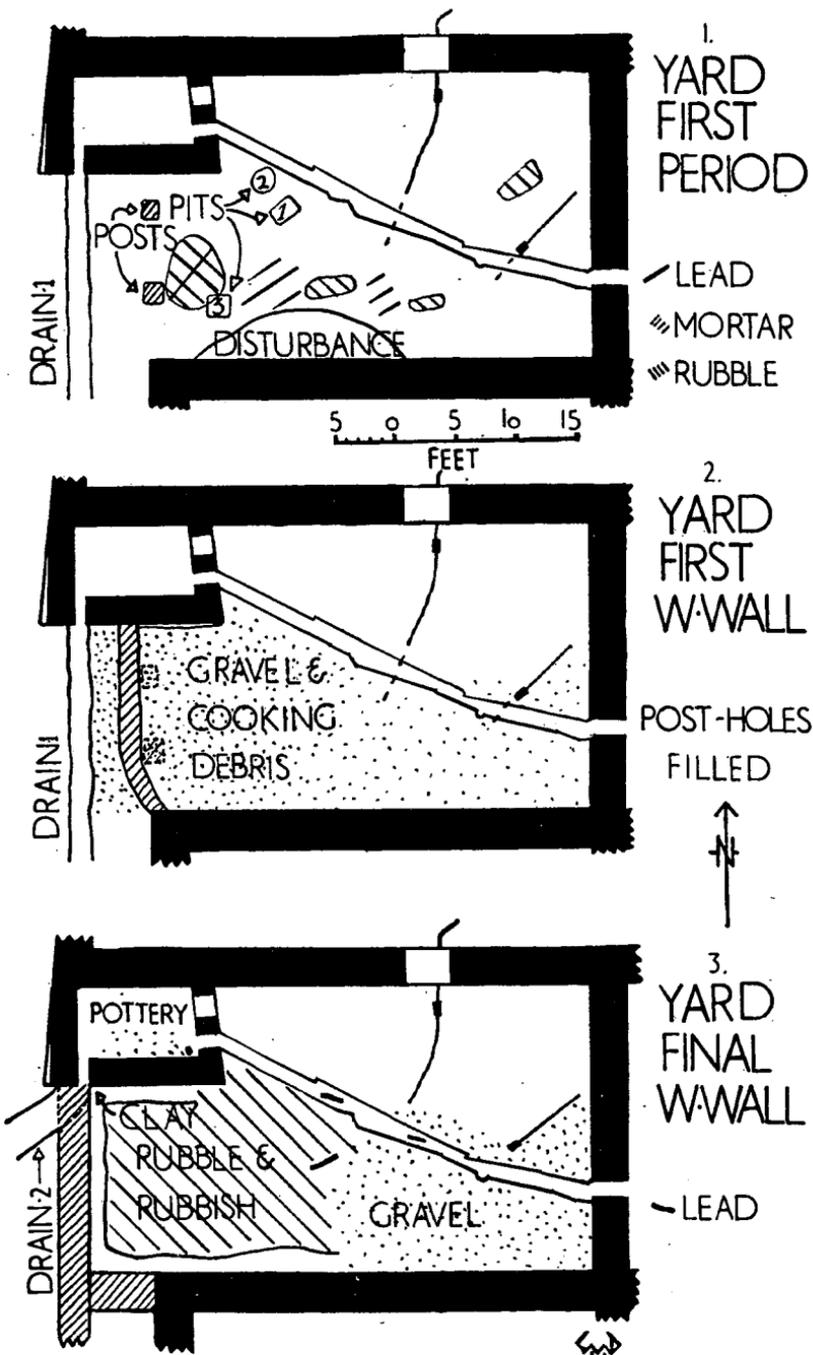


FIG. 17.

pitched stone, cobbles and clay were packed into it everywhere except for the first few feet of its length, and the wall which was now built upon it provided at once a western limit to the yard and the outer wall of a fuel store. A short addition was also made to the south wall of the yard, joining it to the new west wall, and a gravel fillet was packed into the space between the new wall and the side of the old drain, to bring it up to the level of the existing floor.

When the west face of the new wall was excavated it was found to have sagged at its northern end. The filling under the lowest course was not clay and cobble, as below the rest, but a soft, silty deposit which had washed in, showing that some provision had been made for a new drain. Whether this was a pipe, later removed, or merely a culvert through the wall, the mortar failed to hold the courses in place and the wall had collapsed.<sup>92</sup> The new drain ran away in a south-westerly direction, but lack of space prevented it being followed for any distance.

*Final floor covering.* A thick clay fillet was added round the three sides of the west end of the yard, and the floor was gradually covered with a layer of dirty earth, burnt material and pottery, over which came the debris of a minor demolition. Finally, the whole was levelled with a further spread of gravel (fig. 17, 3), which seems to have gone a certain distance east and probably did not cover the northern part of the yard.

*Abandonment.* When the abandonment came the northern part of the room was gradually covered by a thin layer of sand, as were the courtyard (II) and portico (I). As these three areas were the only ones in the building where the floor was not disturbed by the demolition, it is significant that each was covered by a layer of sand.

*Demolition.* Finally came the demolition, in the course of which two or three earthenware water pipes<sup>93</sup> were flung into the slight depression over the line of the robbed

<sup>92</sup> A similarly constructed drain was found at Newstead, Curle, pl. XIII.

<sup>93</sup> See Appendix IV, A4.

channel of the drain, together with the remains of an ox's skull.

Originally, the existence of the yard was a mere accident of planning. Its only function was to house the latrine, which was, strangely, built against the northern and not the southern wall. However, at an early stage the yard seems to have become a cooking area, and some attempt was made to close its western side. This enclosure was presently made permanent, and an attempt was also made to improve the sanitation. Once the yard was incorporated within the building, the cooking which took place in it must have become a recognized part of the activities of the bath house.

(b) *The Latrine.*

The latrine occupied the north-west corner of the yard, and measured 9 feet by 6 feet internally (plate VII, 1).

The room was not one of the most successful pieces of workmanship on the site. Its east, west and south walls had been founded deeply, and its basement, made of hard mortar, was 3 feet below the surface of the yard. The treatment of the north wall was very haphazard. It had been built as the south wall of the courtyard, before the latrines were planned, and its south face hardly went below ground level. When the excavation for the latrine made it necessary to go  $2\frac{1}{2}$  feet below the offset, the foundations were merely exposed, without any attempt torevet the exposed face. The result was inevitable; the lower courses became extremely loose and eventually fell out, as they were found during the excavation. The upper part of the wall was pointed, as was its north face.

The doorway was in the east wall, and its north jamb still remained, faced with plaster. Some portions of plaster also remained on the southern, external face.

The west wall, too, was irregularly built. A considerable, but uneven, offset ran the full length of its eastern face, orientated with the north wall of the courtyard, and clearly constructed as a continuation of it. When, however, the

upper courses were added, it was realized that the angle between the north and west walls was much too obtuse, and the visible part of the wall was, therefore, built on a truer alignment, leaving the offset more pronounced at the southern end than the northern.

The modern silage drain had removed the north-west and south-east corners of the room to offset level, breaking through the solid coursing with considerable force. This and the *tepidarium* furnace chamber were the two most damaged places.

The timber floor of the room was added in a manner in keeping with the rest of its construction. Three beam-holes were supplied in the south wall (plate XIX, 2), and three stones were removed from the northern, one course above the offset. The beams were built in position to receive a wooden floor, with a void covered by seating against the south wall. The wall did not remain to sufficient height to show any socket holes for the back of the seats.

The main filling of the room was debris, together with a few fragments of tile pipes and some food bones. The basement floor, however, yielded the largest individual deposit on the site. It was covered with a 3-inch thick layer of silt, charcoal and filth which contained the remains of one complete *mortarium*, several rusticated cooking-pots and two glass vessels, as well as a miscellaneous collection of coarse and samian pottery, bones and shells.<sup>95</sup> All this lay in the southern part of the room, the pottery almost all along the south wall. The smaller objects, nearer the centre, might have washed down the drain from the *frigidarium*, but the character of the considerable deposit of rubbish along the south wall gives a clear impression of how it got there by the use of the latrines as rubbish shoots.

As there was no attempt to canalize the water in the basement, the flushing force cannot have been very strong. Considering the amount of pottery and bone which had not been washed away, and the total absence of any in the portion of

<sup>95</sup> Pottery Report.

the two main drains outside,<sup>96</sup> it appears that, even if a sluice had been used to build up a head of water for periodic flushing, the result was not very efficient. A square latrine cannot have been as satisfactory as the type which canalized the water into a narrow flow, either within a rectangular or a square building.<sup>97</sup>

(c) *The Main Drains.*

The old main drain was followed from the outlet of the latrine parallel to the west wall of the building and away to the south of it. It was a simple, open ditch, lacking even revetted sides. The new drain seems to have run away in a south-westerly direction, but for reasons of space it could not be traced beyond the first two yards. It also appeared to be an open ditch emerging from under the new west wall of the yard, and flowing away towards the edge of the flat river-haugh. It is just possible that timber lining had been used in the drain trenches and had either been removed at a later date, or else had left insufficient trace to be visible in the portions of the drains excavated.

#### 6.—TRIAL HOLES OUTSIDE THE MAIN EXCAVATION.

In addition to the trial hole made to locate the south-west angle of the portico, three groups of holes were dug outside the limits of the main excavation (fig. 18).

A 1-7. A series of test holes were dug west of the site to probe the area which was to be covered by the main spoil heap. Nothing was discovered.

B 1-2. A pair of trenches, later linked by a cross trench, was dug in an attempt to locate the site of the settling tank. No structural remains appeared.

C. A trench, 42 feet long by  $3\frac{1}{2}$  feet wide and 9 feet deep,

<sup>96</sup> Neither was excavated very far, but at a comparable distance fragments occurred outside the *frigidarium*.

<sup>97</sup> E.g. Chesters and Housesteads—south-east angle of fort.

was dug across the narrow neck between the Red House Burn and the terrace, in an attempt to locate the water supply. Traces of an intrusion occurred approximately 10 feet from its northern end, in the form of a small trench which had been dug into the natural clay, and filled again with clay and a few cobbles (fig. 19). This filling had a level surface on which were the remains of tiles, pottery and glass as well as

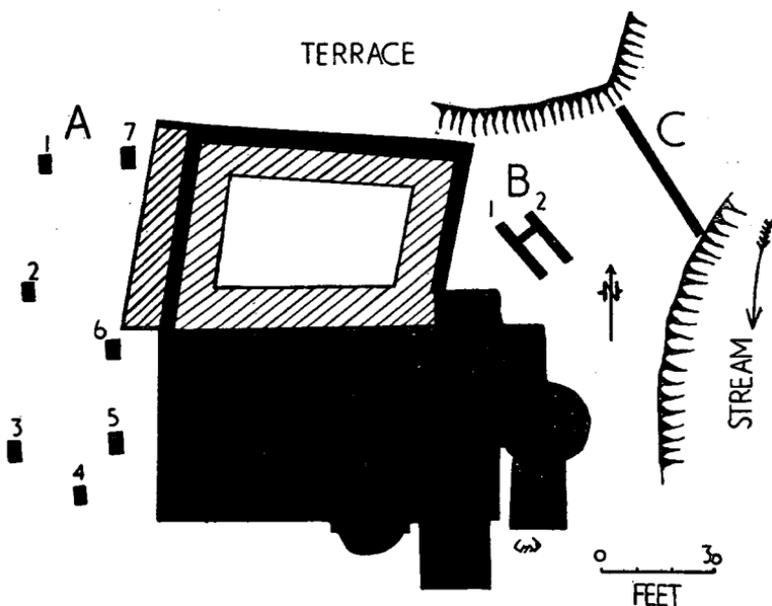


FIG. 18.

an amount of burnt material; it could well be the remains of a pathway and surface aqueduct<sup>98</sup> supplying a settling tank from a short distance higher up the burn. Since the internal pipes were of lead, a lead pipe might be expected here rather than wooden pipes or a stone conduit. A closed pipe using the inverted-syphon system could have brought water from a sufficient head to have given a reasonable pressure within the building.

<sup>98</sup> Cf. aqueduct channel Fendoch. PSAS, LXXIII, p. 140.

## THE ARCHITECTURE OF THE BUILDING.

Few architectural fragments have survived amongst the debris. Several very interesting pieces were found in the portico and courtyard, but the coldroom, *laconicum* and

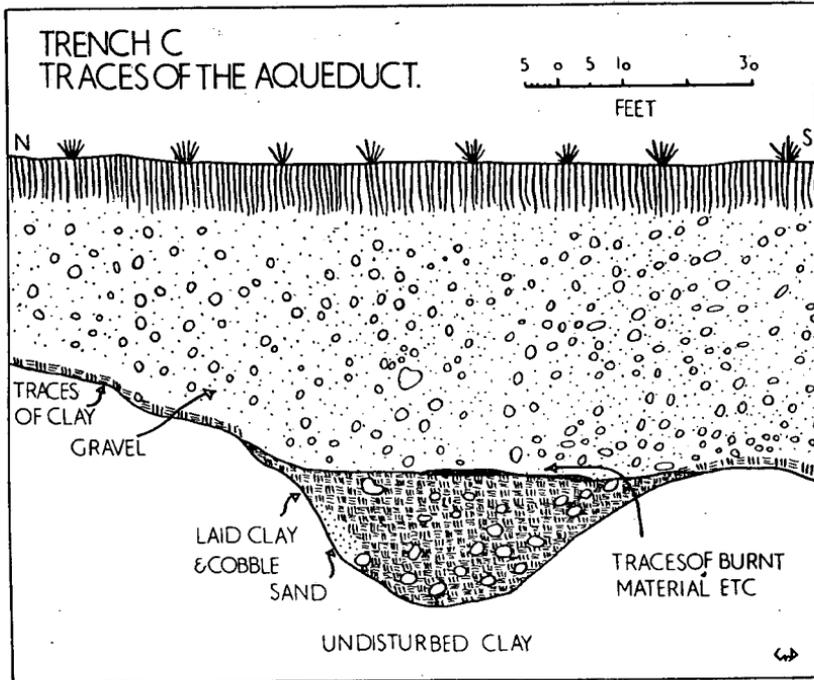


FIG. 19.

main heated rooms had been stripped bare. On the other hand, the wall footings mostly remain and so does some indication of the pillars in the courtyard; while there was enough evidence in the *frigidarium* to restore some of the detail of painting and plasterwork, and similar buildings surviving elsewhere give some assistance.<sup>99</sup>

<sup>99</sup> I am indebted to Mr. H. B. Allsopp, Senior Lecturer in Architecture, King's College, who was kind enough to discuss the possible restoration with me.

Considered as a whole the building was ambitious, but carelessly built. The plan was imposing but repeatedly small points show that the architect, or the builders, failed to make the most of their chances. The major axis of the courtyard was impressively designed, but the doorway to the *frigidarium* was on the line of the eastern row of pillars. While the monumental portico would give the building dignity, it was not parallel to the building and in the first period there was, directly to the south of it, an open yard with drain and pent-house latrine. That such points as this do not matter in military architecture cannot be argued in a building which boasts a peristyle and monumental portico.

The surveying was not always accurate, as the courtyard shows, and many of the walls had butt joints although certainly contemporary, while the curved walls were never regular. In fact, the design was that of a military architect who was imitating ambitious civil buildings to the best of his ability,<sup>100</sup> and the craftsmanship, which at best could be good, was clearly that of the troops themselves.

The two main piers of the PORTICO (I) were matched by two pillars inside the courtyard, and must together have carried a considerable monumental entrance. If the cornice fragment came from any part of this, it bears out the point well. The interval pillars and both the north wall and the foundation at the south-western angle were decidedly smaller in scale and could not carry loads proportionate to the main columns. The outer arms of the pier, and the nails, found in great quantities in the rubble, provide evidence: a wooden framed pent-roof extended on either side of the main porch supported on interval columns approximately 9 feet high. These pillars, like the small pillars inside the courtyard, were almost certainly of composite construction, built round a rod or pole, fitting into the central 3-inch dowel-hole. The

<sup>100</sup> One remembers Agricola's: ". . . hortari privatim, adiuuare publice, ut templa fora domos extruerent, . . ." (Tacitus: Agric. 21.) If it does not apply to this building it does apply to those it was copying.

outside would then be plastered, as the main columns, and the moulding added in harder lime mortar.

The central piers and the interval columns must be treated as one, and the base, Tuscan or Doric, indicates a height of 18 to 24 feet. The western responds of the piers carried something, probably the pilasters of an outer pediment with a building inscription, forming the façade of a higher porch, which extended back into the courtyard.

The COURTYARD (II) presents more of a problem, for the main pillars could not step down the roof to a lower peristyle as the porch piers could, although the raised surface of the walk would seem to indicate a roof over its western side; nor would the north-west and south-west corner pillars take the stepping down in height. A bracket on the main pillars may be the correct solution.<sup>101</sup> Otherwise, one is left, awkwardly enough, with a peristyle on three sides only and the monumental porch on the fourth, unattached to it.

The peristyle roof was carried on columns approximately 9 feet in height, circular in shape and composite, closely resembling the pillars of the front portico. The roof consisted of tiles laid on a wooden frame—although the fallen piece of stonework in the north-eastern corner may have come from some part of the roof, perhaps an attic wall above the wooden architrave. The two eastern columns held some higher feature, probably a shrine, balancing the monumental porch; but as no trace remained, restoration is impossible.

Little remains of the FRIGIDARIUM (III) walls and ceiling, but its foundations and the plan gave some indications. A barrel-vaulted roof would be normal,<sup>102</sup> and when the scale of the foundations and offset (plate XI, 2) of the north wall are considered, such can be restored here. The proportions of rooms of similar size and better preservation elsewhere would indicate an internal height of almost 25 feet in this

<sup>101</sup> Portions of two pillars each with a corbel wrought on its face were found at Bar Hill. Bar Hill, p. 541 and fig. 52.

<sup>102</sup> See list below.

room,<sup>103</sup> but little remained to show of what had been used in the construction of the roof, for all surviving fragments were small. Three pieces of plaster, however, exhibited slightly curved faces, and one of them was almost 4 inches thick and had one tile and the imprint of a second on its reverse. This is important, for the tiles are the thin type which could be used in vaulting, and there was an unusually large amount of them in the debris.<sup>104</sup>

Internally, the east wall presented an asymmetrical appearance, for the door to the *laconicum* was a small passage, while that of the annexe a wider entrance with responds and arch. The annexe itself was rectangular and would be vaulted at a slightly lower level than the room.<sup>105</sup> The alcove for the *labrum* in the north wall would have been domed with a semi-vault.

An amount of material survived from which to restore the decoration of the room. The lower portions are a simple *opus signinum* dado, below 25 inches, and white plaster above, with a blue line painted across the join. However, of the 33 surviving fragments of blue paint perhaps a third clearly show white on *both* sides of the blue, which on these pieces was a 3-inch band painted between incised marking lines. Perhaps related to this was a small group of fragments from the rebates of doorways or windows, some of which had a blue band outlining the angle of the rebate, and others one at right-angles to it. Yet another group exhibited traces of red paint, though without pattern or form. How these smaller red and blue fragments had been incorporated in the decoration cannot now be deduced.

The exceedingly small number of roofing tiles found

<sup>103</sup> The relationship of height to width of room is just over 9:8 in the vaulted rooms of the Forum and Stabian baths, and in the Hunting Baths of Lepcis it is scarcely 8:7 at maximum. As these two are separated by over 250 years the ratio would seem relevant. Even in a building the size of the Large Baths of Hadrian's Villa, Tivoli, the *tholos* is almost exactly 1:1. Any heightening of the roof would be found in the more impressive buildings of metropolitan and imperial cities rather than in provincial, military bath houses.

<sup>104</sup> Appendix IV, A2a.

<sup>105</sup> As e.g., the cold bath in the suite in the house of *Giulia Felice*, Pompeii.

amongst the tile debris in the courtyard indicate that the main portion of the building was not given an external covering of tiles.

A reconstruction of the LACONICUM (IX) is comparatively simple. Vitruvius states that such a room should be as high to the springing of the dome as it is wide, and that it should have an eye left in the centre of the dome from which a bronze baffle is hung by chains. By raising or lowering this baffle the heat can be adjusted.<sup>106</sup> If we discard the relationship of height to width in favour of that already discussed, the dome would have been just over 20 feet above the suspended floor, which was some 30 inches higher than that in the *frigidarium*. The external height would then have been within a foot or so of that of the other vaulted rooms. Whether, or not, the bronze plate was used, one cannot tell.

There was no evidence for anything but white plaster as the decoration of the room; for among the large number of fragments found, only three bore traces of red paint, and those could be strays from the *frigidarium*.

The furnace chamber was roofed, for its walls were too solidly built to be mere yard walls. It should be compared with the main furnace chamber.

The TEPIDARIUM (IV) and CALDARIUM (VI) must be treated as a pair for both would be vaulted. Whether anything was used which would lighten the weight is not known. No trace of tufa voussoirs<sup>107</sup> or clay piping<sup>108</sup> and less tile than in the *frigidarium* was found in the debris; nor was there any trace of stone voussoirs or concrete vaulting; in fact, the material used remains unknown. It is highly unlikely that the roof was of timber, as described by Vitruvius.<sup>109</sup> The thorough demolition was responsible for absence of evidence.

The vaulting could either have covered both rooms continuously, or covered each separately in parallel. The former seems much the more likely, for, if each was vaulted separ-

<sup>106</sup> V x 5.

<sup>107</sup> As used at Chesters (report, 278-81) and Bewcastle (unpublished).

<sup>108</sup> As in North Africa, e.g., Gemellae and Bu Ngem.

<sup>109</sup> V x 3.

ately, the *caldarium* would have been covered across its longer span, and the weight of both vaults would have to be borne by the 3-foot wall between the two rooms, which was in no way strengthened. On the other hand, a single vault would be much simpler and the apse (VIa) would present the only problem. The distance between its responds was 14 feet, which would give an arch a foot higher than the springing of the vault, but so small a difference could have been adjusted easily.

Of the interior very little remained. In the *tepidarium* and its *praefurnium* there was one informative piece of the suspended floor and just over 1,000 small pieces of uninformative plaster, two of which possibly had blue paint on them. There was no *opus signinum*. In the *caldarium* there were no useful pieces of the suspended floor, but several fragments of *opus signinum* remained. As this room contained baths it may have looked like the *frigidarium* with a blue line and white plaster above an *opus signinum* splash-dado. Of the 500 fragments of plaster remaining some 20 had traces of blue paint, and a further two were possibly painted red. The similarity to the *frigidarium* has already been remarked.

The two stokehole rooms, V and VII, would probably have had no more than rough gabled roofs. But that the main *praefurnium* was roofed is certain, for remains of a western wall at least 9 feet high were found. A pent-house roof probably covered the fuel store.

The only other area which there is any reason to think of as roofed was the LATRINE (XII), and a simple pent-house roof would suffice, slotted into the south wall of the courtyard, as the floor was.

Before the new west wall was built across the yard the appearance of this area could only have been unsightly to say the least. This new wall may have been built as much for an architectural reason as a sanitary one; and the lean-to roof over the fuel store would provide a rough counterbalance to the portico roof at the other end of the building.

That the bath house was lit by windows is certain, for the

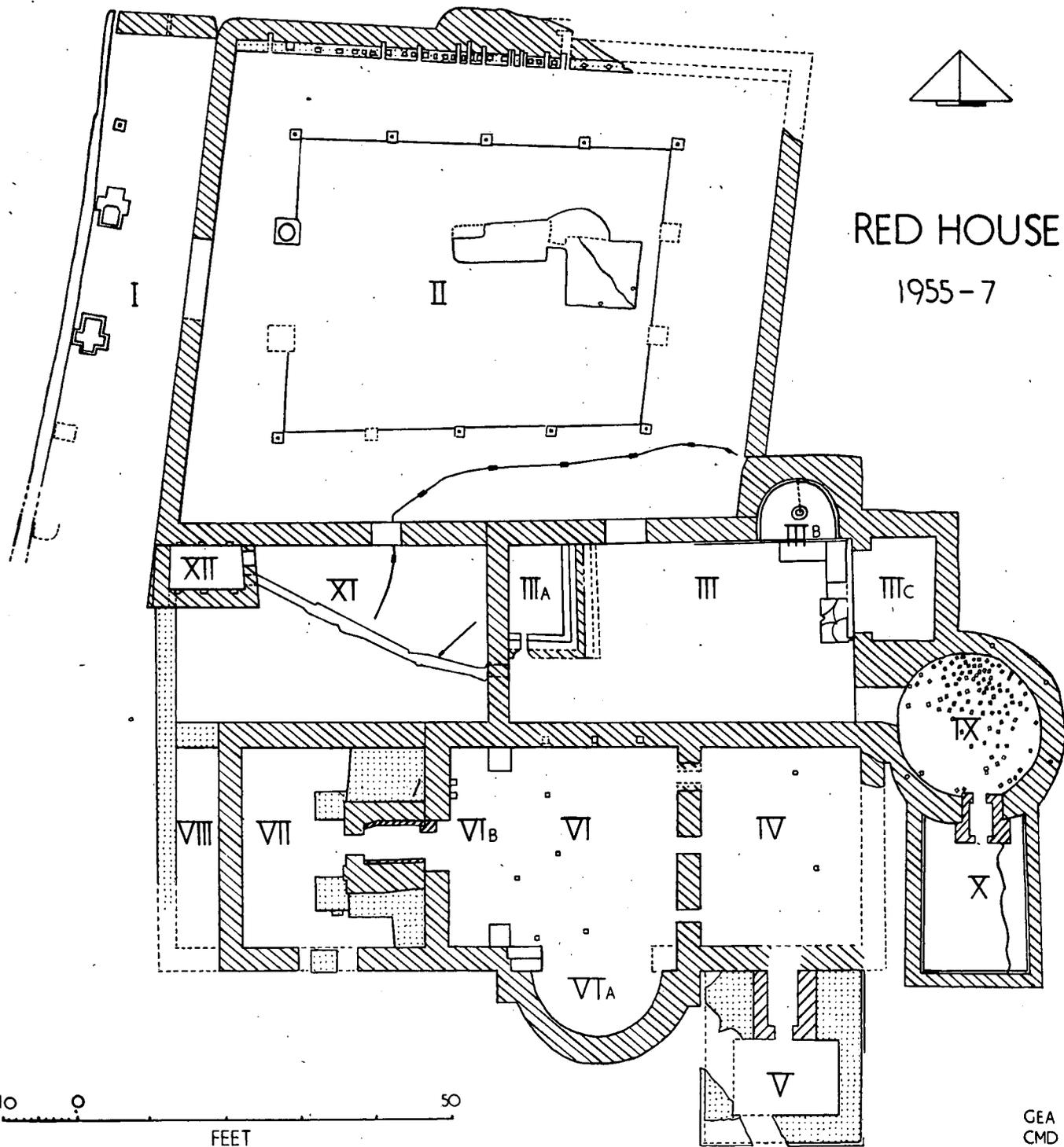
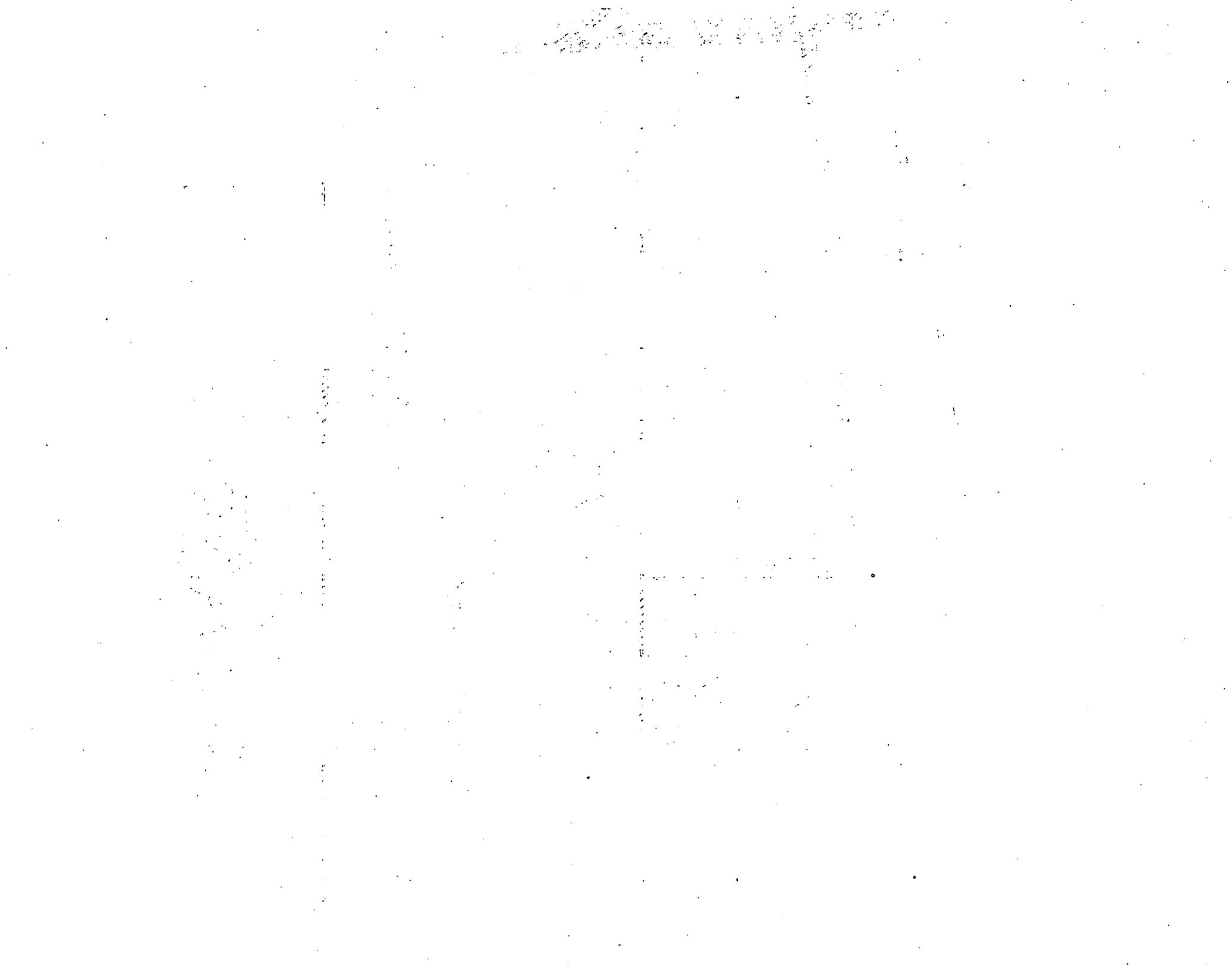


FIG. 24.



fragments of a large frosted pane were found in the main drain.<sup>110</sup> In Pompeii, in the earlier bath houses the rooms are without adequate windows<sup>111</sup> while the windows in the Hunting Baths at Lepcis are relatively few and set high in the vaulting or apse domes.<sup>112</sup> Although large windows became fashionable in civil baths from the middle of the first century,<sup>113</sup> it is unlikely that this innovation affected military bath houses at once.

The windows surviving in the fort bath houses of Chesters, Great Chesters and Ravenglass are instructive: their sills are no more than 4 to 5 feet above the suspended floors, considerably less than in the civil baths quoted, while the windows in the bath house at Ravenglass are more numerous too. Chesters and Great Chesters have one surviving window each, situated in the apsidal projection of the *caldarium*, a position already discussed:<sup>114</sup> Ravenglass is more informative, two of its windows are in what is possibly the *frigidarium*. The date of all these windows, however, is Hadrianic at earliest, by which time the new trends had obviously affected military buildings. The date of Red House is over 40 years earlier, when the new ideas in building associated with the Flavian era were still novel. Red House, therefore, may have had fewer windows than the later buildings, but when the total number, and size, of the fragments of window glass from it are considered, it is undeniable that the bath house was better lit at least than those of which Seneca could boast, *non videbatur maioribus nostris caldum nisi obscurum*.<sup>115</sup>

<sup>110</sup> At least 24 inches by 24 inches in size, see Glass Report.

<sup>111</sup> " . . . balneolum angustum, tenebricosum ex consuetudine antiqua . . ." Seneca, *Epist.* 86.4.

<sup>112</sup> Lepcis, especially plates XXXV-XXXVI: Vitruvius, V x 4.

<sup>113</sup> Seneca *loc cit.* The Central (unfinished) baths in Pompeii show the change.

<sup>114</sup> Vitruvius, V x 4.

<sup>115</sup> *Epist. l.c.*

## SMALL FINDS.

1. A *dupondius* of Vespasian (A.D. 71-79) found in the debris filling the eastern water tank of the courtyard. Identified by Dr. M. G. Jarrett. Obverse: IMP CAESAR VESPASIAN AVG [C]O[S . . . . .]P. Head radiate r. Reverse: [. . .]R[. . .]. Obversē: Legend not in Mattingly and Sydenham's *Roman Imperial Coinage*, but similar to their type 1 for A.D. 71. The reverse was worn almost smooth although the obverse was still legible.
2. A small, unidentifiable, bronze coin from the debris in the *tepidarium* stokehole.
3. and 4. A halfpenny of Victoria, 1900, and a penny of Edward VII, 1905, both unstratified.
5. Small bronze buckle, found in the imprints of the *frigidarium* floor.
6. Bronze harness-ring  $1\frac{3}{4}$  inches in diameter, found above the demolition debris.
7. A large and fine stud of bronze  $1\frac{3}{8}$  inches in diameter, with a plain, raised edge. Found in the imprints of the *frigidarium* floor.
8. Dress fastener with plain, rectangular head 1 inch across. Of undated type.
9. Bronze brooch of Collingwood's type Q.<sup>116</sup> Some red enamel still remained in 4 of the 15 rectangular divisions of the decorated fore-edge. The pin is hinged, but the head loop is of wire; the whole measures  $2\frac{1}{8}$  inches in length. From the top layers of rubble in the main furnace chamber.
10. Bronze brooch of Collingwood's type Q. 7 of the 12 rectangular divisions of the fore-edge still retain alternate turquoise and red enamel. The pin is sprung, the head loop is lost; the brooch measures 2 inches in length. From the rubble filling the main furnace chamber, close to the stokehole.
11. Brooch of Collingwood's type Q. No enamel now remains on the fore-edge. The pin is sprung, the head loop is missing, and the brooch measures  $2\frac{1}{4}$  inches in length. From the courtyard, above the demolition.
12. Fragment of a brooch of Collingwood's type R iii. Without ornament except for the disk and acanthus leaves. It has lost its base and pin, which was sprung. The remaining fragment measures  $1\frac{1}{2}$  inches. From the rubble in the courtyard.

<sup>116</sup> All references to Collingwood are to pages or figures in his *Archæology of Roman Britain*, 1930.

13. A small and very well preserved bronze brooch of Collingwood's type R ii. It is without ornament apart from its disk and acanthus leaves. The pin is hinged, the hinge being an imitation spring. The head loop is missing, the length of the brooch is only  $1\frac{1}{8}$  inches. From above the rubble in the courtyard.

Of these 5 brooches none was found lower than the demolition rubble, while two were above it, suggesting that they may have been lost during, or after, the demolition of the building. Collingwood dates both types to the early-second century; however, the three brooches sealed in the rubble were clearly lost before the demolition, suggesting that these two types developed slightly earlier than Collingwood's general date; in fact by the end of the first century.

14. A small bronze chape from a sword or dagger scabbard. In shape similar to Collingwood's fig. 66 k, but pierced in the manner of 66.1. From soil removed by mechanical excavation.
15. A small fragment of very pure, beaten silver  $1\frac{1}{4}$  inches by  $\frac{1}{8}$  inch in size. It is roughly pelta-shaped and was possibly part of an officer's decoration. From the gravel which had washed over the north wall of the portico.
16. Several fragments of horseshoes, all unstratified. All are worn and lack calkins. In appearance they resemble the late-Tudor shoe published by R. P. Wright<sup>117</sup> rather than the Roman shoes from the German *Limes*.<sup>118</sup>
17. Many iron nails and T-clamps; various sizes up to 4 inches in length.
18. A small, circular, jet counter; dome shaped and  $\frac{5}{8}$  inch in diameter. From the imprints of the *frigidarium* floor.
19. A small, flat, circular counter of bone  $\frac{3}{4}$  inch in diameter. From the small yard.
20. A bone pin, broken into 3 pieces and incomplete. From the rubbish deposited outside the portico.
21. A possible *graffito*. A tile fragment 4 inches by  $3\frac{1}{2}$  inches and 1 inch thick. From just behind the north wall of the courtyard, towards its western end. Inscribed A P (fig. 19, H).

<sup>117</sup> AA<sup>4</sup>, XVII, p. 57.

<sup>118</sup> ORL. Feldberg Taf. VII.: *Das Röm. Kast. Saalburg*, Jacobi, p. 528, and Vol. II Taf. XXXXI: RLO. V Carnuntum, p. 78.

## SAMIAN WARE.

BY B. R. HARTLEY.

With three obvious exceptions and one probable one,<sup>119</sup> the samian submitted is all of first-century manufacture. It is a compact series, closely matched in general character by a group found recently at Inchtuthil in circumstances which allow its deposition to be dated to *c.* A.D. 90.<sup>120</sup>

None of the Red House material need have been made earlier than A.D. 80, none *necessarily* later than A.D. 85, though some could well have been imported later than that, perhaps as late as A.D. 105. The complete absence of early Central Gaulish ware is noteworthy, since this was certainly reaching Britain before the withdrawal from Scotland, *c.* A.D. 104, though perhaps only in small quantities at first. Its absence at Red House suggests strongly that the occupation of the site did not extend into the second century for any appreciable time.

The samian evidence leaves the possibility of abandonment of the site before the end of the first century unresolved. For what it is worth, the absence of the latest types of South Gaulish figured samian may be noted, but there are only six sherds from moulded bowls altogether: At the most it can only be said that the evidence would not be inconsistent with an abandonment *c.* A.D. 90.

1. *Form 29 (fig. 20, F).* Lying on top of the demolition rubble in the *caldarium*. A thick, clumsy bowl in a style familiar from the Pompeii hoard of A.D. 79. Perhaps the work of MOMMO (cf. JRS IV, pl. II, especially no. 5). *c.* A.D. 75-85.

2. *Form 29 (fig. 20, D).* Found in the later gravel floor in the small yard. A thin bowl of rather poor workmanship. The vertical palisade of the upper frieze, no doubt impressed with the edge of a gadroon stamp, occurs rarely on South Gaulish ware (e.g. Hermet, *La Graufesenque*, pl. 50, 4 etc.), but the fabric of this piece and its thinness raise the possibility of a Central Gaulish origin. Such

<sup>119</sup> (a) Form 37, Central Gaulish. Style of CINNAMUS. Antonine. Above the debris in the *caldarium*.

(b) Form 37. East Gaulish. Antonine. Unstratified; well above debris over the courtyard.

(c) Form 33. Central Gaulish. Antonine (?). Unstratified.

(d) Form doubtful. Found in the gravel above the aqueduct in trench C. Extraordinarily sandy fabric. Potter's stamp IVNIV[. This is perhaps the work of one of the second-century potters of that name which have never been satisfactorily studied. Antonine (?). The piece is heavily weathered.

<sup>120</sup> I am indebted to Professor I. A. Richmond for information about this.

vessels are rare in Britain (cf. JRS XXVII, 210ff.). Whatever the origin of this piece, however, it is certainly first-century and probably Flavian, though it could have been made before A.D. 80.

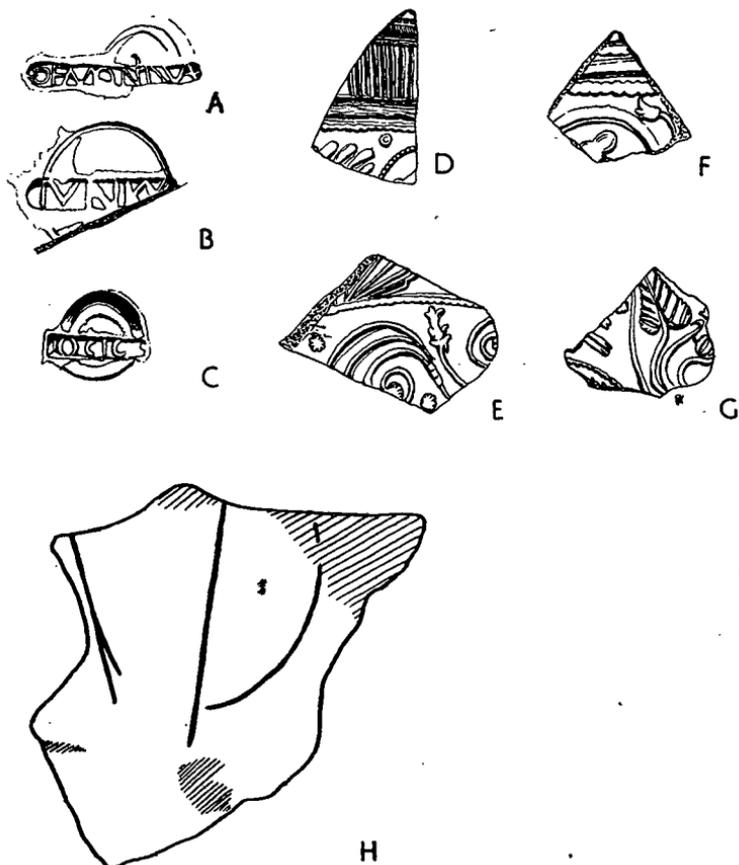


FIG. 20. SAMIAN WARE (stamps  $\frac{1}{1}$ , rest  $\frac{1}{2}$ ). POSSIBLE GRAFFITO ( $\frac{1}{2}$ ).

3. *Form doubtful.* Found in the later gravel floor in the small yard. The piece has been cut down, presumably for use as a counter. Flavian.

4. *Form 37.* From the lower gravel spread in the small yard. The blurred ovolo is reminiscent of the work of GERMANVS (Hermet, op. cit., pl. 99, 2). Flavian.

5. *Form 37* (fig. 20, E). In the clay of the main stokehole's northern packing. Scroll decoration. A similar scroll is found on bowls in the Pompeii hoard (JRS IV, pl. IX, 47). c. A.D. 75-90.

6. *Form 37* (fig. 20, G). In a small deposit of rubble lying on the clean sand surface of the small yard, under the earliest gravel floor. Scroll decoration with a leaf and general arrangement of the kind favoured by PATRICIVS and FLAVIVS GERMANVS (Knorr, *Terra-Sigillata-Gefässe des ersten Jahrhunderts*, Taf. 24; 50). c. A.D. 80-100.

#### *Plain vessels.*

*Form 15/17*. From the latest gravel surface in the small yard. A single example of the Flavian variety, which occurs sporadically to the end of South Gaulish manufacture. In Flavian contexts it is always greatly outnumbered by form 18.

*Form 18*. One vessel of form 18R (the large, spreading variety with rouletted circle on the base inside): at least 8 examples of the normal form 18, all with the rather deep profile usual in the last quarter of the first century. One, found in the courtyard (fig. 20, A), has the potter's stamp OFMONTANVS, which is almost certainly to be referred to MONTANVS of *La Graufesenque* (Hermet, op. cit., pl. 112).

*Form 27*. At least ten different cups, all South Gaulish. Internal grooves at the lip are normal, a groove around the foot-ring is present on the only one preserved. As is usual in the Flavian period, however, the grooving tends to be rudimentary. The only stamp, OCIC., has no precise parallel known to me, though OCICO is recorded from Besançon (Oswald, *Stamps on T.S.*, p. 223, where it is assigned to OCCISO of East Gaul on insufficient evidence). This piece is certainly South Gaulish (fig. 20 C). Unstratified, but joins with a fragment found amongst the demolition debris over the main drain in the small yard.

*Form 35/36*. Two different vessels, both South Gaulish. The form does not lend itself to close dating. One fragment comes from the rubbish tip outside the portico, the other from the small yard.

## COARSE POTTERY.

BY J. P. GILLAM.

It was not to be expected that the yield of pottery from a bath house, even one so completely excavated, would be large; nevertheless substantial portions of over fifty separate and recognizable vessels were recovered, together with numerous small fragments. A small representative selection is illustrated.

Nos. 1 to 5 were found in a rich deposit of rubbish, evidently removed from the building immediately before its demolition, on the original ground surface immediately outside the portico on the west of the courtyard.

1. Rim and shoulder fragment from a jar in light grey self-coloured fabric; typically Flavian or Flavian-Trajanic.
2. Many fragments from the rim and shoulder of a jar in light grey fabric with a darker surface; while this vessel lacks the scored line on the shoulder, it is contemporary with no. 1.
3. Three fragments from the upright flanged rim of a jar, in smooth greyish fawn fabric; cf. *Leicester*, fig. 37, no. 27, dated not later than A.D. 90-100.
4. Four fragments from the wall and reeded rim of a carinated bowl in light grey self-coloured fabric; typically Flavian or Flavian-Trajanic.
5. Several fragments from a shallow bowl with an internal flange; hard light grey gritty fabric; cf. *Clausentum*, fig. 19, no. 17, dated A.D. 70-80.

The many other fragments in this group were either securely of the same date as the fragments illustrated, or quite indeterminate. Taken as a whole the group is undoubtedly Flavian, consisting as it does of types which are either Flavian, or Flavian-Trajanic. It gives an indication of the date of the clearance of the site.

Nos. 6 to 9 were found in the grey silt at the bottom of the latrine, XII.

6. Several fragments making up the greater portion of a small rustic jar in light grey self-coloured unburnished fabric; this vessel, with its short sharply everted rim, scored line on the shoulder and sharp nodular rustication, is typologically Flavian rather than Trajanic.

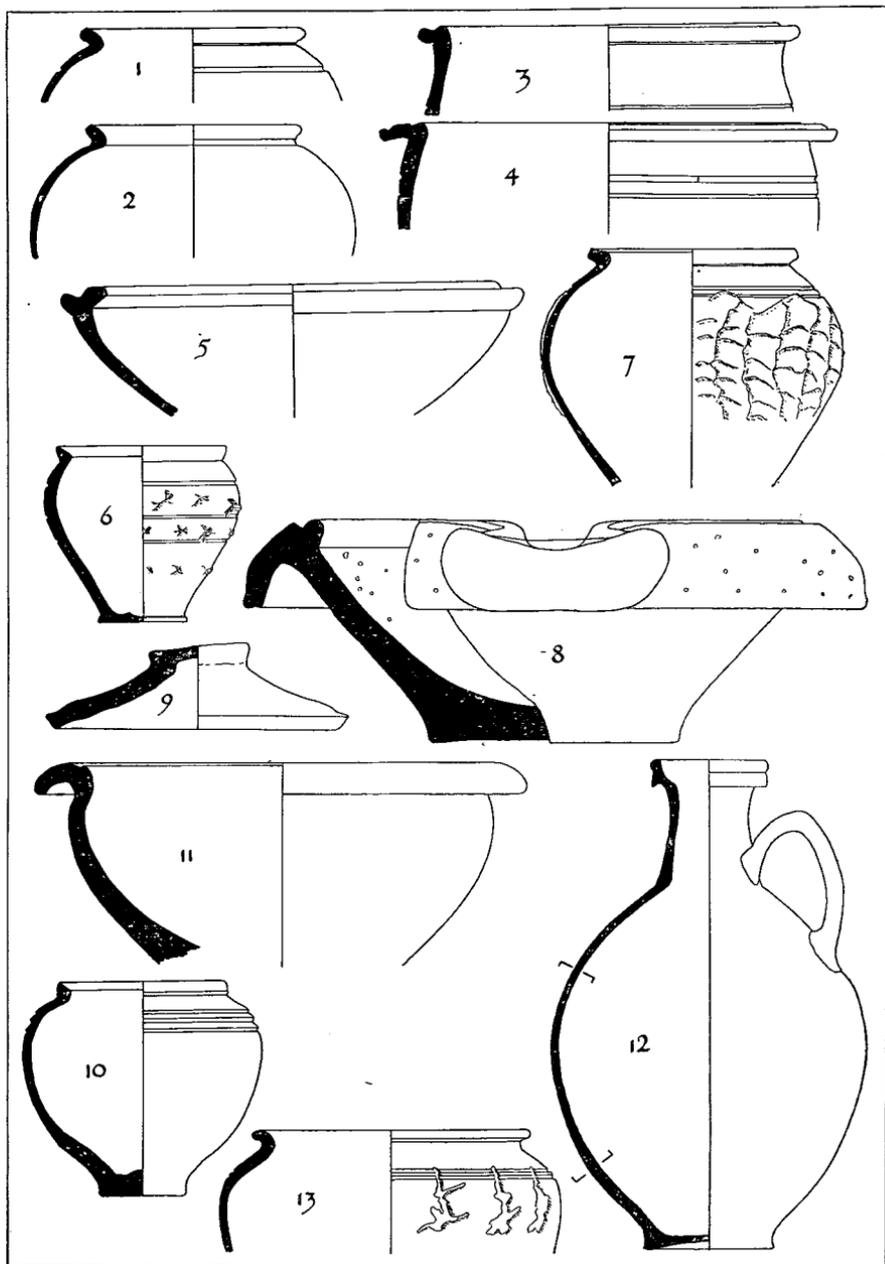


FIG. 21. COARSE POTTERY (4).

7. Many fragments from a rustic jar in light grey self-coloured fabric; typically Flavian or Flavian-Trajanic.
8. Mortarium, broken but complete except for damage to the applied portion of the spout; it is in bright orange self-coloured fabric with traces of grey and white grit both on the interior of the vessel and on the exterior of the rim; the interior of the vessel had been worn smooth by use before it was broken; the mortarium is of a type which is found in East Yorkshire and is comparatively rare in Scotland and at Corbridge; the type was clearly passing out of use at the time of the Agricolan advance, and should therefore be dated early Flavian.
9. Four conjoined fragments making up the greater part of a lid in light grey self-coloured fabric; lids of this simple type changed little from pre-Flavian to Hadrianic times, after which they became rare.

The group as a whole, including the unillustrated fragments, is securely Flavian; all the recognizable vessels are either Flavian, or of types which had a long life spanning that period; they indicate when the latrine was in use.

Nos. 10 and 11 were both found in the debris of demolition in the *laconicum*, IX.

10. Many fragments from a small jar in light reddish orange slightly gritty fabric; typically Flavian or Flavian-Trajanic.
11. Several fragments from a wide-mouthed bowl in soft orange-pink fabric; the character of the fracture indicates that the vessel once had a spout like that of a mortarium, a class of vessel from which the present vessel, which is without grit, differs in form. Although the vessel is unusual, there is nothing about it to suggest that it is not contemporary with no. 10.

All the recognizable fragments found in or below the debris of demolition on every part of the site were quite certainly of pre-Hadrianic type; they could well all be Flavian and indicate a late first-century *terminus post quem*.

No. 12 was found in the side of the dismantled water tank in the courtyard, in position which suggested that it had been broken during demolition.

12. Flagon, in whitish buff self-coloured fabric; graphically restored from many small fragments; there is an element of doubt about the precise height and precise form of the body; typically Flavian.

Demolition seems to have been in progress at a time when complete first-century vessels were still in use.

No. 13 was found in the lower burnt level in the small yard, XI.

13. Five conjoined fragments from a rustic jar in light grey self-coloured fabric; typically Flavian or Flavian-Trajanic.

Among the recognizable vessels which have not been drawn, from stratified deposits on the site as a whole, were two further lids, reeded rims from two carinated bowls, fragments from an early ring-neck flagon, a fragment from a low-bead mortarium, and many fragments from light grey jars, both plain and rusticated. The pottery from the topsoil was mainly of the same general character; three scraps of Castor-ware hunt cup, and four from a single plain-rimmed dish, with intersecting-arc decoration, in black burnished fabric, were the only later Roman pieces found. Fragments of glazed medieval and sub-medieval pottery and of clay-pipe stems were also found.

Without reference to the other datable material, the coarse pottery alone leaves it in no doubt that the bath house was in use in the last quarter of the first century and that it was demolished either before or soon after the end of that century. The pottery would not conflict with a conclusion reached on other grounds that demolition came appreciably before A.D. 100.

#### *References*

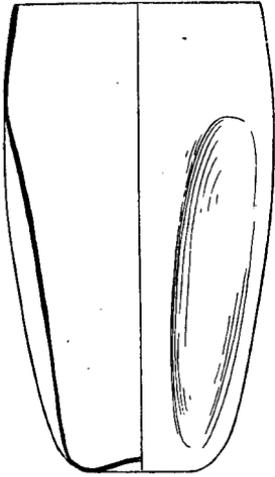
*Leicester*: Kathleen M. Kenyon: *Excavations at the Jewry Wall Site, Leicester, S.A.L.*, 1948.

*Claesentum*: M. Aylwin Cotton and P. W. Gathercole: *Excavations at Claesentum, Southampton, 1951-1954, H.M.S.O.*, 1958.

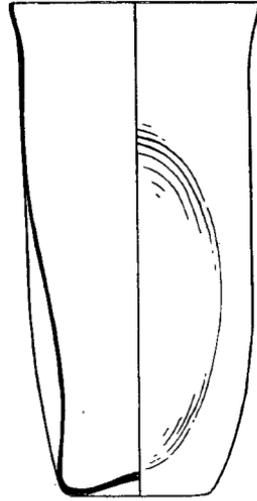
#### THE GLASS.

BY DOROTHY CHARLESWORTH.

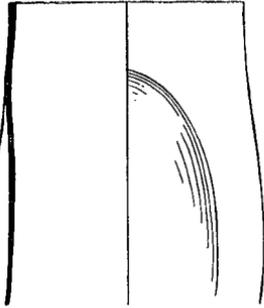
Most of the glass from this site was pieces of window-pane of green or blue-green metal about 3 to 5 mm. thick. It would let in light but be impossible to see through. Very few fragments of glass vessels were found. The small quantity of bottle glass included part of a cylindrical and a hexagonal or octagonal bottle as well as non-descript pieces from about six other bottles or flasks. Two fragments were of deep blue glass, a colour which is seldom used after



1.



2.



3.



FIG. 22. GLASS OBJECTS ( $\frac{1}{2}$ ).

the end of the first century, one of them part of a conical ribbed flagon.

*Pieces from the silt in the latrine:*

Fragments of two indented beakers (fig. 22, 1 and 2). These beakers are not a closely dated type. They are most common in the second half of the first century and are found throughout the Empire, e.g. at Pompeii, in first-century graves at Muralto, at Nijmegen in graves dated c. A.D. 30-70 and A.D. 70-105,<sup>121</sup> at Richborough in a pit with mid first-century material and at York, but they are not confined to that period. The two from Red House are in good blue-green glass, and have ground rims.

*Lying on the surface of the courtyard:*

Half a melon-shaped bead in blue-green glass (fig. 22).

*Amongst the debris in the tepidarium:*

Part of a glass bottle. Part of a hex- or octagonal bottle.

*Outside the laconicum amongst debris:*

Base of a cylindrical bottle.

*Outside the south wall of the main praefurnium:*

Shoulder of a cylindrical bottle.

*In the lower gravel and cooking debris in the small yard:*

Fragments of an indented beaker in a poor, yellowish-green metal, with a ground rim (fig. 22, 3).

*In the main drain between cold bath and latrine:*

Part of a deep blue, ribbed, conical flagon of first-century date, and many fragments of a window-pane which had been broken in Roman times by a stone throw which made a star-shaped break. Enough remained for most of the pane to be reconstructed and its size cannot have been less than 60 × 60 cms., which is large for a Roman pane. Kisa<sup>122</sup> quotes panes of 27 × 30 cms., 30 × 40 cms., and 33 × 54 cms., from various sites in Italy. Some examples in Pompeii Museum are c. 23 × 15 cms. It is not apparent how the Red House pane was fixed, whether it was leaded or mortared into place. There is no trace of mortar on any of the edge fragments.

*In the rubbish dump outside the portico:*

Fragments of deep blue glass of first-century date. Base of a small flask or beaker.

Amongst the unstratified material close to the surface were portions of at least four seventeenth-eighteenth century wine-bottles.

<sup>121</sup> C. Isings, *Roman glass from dated finds* (1957), p. 46, form 32.

<sup>122</sup> A. Kisa, *Das Glas im Altertume*, p. 362f.

## APPENDIX I.

## REPORT UPON THE LEAD PIPE FROM RED HOUSE.

1. Piece of pipe found *in situ* running from the east wall of the courtyard to the main drain in the small yard; 60 feet 9 inches in length. The pipe is pear-shaped in section,  $3\frac{1}{2}$  inches high and  $2\frac{1}{2}$  inches wide, and is made from sheets of  $\frac{1}{4}$ -inch thick lead, bent to shape with the join forming the ridged top of the pipe. The whole is in 10-foot lengths, joined by large, cast box-joints  $5\frac{1}{2}$  inches long and 5 inches deep.
2. 3, and 4. The two pieces of pipe from the main drain and the piece from the packing of the main stokehole were of the same internal bore as number 1. One of the drain pieces tapered to a narrow nozzle 1 inch in diameter.
5. The 10-foot length of pipe from the small yard was  $\frac{1}{2}$  inch less in internal diameter than number 1, although its joint was identical.

The composition of the lead in all these cases was the same: it had been purified and it contained no silver.<sup>1</sup>

## APPENDIX II.

## REPORT UPON INTERESTING STONES FROM RED HOUSE.

1. A small piece of worn Pumice. This is not local and almost certainly has been used as a scraper, to remove dirt, sweat or oil from the body.
2. A small basalt bleb. Probably used in the same manner as number 1.
3. Five small fragments of coal, partly coated, from outside the *tepidarium* stokehole. This is the earliest securely dated example of the use of coal from the north of Britain.

<sup>1</sup> Mr. Noel Shaw analysed the metal of the pipe.

## APPENDIX III.

## HUMAN AND ANIMAL BONES FROM RED HOUSE.

ABSTRACT.<sup>2</sup>

In the collection of somewhat fragmentary bones from this site were found specimens of the domestic species horse, ox, sheep/goat, pig and fowl, and the wild species red deer, roe deer and rabbit; the latter possibly intrusive. The Canidae are represented by one phalange; it is not possible to identify it as either wild or domestic. There were also three human fragments, two specimens of tibia shaft and one fragment of left parietal from the skull, the two sutural borders unsynostosed. None of these fragments show any characters of particular anatomical interest. The ironstaining on one tibia shaft suggests that it was included secondarily in the group in which it was found.

Of identifiable specimens ox appears in greatest number, presumably the major food animal. Horse and sheep are considerably fewer in number, but nearly equal each other; at least a quarter of the sheep are immature. Fowl and pig are even fewer and half the specimens of pig are immature. The wild species represented are very scarce.

The largest part of the collection of bones from this site is of specimens that have been longitudinally split and splintered, precluding specific identification. They are, however, all from large animals, presumably horse and ox, the latter probably dominant as in the identifiable specimens.

## APPENDIX IV.

## REPORT UPON THE TILES AND PLASTER FROM RED HOUSE.

Every attempt was made to keep all pieces of tile and plaster from the site. The resultant collection weighed several tons, and comprised many thousands of pieces, most of which were too small

<sup>2</sup> A fuller report on the human and animal bones from Red House will appear in the next volume.

to be informative. Several large or restorable fragments and a small number of complete tiles were found. From them the following was deduced.

#### A. TILE.

The tiles fall into six groups: *pila* tiles, building tiles, box tiles, pipe tiles, roof tiles and those of unusual shape or unknown function.

1. *Pila tiles*. The tiles used in the hypocaust chambers, occurring in four sizes:

(a) Small.  $6\frac{1}{2}$ "-8" square  $\times$   $1\frac{1}{2}$ "-2" thick. Used in the *laconicum*, and occasionally elsewhere—e.g. *caldarium*.

(b) Medium. c. 9" square  $\times$  2"-2 $\frac{1}{2}$ " thick. Used in the *tepidarium* and *caldarium*.

(c) Large. c. 11" square  $\times$  2"-2 $\frac{1}{2}$ " thick. Some are as much as 3 $\frac{1}{4}$ " thick. Used in parts of the *caldarium*, and possibly as underslabs in the *laconicum*.

(d) Extra large. c. 12"  $\times$  c. 16"  $\times$  2 $\frac{1}{2}$ "-3". Used to bridge the tops of the *pilae*, forming the underslabs of the suspended floors. Some used elsewhere, e.g. in *laconicum*, as bases for *pilae*.

2. *Building tiles*. These differ from the above in that they are more finely finished, and are always thinner. There are four sizes:

(a) Small. c. 7"  $\times$  6 $\frac{1}{2}$ "  $\times$  1", sometimes up to 1 $\frac{1}{2}$ " thick. Mostly from the walls and vaulting of the *frigidarium*; 97% of the 3,000 tile fragments from the room were of this type.

(b) Medium. i. 11"-12"  $\times$  8"  $\times$  2"-2 $\frac{1}{2}$ ".

ii. 11"-12"  $\times$  10"-11"  $\times$  2"-2 $\frac{1}{2}$ ".

Both medium sizes were used in the *frigidarium*, *caldarium*, *tepidarium*, and especially in stokeholes. Few are now complete.

(c) Large. Used especially in the construction of stokeholes, either complete or broken. 11"-12"  $\times$  14"-15"  $\times$  2"-2 $\frac{1}{2}$ ". Found in all three stokeholes *in situ*, always with smaller tiles.

3. *Box tiles*. The most informative fragments were from the courtyard; some of these could be restored to almost their original size. Fragments of 1 nearly complete tile and 5 out of 250 smaller fragments had a rough salt glaze on them, both inside and outside. It is not known whether this was intentional or accidental. The glaze was of a very rough nature. An insufficient number of tiles of this class was found to indicate jacketting; the most likely use is in chimneys similar to that in the *laconicum*, but built of square tiles. The size is 13"  $\times$  4 $\frac{1}{2}$ " square, externally (3 $\frac{1}{2}$ " square internally). Externally the corners are rounded, internally square.

4. *Pipe tiles*. These were used as wall chimneys, but fragments found without adhering mortar seem to have been used elsewhere. There are three sizes:

(a) Small. Well made pipes of bluish colour, which might almost pass for pottery. External diameter 4", thickness  $\frac{1}{4}$ ". No complete specimen; largest restored piece was 6" long, of which  $1\frac{1}{2}$ " was neck.

(b) Medium. Thicker red earthenware pipes. 17" high, 7" maximum external diameter, c.  $1\frac{1}{4}$ " thick. Diameter of the neck  $2\frac{1}{2}$ ". Normal size of the tiles found *in situ* as chimneys in the *laconicum*. Some also found in the yard (XI), but their use there is unknown.

(c) Large. Very crudely made and not wheel turned. Largest piece is  $11\frac{1}{2}$ " long,  $1\frac{1}{2}$ " thick. These could well be crude *imbrices*.

5. *Roof tiles*. *Imbrices* mostly indistinguishable from large pipe tiles (4c above). The largest piece of *tegula* recovered was 12" x 8" with flange  $1\frac{1}{2}$ " high; it was  $1\frac{1}{4}$ " thick. Very few roof tiles were found, suggesting that the demolition party had taken considerable care with the tiles, and that only portions of the building were covered with them.

6. *Other types*.

(a) Tiles similar to *tegulae*, but with an irregular flange. The flange is in the form of a truncated triangle  $3\frac{1}{2}$ "- $4\frac{1}{2}$ " at the base,  $1\frac{1}{2}$ "-2" at the top, and  $2\frac{1}{2}$ " high. As all the fragments of this type of tile were small it is not certain whether the flange was repeated at intervals all the way along the edge or whether it only occurred at the ends of the tiles. The use is unknown.

(b) Tiles similar to *tegulae*, but stepped down in thickness along the edges instead of being flanged. Some found with mortar, others used in stokeholes. No size known except thickness ( $1$ "- $1\frac{1}{2}$ ""). Use unknown.

(c) Tiles used in the building of the main pillars of the courtyard. Stones were the principal material, but tile courses were used. Some were thin building tiles roughly curved by chipping, others must have been made specially for the purpose. These were in two sizes,  $7\frac{1}{2}$ " long and 7" wide across the arc; quadrants of a circle of 7" radius, each  $2\frac{1}{2}$ "-3" thick.

#### *Decoration.*

The small building tiles were decorated with thin line patterns applied with a seven- or eight-toothed comb. The larger building tiles and the *pila* tiles had shallow, wide finger- or stick-marks on

them. Occasionally the small building tiles had broad, shallow marks: one has both types. No large tiles had comb patterns.

Figure 23 shows the decoration on comb-marked tiles, and three

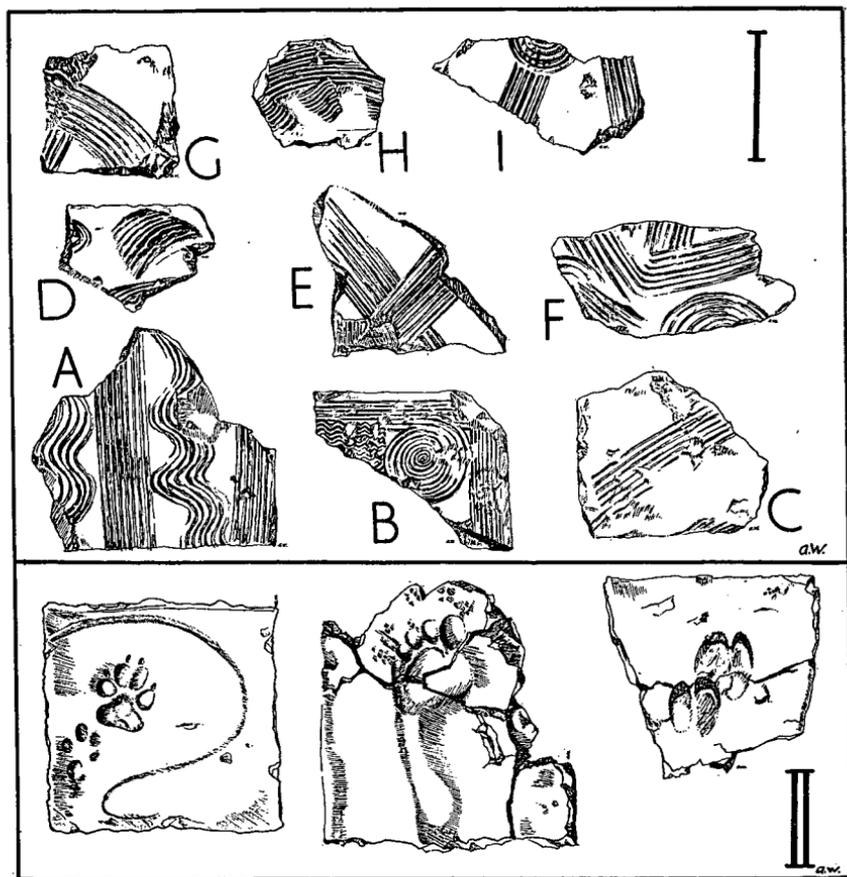


FIG. 23. TILE MARKS ( $\frac{1}{8}$ ).

of the more interesting foot imprints. Section I is comb-patterns, all on thin tiles. A is by far the most common design. G, E and C are much rarer, but occur consistently. B and I (which may be portions of the same basic pattern) occur only in room III, but in a noticeable number of cases there. D and H are rare, even in

room III, while F is highly irregular, and unique. The tiles in Section II are described below; items (c), (d), (e).

A number of tiles had human or animal prints on them.<sup>3</sup>

(a) Thin tile with seven indistinct human fingerprints.

(b) Thin patterned tile with three human fingerprints; the ridges of the skin are clearly visible.

(c) Print of a human left foot, made by a male in late adolescence or early twenties. A normal healthy print entirely lacking in irregularities. The skin pattern of the toes is visible under a magnifying glass; its presence shows that the youth normally wore sandals or some form of foot protection. The mark is well made, with the weight on the ball of the foot. As there is no blur to the edges of the print it must have been made deliberately (fig. 23, II).

(d) Complete *pila* tile, with a very large and distinct footprint of a dog. The depth of the imprint suggests that the clay was extremely wet or that the creature was made to place its foot on the raw tile; the presence of a second extremely faint print near the first one supports the latter theory (fig. 23, II).

(e) Thin tile bearing a pair of slots of (probably) a red deer (fig. 23, II).

(f) (g) (h) Tiles with single footprints of large dogs, incomplete.

(i) (j) Tiles with two imprints, each of a large dog.

(k) Tile with a single imprint, probably a dog, but possibly a fox.

(l) Tile with two imprints, one a large dog, the other possibly a fox.

## B. PLASTER AND OPUS SIGNINUM.

*Porch:* Many pieces, without colouring or unusual features.

*Courtyard:* Few pieces of interest; 6 curved pieces from shaft of main columns, 1½"-2" thick, without colour.

*Frigidarium:* Of 4,126 pieces examined, only 13 were between 4" square and 12" square. 55 pieces were coloured—22 red, 7 white with a 3" blue band between incised lines, 26 with traces of blue paint. 8 pieces were from the rebates of windows or doors, 4 were painted as described in the text above. 2 pieces came from the groin of the apse and the room. 18 pieces had the imprints of building tiles (small size) on them, but only one was large enough to show the curve of the vault.

<sup>3</sup> The human prints have been examined by Dr. C. H. Tonge, Reader in Anatomy, Durham University Medical School; the animal prints by Mr. A. M. Tynan, Curator of the Hancock Museum, Newcastle upon Tyne.

The corner and riser of one of the bath steps remained, and 4 other pieces of *opus signinum* from the bath and 22 from the walls were found. All were undecorated.

*Tepidarium*: 299 fragments of plaster, all small and battered; two possibly painted red. Fragments of suspended floor (only one informative) also occurred.

*Tepidarium praefurnium*: 1,048 small and battered fragments of white plaster.

*Caldarium*: 481 fragments of white plaster. 26 had traces of blue paint, 3 had a blue and white edge and one a 3" blue band on a white background. 2 bore traces of red paint. No informative pieces of suspended floor remained.

*Caldarium praefurnium*: 62 fragments of white plaster, 2 pieces of *opus signinum*.

*Laconicum and praefurnium*: 3,748 pieces of plaster. 7 pieces showed the curve of the vault. No blue, but two pieces possibly red. No *opus signinum*.

*Yard and latrine*: 38 battered fragments of white plaster.

## APPENDIX V.

### REPORT UPON THE CHARCOAL AND WOOD FRAGMENTS FROM RED HOUSE.

BY DR. W. A. CLARKE,

*Senior Lecturer in Botany, King's College, Newcastle upon Tyne.*

1. Charcoal from the main stokehole and its *praefurnium* (VII); birch and oak.
2. Charcoal from *tepidarium* stokehole and its *praefurnium* (V); oak.
3. Charcoal from the 3" layer of silt and filth lying in the latrine bottom (XII); birch.
4. Charcoal from the cooking fires in the yard (XI); birch and oak.
5. Charcoal from pit I in the yard (XI); oak.
6. Charcoal from the courtyard (II); birch.
7. Rakings from the *laconicum* stokehole and its *praefurnium* (X); oak, elm (*ulmus glabra*) and coal.

8. Charcoal from the rubbish dump to the west of the porch (I); birch and oak.
9. Charcoal from the fuel store (VIII); oak.

It will be seen that the majority of the wood is oak and birch. Sample 7 is of particular interest as it contains coal (cf. that found beside the *tepidarium* stokehole yard, Appendix II B).

10. Fragment of wood embedded in the mortar make-up of the flagged floor of the *frigidarium* (III); oak.
11. Fragments of wood from just outside the south wall of the *tepidarium praefurnium*; possibly from the modern drain trench, but more probably Roman; hazel.
12. Three post stumps from the north wall of the courtyard (II):
  - i.  $30'' \times 3\frac{1}{2}'' \times 3''$ , roughly squared, pointed end.
  - ii.  $25'' \times 3\frac{1}{2}''$  diam., roughly rounded, pointed end.
  - iii.  $20\frac{1}{2}'' \times 3\frac{1}{2}'' \times 3''$ , roughly squared but twisted and knotted, very blunt point.
 All three are oak.

Four of these five examples are oak, and the fifth may not be Roman.

## APPENDIX VI.

### REPORT UPON VARIOUS STAINS FROM WALLS AND FLOORS AT RED HOUSE.

BY W. A. CAMPBELL.

*Department of Chemistry, King's College, Newcastle upon Tyne.*

1. Sample of black staining from matrixes of floor of *frigidarium*.
2. Sample of black staining from wall of *laconicum*.
3. Sample of yellow staining from wall of *laconicum*.

None of these contains elementary carbon, therefore none is a soot. Apart from varying quantities of siliceous material, all are compounds of iron, mainly hydrated oxides.

## APPENDIX VII.

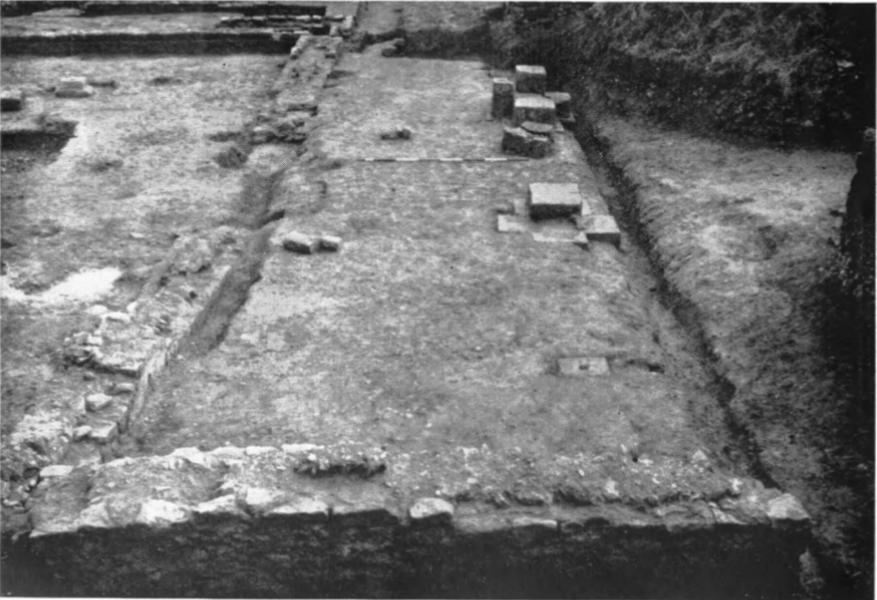
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1. Latrine from west.



2. Portico from north.

2, Photo. R. Wallis.



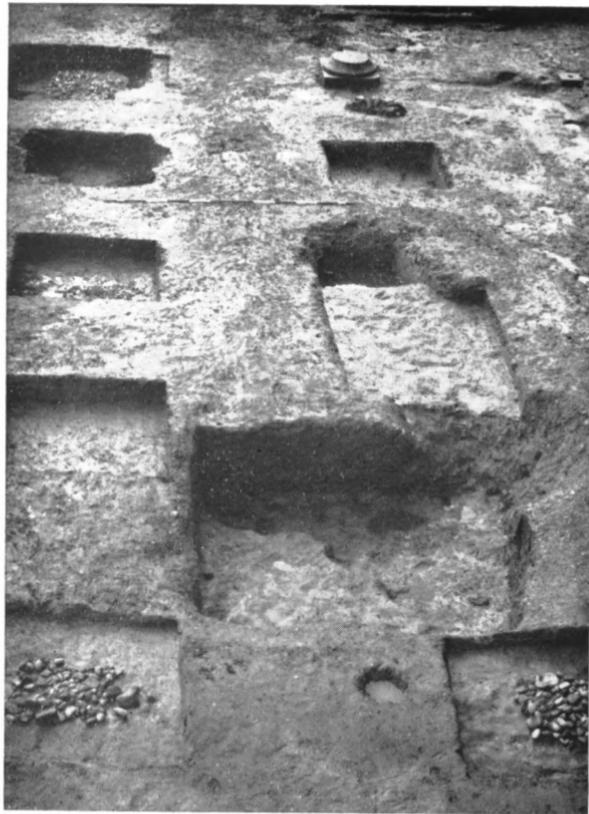
2. North wall of courtyard showing second face and bulge.



1. South pier of portico from west.



3. East side of courtyard during excavation.



1. Courtyard: Test holes for pillars and water-tanks in foreground.  
Photo. R. Wallis.



2. Water pipe from east.



1. East end of pipe in courtyard.



2. East bone-pile, lying on sand.



3. *Laconicum* and *praefurnium* cleared.



1. Main pillar base, courtyard.



2. Doorway room II-III showing offset.



1. Matrices in *frigidarium* floor.

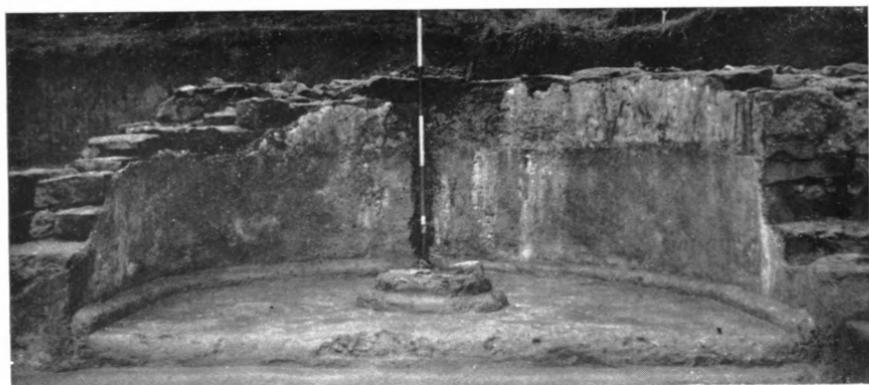


2. Floor and step of annexe.

Photos. R. Wallis.



1. Moulding and pick marks: N. wall *frigidarium*.



2. Alcove after removal of basin.



3. Cold bath from north.



2. N.-E. corner bath, internal steps.



1. South end *frigidarium*, annexe step.



3. North end *frigidarium*, annexe step.



1. Outline of lowest step to cold bath.



2. Alcove with basin.

1. Photo. R. Wallis.



1. *Laconicum*, suspended floor and *pilae* fragments.



2. *Laconicum*, *pilae* bases *in situ*.

Photos. R. Wallis.



2. Chimney flue, *laconicum*.



1. Level of suspended floor, stokehole *laconicum*.



3. West cheek of *laconicum* stokehole.



FIG. 1.

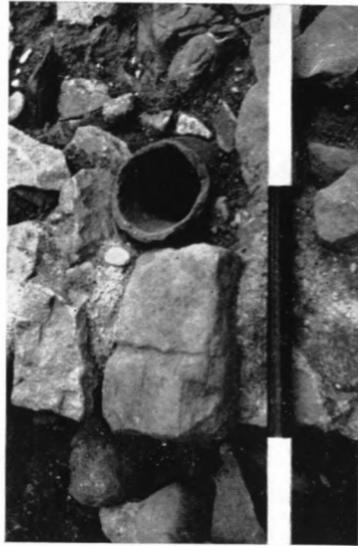


FIG. 3.



FIG. 2.



FIG. 4.

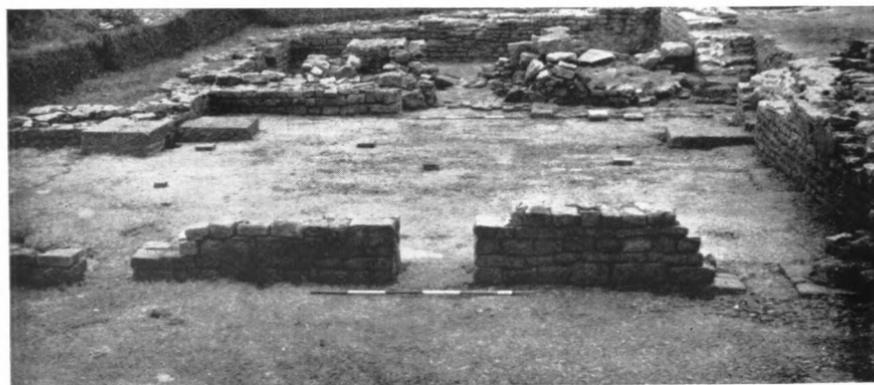
1. Lime rubble, *laconicum*.
2. Second floor *laconicum praefurnium*.
3. Pedestal of basin *frigidarium*.
4. Chimney flue and outer wallface *laconicum*.



1. Southern portion of building from west.



2. Latrine: Beam holes in south wall.



3. *Tepidarium-caldarium* wall from *tepidarium*.



1. *Tepidarium praefurnium* from south.



2. Main drain blocked by wall foundations.



1. Fuel store from south.



2. Caldarium, south apse.



1. *Caldarium* from south.



2. Main *praefurnium* from south.



3. Main stokehole from west, final period.



1. Main stokehole from east, earliest period.



2. Main stokehole, period I. N. face, N. check.

