The Roman Villa at Denton, Lincolnshire

PART II. THE BATH-HOUSE AND WELL

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Editor’s Note — Part I, the report of the excavation of the villa itself, by Mr. J. T. Smith, appeared in the Lincolnshire Architectural and Archaeological Society Reports and Papers, Vol. 10, part 2, 1964 and details of the historical and geological background to the site are given there. A note on the mosaics from the villa by Dr. D. J. Smith was omitted from the original report and is published here as an appendix (Appendix V). Drawings of the pottery and small finds from the villa did not appear in the report although descriptions were published. These drawings are now to hand and are published here as figures XV and XVI. The descriptions are reprinted from the original report as Appendix VI.

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THE EXCAVATION

INTRODUCTION AND CIRCUMSTANCES OF EXCAVATION

The position of the bath-house and well was approximately 300 feet south-west of the villa. (Grid Ref: 1 inch O.S. Map 122. 43/874 313; Area Plan, fig. V). The site was discovered in April, 1959, as the result of a survey, by the writer, of a group of three quarries at Harlaxton, during the examination of a group of Bronze Age barrows under destruction in Hungerton quarry.

The top soil had been removed by scraper down to the surface of the underlying limestone. The site of the bath-house and well showed in the clean natural limestone as two large oval-shaped patches of dirty and burnt rubble. Other smaller patches in the vicinity were also examined at the time of excavation.

The excavation of the bath-house was carried out for the Inspectorate of Ancient Monuments of the Ministry of Works by kind permission of the owner Sir Oliver C. E. Welby, Bt., (Welby Estates) and Messrs. Stewarts and Lloyds Minerals Limited who gave every facility to the writer during the work. The duration of the excavation was from 13th to 31st July 1959, with a labour force of four men and one volunteer. The excavation of the well (some 30 feet south-east of the bath-house) was deferred until its destruction was imminent. This occurred in early February, 1961; the well shaft was systematically destroyed by the machine and the well-base examined by hand by the writer and his colleagues.

THE EXCAVATION

As all Roman occupation and later levels had been removed by scraper from over the bath-house and its surroundings, the patch of rubble representing the foundations of the bath-house was cleared in two halves. An east-west baulk was left in position, until the final stage of the work, on the long axis of the site; this was drawn and is represented as Section A - B fig. VII.

THE BATH-HOUSE (Figs. VII and XII)

The bath-house was of rectangular plan, completely detached from the villa. It consisted of a main hypocaust (2) with a well-used furnace and stoking pit (1) at the west end. At the east end was an unheated room (3) which had contained the main entrance. On the south side of the main hypocaust were hot and tepid baths (4 and 5) of semi-circular shape. A cold bath (6) of the same shape was attached to the south side of the entrance room on the same alignment as the hot and tepid baths. Drains (F.11 and 14) carried away waste water from the baths. Wall trenches (7 and 8) were found on the north and south sides of the structure.

The foundations had been scraped down to below floor level over the whole of the structure, with the exception of the cold bath and the stoking pit. The interior was filled with rubble (Layers 1, 2, 4 and 7) sealing soot and ash levels (Layers 3, 5 and 8). The rubble represents the remains of a deliberate breaking up and wrecking of the bath-house at the close of its useful life and consisted of limestone wall blocks and pieces, especially at the east end of the structure; large and small pieces of irregularly-shaped tufa; a great deal of buff-brown coloured mortar (No. 2) from the destruction of the walls; hard pink cement derived from the floor and the baths (Nos. 4 and 5); painted wall plaster; broken red clay tiles and bricks and box flue tiles; a small quantity of broken blue-green slate roofing tiles (No. 10); mosaic and larger tesserae; fragmentary human bones and charcoal (samples Nos. 1 and 2).
THE MAIN HYPOCAUST (CALDARIUM and possibly TEPIDARIUM) (Fig. XII)

The length east to west was 15 feet 3 inches by 7 feet 6 inches north to south, the average depth 1 foot 3 inches from the scraped surface to floor level. The north wall had been breached in antiquity and consisted, where undisturbed, of three courses of wall slab laid horizontally. At the base of the foundation trench on the north exterior was an offset of average width 4½ inches. The south wall had two oblique apertures to conduct heat to the hot and tepid bath hypocausts. The average depth of this wall was 1 foot 5 inches and consisted of four courses of slab. The west wall, containing the centrally placed entrance from the furnace, consisted of the burnt remains of four courses of slab. The north side was particularly burnt red blue, and the wall slabs had been reduced to almost powder form (No. 9). The floor of the hypocaust (Layer 9) was composed of hard pink cement (No. 1) laid on the underlying natural limestone. This was of average depth of 1 - 1½ inches and extended into the furnace channel and the baths hypocausts. It had been penetrated by holes against the north wall and at the entrance from the furnace. Many impressions of boot nails were found all over the floor surface and in the bath hypocausts. Bedded on the floor were the remains of 8 pilae composed of square red clay bricks (10 × 10 × 2 inches). The positions of 9 others were indicated by cement patches. These are shown on the plan. The pilae were attached to the floor with hard pink cement, but the mortar between the individual bricks was sandy in nature and of buff colour. The pilae had been sheathed or “jacketed” with pink cement facing. Originally there had been a total of 28 pilae, consisting of seven rows of four, equally spaced. Evidence of repair was seen at two places at the west end; against the west wall on the south side where there were 6 courses of dissimilar tile and brick forming a roughly constructed replacement, and two pilae to the east where a patch of pink cement at three course height had sealed grey ash. The interior of the hypocaust walls were burnt light red in colour which deepened to brick red on the west wall and the west sides of the north and south walls. A coin of Valentinian I (No. 2) was found in soot (Layer 5) on the floor.

THE FURNACE AND STOKING PIT (Fig. XII)

The furnace was composed of a tapering channel between flanking blocks of masonry. The width of the channel narrowed from the stoking end where it was 2 feet 5 inches at the top and 1 foot 8 inches at the base to where it entered the main hypocaust and was 2 feet 1 inch at the top and 1 foot 7 inches at the base. Its average depth was between 1 foot 2 inches and 1 foot 4 inches. Both sides of the channel were composed of two courses of sandstone blocks burnt red and blue and whitish-grey-green in that order from the interior outwards for a depth of between 6 to 10 inches.

The stoking pit consisted of a shallow fan-shaped hollow cut in the natural limestone. Its floor sloped gently from the west to where it entered the furnace channel. Heavily charcoal-flecked ash lamination covered the floor and from this level (Layer 8) were recovered two coins (Nos. 3 and 4) of Valens together with grey pottery sherds, animal bones, clinker (slag No. 1), fragments of window glass, (fig. IX, 6 and 7) and parts of two iron spikes or nails (A.M. No. 9795). A charcoal sample is identified as oak or possibly chestnut (No. 2).

THE ENTRANCE ROOM (FRIGIDARIUM) (Fig. XII)

The whole of the east wall and parts of the north and south walls had been carried away by the scraper as well as the internal floor level. Little can be said about the main entrance into the establishment or the doorways into the main hypocaust chamber and the cold bath. It can be suggested that there was a considerable difference in level between the floor levels of this room and the cold bath, and that there were, no doubt, steps or at least one step, involved. It is usual for there to be a stepped approach into a cold bath.
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THE HOT BATH HYPOCAUST (Figs. XII and XIII)

This consisted of 4 courses of limestone slab above an internal offset 4 to 5 inches in width and 3 inches above the level of the pink cement floor. The average depth of internal walling above the offset was 1 foot 4 inches. The floor level abutted against the lower edge of the offset. Four equally placed pilae were found in situ. These were of the same construction as those in the main hypocaust. Cement droppings from the construction of the pilae were found on the floor. The base of a patch of pink cement was found on the scraped surface of the south wall of the hypocaust; this has been interpreted as the cement bedding of the waste pipe or channel (not found) to convey waste water from the bath into the drain (F. 14) on the exterior. The rubble filling of the bath hypocaust contained many pieces of the hot bath (No. 6) which had been broken up when the bath-house was robbed of its re-usable materials. The bath had been composed of hard pink cement; the interior face, which was smooth, was tinted sea green. Pieces of pink cement quarter fillet mouldings; pieces of painted wall plaster in white, red and white, maroon, and white with purple stripes; mosaic and larger tesserae and a large T-shaped iron spike (fig. IX, No. 15), were also found in the filling.

THE TEPID BATH HYPOCAUST

This was similar in construction to the hot bath hypocaust. There were 6 courses of limestone slab above an internal offset 6 inches in width and 3 inches in depth to floor level. On the west side of the hypocaust the offset was covered by pink cement which extended up the wall for 10 inches. The cement floor abutted against the lower edge of the offset. Three equally spaced pilae were found in situ and the positions of two others were seen by patches of cement on the floor. A large hole had breached the north wall and had penetrated the floor level. The rubble filling contained pieces of the broken up bath which had been constructed of hard pink cement. The internal surface was smooth but not tinted as the hot bath. A few pieces of wall plaster and tesserae were also found in the rubble.

THE COLD BATH (Fig. XIII)

The bath was of semi-circular shape and showed two phases of construction. The primary phase which was secondary to the rest of the bath-house, consisted of a D-shaped wall attached to the exterior face of the south wall of the entrance room. This was composed of 4 remaining courses of thin limestone slab from the base of the foundation trench. The floor and walls of the interior of the bath were rendered in hard pink cement of close texture, similar in composition to the hot and tepid baths. The concrete floor was of average thickness between 2 and 2½ inches, laid on natural limestone. Its depth was 7 inches from the scraped surface of the walls at the edges to 8 inches deep in the centre. The cement sides of the bath were an average thickness of 1 inch. A north-east to south-west diagonal crack in the floor was no doubt the reason for the resurfacing. 2 - 2½ inches of buff coloured sandy mortar, which was hard in places, had been placed over the cracked floor and 5 inches of hard pink cement laid on top to form a new floor. At this time the walls of the bath were also resurfaced with ½ - ¾ inches of the same material. The depth of the secondary bath floor, which was flat, from the scraped surface of the walls was 2 inches. A patch of pink cement was found on the scraped surface of the south wall, similar in texture and position to that in the south wall of the hot bath hypocaust. This indicated the position of the waste pipe (not found) or channel emptying into a north to south drain (F. 11) on the exterior. From its position the waste pipe would have been at least 2 inches above floor level.

THE WALL TRENCHES (Figs. XII and XIII)

The north trench was 3½ feet east to west by an average depth of 1 foot 8 inches. The north side sloped steeply to the base which was 1 foot 6 inches in width. Both ends were
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rounded. The filling was charcoal-flecked mixed buff-brown clayey soil and limestone. The upper filling contained a piece of thick lead sheet; half a whetstone (Fig. IX, No. 17) and two rim sherds of colour-coated shallow dishes (similar to fig. X, No. 31).

The south trench had an average width at the top of 3 feet 6 inches. The average depth against the wall face was 3 feet. The sides sloped steeply to the base which had an average width of 2 feet 4 inches. It will be seen from the plan that there is a difference in size and depth of the trench from beneath the drain (F. 11) eastwards, on the exterior of the cold bath. This indicates the extension of the trench when the cold bath was added to the main structure. The filling of the trench consisted of dark clayey soil with a great deal of limestone rubble. The filling was charcoal flecked and contained in its upper half, burnt limestone, tile fragments, four iron nails, thirty fragments of window glass and pottery rim sherds (Fig. X, Nos. 22 - 24) and other pottery sherds of the 4th century AD. Coins 5 and 6 of Valens and Gratian, at a depth of 13 inches and on the base of the trench respectively, were found at the positions indicated on the plan. In the upper filling of the trench mixed with the clayey soil and rubble were pieces of blue Estuarine Clay. This is significant as it indicates most probably that the well construction was carried out before, or at the same time as, the trench was filled in. This clay occurs naturally some 17 feet below the surface of the limestone (see Part 1, p. 103).

THE TWO PHASES OF THE BATH-HOUSE (Figs. VII, XII and XIII)

The primary phase of the bath-house consisted of the whole of the structure with the exception of the cold bath and the exterior walling of the hot and tepid baths hypocausts. It was evident from an examination of the construction of this that additional walling had been added to the primary structure at the same time as the cold bath was attached. The scraped surface of the wall showed the primary wall to be 2 feet 3 inches in width with a vertical rendering of pink cement of average thickness of ½ an inch. On the outside of this a 1 foot width of limestone walling had been built against it. Finally, a pink cement rendering between ½ and ¾ inch in thickness had been applied to the exterior.

THE BATH-HOUSE DRAINS (Fig. VI and VII)

These were narrow gullies, U-shaped in section. Only the lower portions remained, the upper parts having been scraped away. F. 14 an east to west length of drain to convey waste water away from the hot and tepid baths, was 1 foot in diameter and 6 inches in depth. No pit or sump was found at its west end. A fragment of window glass and part of a bronze bracelet or bangle (Fig. IX, No. 1) were found in the filling. F.11 was the drain for the conveyance of waste water from the cold bath and led into a pit some 20 feet south of the bath. It was 6 inches in width and barely 3 inches in depth. A mortarium rim sherd (Fig. X, No. 26) was found in the centre of the filling of the pit.

THE WELL. FIGS. VIII AND XIV.

During the period between the discovery of the well and its destruction, Stewarts and Lloyds had left it standing intact on a limestone projection in the quarry face. This admirable arrangement facilitated its controlled destruction in February 1961. The machine grab was able to lift, fairly accurately, 2 feet sections of the well shaft and filling, and to scatter these on the surface where the material could be examined. This method continued successfully until the surface of the Estuarine Clay was reached, when the machine was stopped. The bottom 2 feet of filling of the well-base reservoir were then examined by hand.

The well was square in plan at the top, 2 feet 10 inches north-west to south-east by 3 feet north-east to south-west. Its total depth from the surface of the scraped quarry was 19 feet. It consisted of a limestone block stonning within a rubble filled well-pit of roughly
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circular shape, which had been dug down to a depth of 9 feet. At this level the upper smaller natural limestone changes to large heavy slabs. From below this level the well shaft continued as a roughly circular hole cut through the heavy slab and the underlying band of soft sand to the surface of the blue Estuarine Clay, which occurs 17 feet below the surface at this spot. In this a basin-shaped reservoir had been dug to a depth of 2 feet, and this formed the well-base. Water action had eroded the sides of the well shaft where it had penetrated the band of soft sand, and an inverted mushroom-shaped cavity had been formed in this. The stonework was dry-stone built, the lowest course resting on the surface of the heavy natural slabs. During destruction the stonework was seen to be intact and to maintain its width from the surface to this level.

The upper 17 feet of well shaft filling consisted mainly of rubble, which included limestone wall blocks, large and small pieces of irregularly-shaped limestone, some of which were burnt pink-red; broken red clay roofing tiles of usual pattern; a few pieces of flat brick and fragments of box flue tiles, all with a criss-cross scored pattern. At about 17 feet just before the clay base was reached, was a deposit of some 20 blue slate roofing tiles, only one of which was whole. These were of normal pointed type with nail holes at their upper ends and are similar to others found at Thistleton (Rutland) Site 1, and the villa at Great Staughton (Hunts.).4 A few cattle bones occurred at this level. A few pieces of hard pink cement were seen in the top four feet of filling, together with a wall sherd of hard grey ware and a wall sherd of red-brown colour-coated ware. A rim sherd of a mortarium (Fig. X, No. 29), occurred on the west side of the filling a few inches above the level of the Estuarine Clay. At a depth of 8 feet on the south-west side of the well was found the base part of a lathe-turned stone pillar (Fig. XI, No. 34). This was broken into three pieces by the machine.

THE WELL-BASE

The filling of the reservoir, cut into the Estuarine Clay at the base of the well, was in a waterlogged condition, and organic matter was found in a preserved state. The filling consisted of two deposits, an upper and a lower level that differed in colour, texture and composition. The upper filling had spread into the cavity left by the erosion of the soft sand above and was composed of sandy, black and orange-streaked mud (cf. Table I, A.M. No. 610130) and limestone pieces, with patches of organic matter. The sandy nature of this deposit was no doubt due to the erosion of the soft sand. The filling also contained broken pieces of red clay roofing and box flue tiles; a large piece of thick sheet lead (part of a tank: Fig. XIV); a bone spindle whorl (Fig. IX, No. 3); a shaped piece of flat bone (Fig. IX, No. 4); part of a lathe-turned wooden spindle (Fig. IX, No. 5); a fragment of cinder and fragments of coarse pottery (see below). The lower filling was darker in colour, closer in texture, more muddy and contained less large grit and limestone and tile pieces. A second smaller piece of the lead tank (Fig. XIV) was found beneath the larger piece on the north-west side of the well. The deposit also contained three iron bucket side plates (Fig. IX, Nos. 12-14); two iron nails, an iron bloom (Fig. IX, No. 16) and pottery fragments in smaller quantity than in the upper deposit. A quantity of preserved wood and other matter, including a few pieces of garment, boot or sandal leather, animal bones, deer antler, and one piece of a bucket stave also occurred in the level.

THE OUTLYING FEATURES. SITE PLAN (Fig. VI)

The survey in April 1959, included the whole of the quarry area that had been subjected to a top soil scraping. 14 outlying features mainly on the east side of the bath-house were located, cleared and recorded. This total includes the bath-house drains F.11 and 14 which have already been described above.
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DITCHED ENCLOSURE. F. 1, 2, 3, and 4

When first seen the enclosure was clearly marked but further scraping removed most of the ditch and only fragments remained. The plan was rectangular with rounded corners and there was a well defined entrance at the west end of the south side. No dating evidence was found in the fillings.

A CURVING LENGTH OF DITCH. F. 5

Only the lower half of this remained but it was known to be V-shaped in section.

F. 6, 7 and 8.

These were pits of varying sizes, represented only by the lower portions of their fillings. 10 wall and base sherds of grey ware were found in F. 8. These were undatable and were discarded on the site. From F. 7 in the surface of the filling was a heavy circular limestone weight (Fig. XI, No. 35).

OVEN-BASE. F. 9

The remains of this were represented by two parallel rows of limestone blocks and slab, three courses in depth. The channel between formed the flue and had an internal width of 1 foot 2 inches. Both sides of the flue were burnt pink-red for a depth of between 1 and 3 inches. The internal depth was 11 inches. This included a 1 inch layer of sooty soil that covered the base. The oven was fired from the west end; the east end was square. There was no indication of a chimney at this end.

WALL FOUNDATION. F. 10.

This was represented by two rough courses of limestone slab forming an H-shaped plan. The south ends were squared, the north ends broken. It was apparent that a great deal of the structure and the surrounding occupation level had been destroyed in the scraping. No evidence remained to indicate the original plan or use.

A SHORT LENGTH OF GULLY. F. 12

The filling contained indeterminate grey wall sherds and a little rubble.

POST-HOLE. F. 13

Only the bottom 3 inches of this remained. The filling contained three grey wall sherds.

AREAS OF ROUGH PAVING. F. 15 and 16

These were examined as much as circumstances would allow but both had been damaged in the scraping. A quantity of coarse pottery sherds, two T-shaped nails and a small iron clamp (Fig. IX, No. 8), and a glass rim fragment were found in silt levels over the paving.

* * * *

THE BATH-HOUSE AND WELL: DISCUSSION

The bath-house belongs to the Reinhentyp class, where the frigidarium, tepidarium and caldarium are placed in a straight line and the hot and tepid baths are contained in projecting apse-shaped structures to form an 'apse-pair'⁷ The bath-house belongs to Younge's Group 1, third class, of detached bath-houses placed some distance from barn-buildings.

The bath-house represents a well planned, and solidly built structure. The quality of the materials used, the neatness of the layout design and the workmanship of construction, indicates a structure in keeping with the best in domestic Romano-British building traditions.

From the dating evidence found in the structure it is reasonable to suggest that construction took place around A.D.360 - 70 and that the building was used for a period of at least
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twenty years. By a similarity in coinage it appears to be contemporary with reconstructions
carried out to the villa, which Smith has dated to A.D. 370, his Phase II. The two coins of
Valens and Gratian (5 and 6), found in the filling of the south wall trench may not have been
deposited during the construction. It should be remembered that the cold bath and the
rewalling of the exterior of the hot and tepid bath hypocausts is secondary to the primary struc-
ture and that the two coins may have been dropped during this work. It would have been
necessary to re-excavate the wall trench, in part, to add the walling. No difference in filling
was seen when the wall trench was excavated.

The suggestion (on Plan, Fig. VII) has been made that the main hypocaust was divided
into a caldarium and a tepidarium. There was no site evidence to indicate this. It has been
stated* that the division was made (in this type of chamber) above floor level by a timber
partition or by heavy curtains.

The small piece of thick lead sheet from the north wall trench, and the finding of two
large pieces of a tank, from the well base, suggest that a hot water tank or boiler was fitted
over the furnace, between the stoke-hole and the caldarium. As the site had been scraped,
any structural evidence left in situ had been removed. Only two of the three pieces are likely
to have come from the same tank so there is a possibility that the pieces represent the remains
of two tanks. This would suggest that the original tank had been replaced at some stage
during the functional life of the bath-house. If this was so it seems probable that the replace-
ment necessitated the removal of part of the structure around the furnace channel entrance
into the caldarium. This would explain the replacement of at least one pila referred to above.
It is also possible that the cold bath and the additional walling to the hot and tepid bath hypoca-
usts were added at this time. The addition of the cold bath to the south wall of the
frigidarium would necessitate the piercing of the wall to make an aperture for access to the
cold bath. The floor surface of the frigidarium had been scraped away to the level of the
natural limestone, so that this was seen on the same level as the secondary flooring of the cold
bath. It is thus not possible to say whether or not the aperture was made so as to leave enough
of the original wall to form the north side of the bath, so that it was only necessary to step
over the side, into the bath, and not as suggested above by a step, or series of steps.

The stone pillar or small column base from the well is the only find of carved stone to
be made in the villa and bath-house excavations. It is similar in size and pattern to many
found on late sites. These pillars or columns are usually associated with open fronted corridors
but in the absence of other fragments from the villa, it can hardly be suggested that it formed
a structural feature to that building. More likely it was one of a pair that graced the entrance
to the bath-house.

The pottery dating from the well is mid-to-late 4th century and in the absence of coins
this must be accepted. This evidence, taken together with the lumps of blue clay found in
the filling of the south wall trench, suggests strongly that the bath-house and well are
contemporary.

THE FINDS*

1) THE POTTERY

The pottery from the bath-house and the well consists of six main groups. There is
nothing remarkable about the pottery, with the possible exception of the triple bead rim; all
of it belongs to the late third and fourth centuries. with the greater part being of the later
period. It is mainly similar to the common run of coarse pottery from other sites in the area
and to the north. It consists mainly of grey wares with a few sherds of colour-coat fabric.
The pottery will be described by groups 1 to 6:-
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Group 1. From silt above the smaller patch of paving north of the bath-house.

Fig. X, No. 18. An unusual triple-bead rim of a large jar in hard light grey ware with dark grey surfaces. No parallel has been found for this vessel. Also in this group are: a roll-rim of a large jar in sandy grey ware; an everted rim of a large bowl in hard light grey ware; a roll and bead rim of a bowl in blackish-brown shellgrit fabric and a complete loop handle in hard grey ware from a large jar. The handle would occur halfway down on the side of the vessel. The type is illustrated in *A Roman Villa at Langton, nr. Malton, E. Yorks.* Fig. 26 Nos. 99 - 100, p. 83.

Group 2. From silt above the larger patch of paving north of the bath-house.

No. 19. Bead rim dish in coarse light grey ware with dark grey surfaces, scored encircling line on exterior. *Jenew Wall.* Fig. 44, No. 12, p. 163. With this rim were a roll rim of a large bowl in hard grey ware; an everted rim of a medium sized bowl; a rim recessed for a lid of a bowl in hard buff-grey ware; a rim of a reddish-mauve colour coat open bowl: an imitation samian-ware form ?18/31 and a wall sherd of grey ware with a zone of coarse rouletting.

Group 3. From filling of north wall trench, F. 7.

No. 20. Straight-sided flanged bowl in hard whitish-buff ware with mauve-brown colour-coat. *Great Casterton.* 1951, Fig. 9, No. 36, p. 35 where it is dated to the last half fourth century. With this was found the rim sherd of an incurved platter in similar ware.

Group 4. From the top half of filling of south wall trench, F. 8.

No. 21. Rim of large jar in hard grey-blue ware. Several were found at *Jenew Wall.* Fig. 52, Nos. 37 - 38, p. 200, where they are dated to the first quarter of the fourth century.
No. 22. Everted rim with flat top of large bowl in hard greybrown ware with dark grey surfaces. (See J. T. Smith for another of this type from the villa excavations.)
No. 23. Straight-sided flanged bowl in hard grey ware with metallic surface. Same type and date as No. 20.
No. 24. Straight-sided flanged bowl in hard white ware with red-brown colour coat. Same type and date as No. 20.
No. 25. Wall sherd of beaker or flagon in white ware with khaki brown colour-coat. White trailed decoration. Also in this group are: a rim of a straight-sided flanged bowl in grey ware; three examples of varying size of grey ware jars or bowls with everted rims: part of the base of a footring bowl in grey ware with perforations; the lower part of a strap handle in grey ware from a jar or jug and part of the neck of a jar or flagon with notching below the rim.

Group 5. Not illustrated. From the laminated ash in furnace stokehole. 4

Four wall sherds of same vessel in re-fired hard grey ware. The sherd are of a vessel similar to No. 28, but possibly a handled type.

Group 6. This group consists of fragments from the upper part of the base of the well filling.

No. 28. A reconstructed vessel. A large jar in hard blue-grey ware with zones of scored scroll and wavy lines between horizontal grooves.
Not illustrated: 40 fragments of a roll rim, two-handled jar in hard grey ware with a zone of oblique scoring between base of rim to below base of handles. Below this other zones of wavy scoring and scrolling, between horizontally scored lines. Parts of the lower half of a small jar or bowl in hard blue-grey ware. Faint horizontal scoring on base half below girth groove.

The three vessels are similar to other groups from northern sites, i.e.; the series from the kilns at Swanpool, *Ant. Journ. Vol. XXVII.* Fig. 3, Nos. C40 - 48; the three vessels from the bottom of the well at Langton: *A Roman Villa at Langton, nr. Malton, E. Yorks.* Fig. 15, p. 54 and the series from the destruction level at *Great Casterton.* 1951, Fig. 8, Nos. 719, p. 30. The dating from all these sites would suggest that the Denton examples belong to the second half of the fourth century and the dating from the site itself tends to confirm this.
No. 30. Straight-sided flanged dish in light grey ware. A similar one in form was found at *Jenew Wall.* Fig. 35, No. 5, p. 205 where it is dated to c. A.D.350.
No. 31. Shallow dish, bowl or lid with incurved sides and thickened rim, in shellgrit grey fabric. The interior surface is buff colour.
No. 32. Everted rim of medium sized bowl in hard grey ware with dark grey metallic surface. *Great Casterton.* 1951. Fig. 9, No. 22.
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With these vessels were a rouletted wall sherd and a complete base of a bowl or jar in hard whitish ware with red-brown colour-coat; the complete base of a Samian-ware imitation (form unrecognisable), in light grey ware with a grey core and bright red colour-coat and 20 base and wall sherds in grey ware. No. 33. Found on the surface in Hungerton Quarry (half a mile east of the bath-house).

Rim of jar, in hard grey ware with frilling on neck, and zone of scored decoration on shoulder. This vessel belongs to the same group as No. 28; the same references and dating apply.

No. 27. From surface of quarry close to Gully, F.5.

Rim to base sherd of hemispherical flanged bowl in sandy, light grey ware. Surfaces worn but originally dark grey. There is a zone of fine rouletting just discernible on the exterior below the flange. Probably a local imitation of a Samian-ware Drangenstoff form 38. Great Casterton, 1951. Fig. 9, No. 30, for form only.

2) MORTARIA by Mrs K. F. Hartley

Fig. X. No. 26. From F.11

Hard, pale buff fabric with a light grey core and cream slip; much ironstone grit. This fabric and grit would be consistent with origin in the Nene Valley but it is not an entirely typical product in either form or fabric. Similar clays were, however, available in Lincolnshire, and ironstone grit was used at the Swepool kilns so that manufacture in south Lincolnshire cannot be ruled out. It is unlikely to be earlier than the fourth century.

Fig. X. No. 29. From upper filling of well.

Softish, slightly sandy, white fabric with pink core and buff slip; much crystalline, white, pinkish and brown grit.

Fabric and grit are typical of mortaria made in the area around Oxford, at such kilns as those at Cowley, Headington, Dorchester and Sandford. The form can be closely paralleled at Headington (Oxonomia XVII/XXVIII, fig. 45, No. 20). This mortarium is certainly later than A.D. 250 and is quite likely to be fourth-century. It is, however, difficult to date such Oxfordshire products precisely since some forms were made over long periods and there is a dearth of close dating evidence.

3) GLASS

Seven groups of glass fragments were found and these were submitted to Miss Dorothy Charlesworth who reports as follows:-

Fragments of only two vessels were found, part of an infolded rim and part of a slightly concave base, both in natural green glass and both probably from flasks.

A quantity of window glass, all yellowish green in colour, was found. It is poor quality metal, free blown, with small bubbles and black impurities. Like all 4th century window glass it is smooth on both surfaces and about 2 or 3 millimetres thick, in contrast with the earlier Roman window glass which is rough on one surface and generally thicker. A few fragments came from the edge of a pane. Most of these edges were smoothly rounded and slightly thickened (Fig. IX, No. 7) but one was folded back (Fig. IX, No. 6). There was nothing to show how they had been fixed to the window frames.

4) COINS by Peter Curnow

QC

S CON
R.I.C.X. p. 66 No. 17a.

PCON
No. 17b or 19a.
   ASISCP

   CON

   CON*

5) BRONZE
   (Copper alloy, not analysed) Fig. IX. (Technical comments by L. Biek).

1. Part bracelet or bangle. From main hypocaust, Layer 2 (A.M. No. 9797). Although one end of the fragment appears regular and 'unbroken', suggesting a 'terminal', it is not possible from the material evidence to decide whether the object was originally annular or penannular.

2. Curled end of bracelet or bangle. From drain F. 14, filling. (A.M. 9798).

6) IRON (Fig. IX)

8. Small Clamp. From silt on paving, F. 16 (A.M. No. 9794).

10. Buckle. U/S (A.M. No. 9793). Doubtful, but possible, minute trace of non-ferrous (?tin/bronze) plating, under swivel of pin. Such plating is rare on Roman iron objects but is now found quite frequently, thanks to X-radiographic evidence, on (corroded) medieval ones (e.g. Trans. Leics. Arch. Soc., 1959, XXXV, 17 and Fig. 13, No. 17; see also L. Biek, Archaeology and the Microscope, p. 130 and Pl. 13).

Also, not illustrated, parts of two nails or spikes. From stoking pit, Layer 8. (A.M. 9795). There is no sign of woody 'grain' but much small disorganised, mineralised fibrous residue, some charred, indicative of vegetable debris presumably buried with rubble filling of the pit. There is also some redeposited calcareous material, especially near the tip of the longer of the two fragments, suggesting some association with lime-rich material, in this case possibly simply due to burial with burnt limestone or mortuary rubble.

IRON FROM WELL FILLING (Fig. IX, Nos. 9, 11, 12, 13, 14 and 16). (A.M. No. 610070: by L. Biek)

9. Short nail; ?polygonal or sub-circular head, square section tapering in one plane.

11. Bent nail; slender, rectangular head and section which tapers in the plane of the long side.

12. Virtually identical to No. 13, except for curved lap with base at an angle and rectangular hole for nail; could have come from the same bucket.

13. Bucket side plate, substantially complete. "Lap hook" type of eye, straight-based broad lap, square hole for nail.

14. Bucket side plate fragment, of slighter construction than the above. Owing to corrosion, the eye formation is not clear. One square hole, clearly punched, as the waste metal was not severed on one side but folded over and is still discernible. About half of a second ?sub-rectangular smaller hole remains along the 'broken' lower edge.
15. Large T-shaped spike. From hot bath hypocaust, Layer 1 (A.M. No. 9796). Considerable calcareous residues (see above) are present on the surface, especially around the head, stained by corrosion products from the iron. In this case, the distribution and quantity of these residues might be consistent with the object’s use in (mortared) masonry. (Mr. C. J. S. Green suggests it may be a box flue tile clamp) (c.f. N. Davey, *A History of Building Materials*, p. 199. Fig. 111).

16. (A.M. No. 610071). Bloom, fairly solid and compact core, weight c. 3 lbs. as found. Cf. similar but smaller item from Cranbrook (*J. Iron and Steel Inst.*, 200, 1962, p. 959, Fig. 2; 202, 1964, pp. 502 - 504) metallographic examination of which has indicated a surprisingly high carbon content. Results of a similar analysis of the Denton object show that the carbon content, though high (0.5% in places), is only about a third, but phosphorus is present in considerable quantity (0.32%, about ten times as much). It might seem, therefore, that the Cranbrook bloom shows greatly superior working technique despite its earlier date (possibly as much as 300 years). Recent evidence suggests, however, that even in Roman times zones of high carbon (i.e. ‘steel’) were formed during bloomery, unintentionally. Little control of phosphorus content was possible, and the difference is almost certainly due to regional variation in the ore. More evidence is required to illuminate this very important stage of iron production, but clearly blooms were still far too valuable even in Roman times to be carelessly treated, and this would seem to account for their rarity. (See Appendix III)

**7. STONE**

Stone samples from the bath-house excavations and the well were submitted to Professor F. W. Shotton, (Dept. of Geology, Birmingham University), by the Ancient Monuments Laboratory. His identifications follow descriptions and provenances of samples. (See also Part I, p. 103).

1. Large blue-grey tesselae, from Layer 1, main hypocaust filling. Similar to 3 as material but more suggestive of Lower Lias cement-stone or possibly lower part (Hydraulic Limestone) of Lincolnshire Limestone.
2. Small blue-grey mosaic tesselae, from Layer 1, main hypocaust filling. Grey banded limestone. Many possibilities. Lower Lias, Scarborough Limestone, even Carboniferous Limestone.
3. Small white mottle tesselae, from Layer 1, main hypocaust filling. White Chalk.
4. Fig. 6, No. 17. Half of whitestone, from top half of filling of F.17. Medium grained calcareous banded sandstone. Locality unknown.
5. Fig. 8, No. 32. Large perforated weight, from base half of filling of F.7. Yellow sandy limestone, reddened on one side by heat. Provenance uncertain but probably local: ? Lower Cretaceous rocks of Lincolnshire.
6. Piece of perforated limestone, from surface of quarry. Oolitic Limestone. Middle Jurassic; not prepared to be closer than this.
7. Sample of stone from north side of furnace channel. Deep red, highly calcareous rock with fair amount of mineral residue. ? Red Chalk, which occurs at foot of chalk escarpment, ca. 40 miles away.
8. Sample of blue-green slate, from Layer 1, main hypocaust filling. Trimmed piece of crude sandy slate, suggesting Lower Palaeozoic. ? Lake District Silurian - if so, probably from glacial erratic.
10. Sample of thin slab, from Layer 1, main hypocaust filling. Light grey fissile limestone. ? Colyweston slate, unweathered.
11. As 12.
12. Fig. XI, No. 34. Base of stone pillar, from well filling. Worked stone of pale oolite. Jurassic. Most likely probability is one of the recognised building stone horizons of Lincolnshire Limestone.
13. Fragment of coal, from well base filling. Piece of vitrumin coal from the Coal Measures (unlikely to be from a thin seam in the Jurassic “Estuarine Series”). Might have come into or near the area via Glacial Drift.
14. Teasers from well filling. Grey muddy limestone. Most suggestive of Lower Lias but hydraulic limestone of Lincolnshire Limestone is a possibility.
15. Sample of stone from well filling. Sandy oolitic limestone. Probably Jurassic.
8) Charcoal

The following three samples were kindly identified by Mr. J. F. Levy, Dept. of Botany, Imperial College of Science.

1. From Layer 1, main hypocaust filling: Charcoal from small branches of Ash, ? Hawthorn and Pyrus type.
2. From Furnace Stove-hole in ash lamination: Oak or possibly Chestnut.
3. As 1: ? Hawthorn and Pyrus type.

9) Slag by D. W. Brown, Morganite Electroheat Ltd.

1. Fragments of cinder, with an open, porous structure, semi-fused but quite glassy internally. It is most likely to be melting fuel ash solidified on cooling, derived possibly from coal but more probably from charcoal. This aspect was examined especially in view of the presence of coal here, and cognate evidence from excavations at High Cross, Lincs, where it indicated coal ash, however, from ash lamination, Layer 8, in furnace stove-hole.
2. A fragment of cinder associated with an iron smelting operation. Although similar to the cinder (above) it is harder and denser, more crystalline and contains a central cavity. Magnetic particles are present and there are signs of (probable) secondary limonite such as is known to result from the corrosion of particles of metallic iron contained in cinder. From upper well filling.

10) Building Materials

Details of building materials, the destroyed mosaic pavement and the wall plaster.

a) Box Flue Tiles. From main hypocaust (2), Layer 1.

Two sizes of tile in fired red clay, (a) Length 13½ inches by 10 inches wide by 6 inches in depth. Slot in side 3 inches by 2 inches. Scored with cross combing, (b) 4¼ inches in depth. Length and width not obtainable.

b) Flat Brick Thicknesses. From main hypocaust, (2) Layer 1.

The dimensions of these were 1¼ - 2¼ inches. Apart from the pilae bricks no other complete examples were found.

J. Shipley, Royal College of Art, kindly supplied the following report:-

"A.M. 610106. Fragment of roof tile, from upper well base filling. This 'bloating' tile, with a red outer skin and a black-purple core, dark brown colours being absent, is a typical result of very fast firing up to vitrification and beyond, during manufacture—though this specimen is not well vitrified—being due to excessive formation of gas which is trapped by the vitrified skin. Part of the surface shows signs of having been licked by the flame. The fragment is clearly (part of) a waster."

c) Slate Roofing Tile. Samples of blue-green slate and other stones from the bath-house were submitted for geological indentification (No. 10).

d) The Mosaic Pavement. Mosaic and larger tesserae were found throughout the rubble filling of the bath-house. These were derived from the destruction of a pavement or pavements no doubt sited in Room 2, over the main hypocaust. A total of 1,372 large and small tesserae was recovered and this is made up as follows:-

991 large tesserae of hard blue-grey limestone, varying in size from 1¾ x 1⅛ x 1⅛ inches to ¾ x ¾ x 11 inches (No. 1).
1 large triangular tessera of hard blue-grey limestone 1⅛ x 1⅛ x 1⅛ inches (No. 1).
109 large tesserae of red fired clay tile, average size 1⅛ x 1⅛ x ⅛ inches.
224 small mosaic tessera in hard blue-grey limestone, average size ⅛ x ⅛ x ⅛ inches (No. 3).
27 small red banded clay tesserae same size as blue.
19 small hard white chalk tesserae (No. 5).
1 small black tessera. Not geologically identified.

Only individual tesserae were found, so there is no evidence to suggest the pattern of the pavement.
THE ROMAN VILLA AT DENTON, LINCOLNSHIRE

(e) The Wall Plaster.

Apart from the small group of fragments from the filling of the hot bath hypocaust, the main bulk of the wall plaster was recovered from Layer 1 in the main hypocaust filling. The fragments are all of good quality and without exception, the backing plaster is of hard pink cement. This varies in thickness between \( \frac{1}{3} \) to \( \frac{1}{8} \) an inch. The reverse sides of some of the pieces show a fairly faint, closely toothed combing or ribbed stamp impression. A faint combing can be seen on some of the painted surfaces. Samples of green faced plaster show right angles suggesting that this colour was used at the corners or at the junction of walls and ceilings. A total of 407 pieces have been preserved and these are listed as follows:-

14 red and drab green with a narrow white stripe between
1 green and yellow with a narrow white stripe between
13 broad yellow band on white ground
2 yellow band and green with narrow white stripe between
1 yellow band and purple with narrow white stripe between
5 wide purple border and yellow with narrow white stripe between
1 wide dark green and purple with narrow white stripe between
3 black band on white ground
1 black on salmon pink
1 black and pink with narrow white stripe between
2 black band with two shades of pink on each side
4 black ground
19 maroon to red on white ground
7 wide red band on white ground
1 broad red band and purple with narrow white stripe between
23 wide red band on white ground
36 maroon and drab purple ground
40 white ground
3 white and green bands
87 green ground
23 white ground with narrow purple stripe and dots. This was no doubt part of a fairly elaborate design usually placed within a panel of surrounding broader stripes or bands in other colours.
3 broad purple stripe on white ground
11 white ground with narrow red stripes. Part of a design from interior of panel.
35 rough-faced pieces drab red-brown. Most of these are probably from floor levels and perhaps some are bath pieces.

f) Cement and Mortar Samples.

The following samples were submitted by the Ancient Monuments Laboratory to the usual grading analysis of the acid-insoluble aggregate:-

1. Piece of floor of main hypocaust found in situ.
2. Sample of Wall mortar.
3. Broken piece of cold bath floor (secondary).
4. Piece of original floor of main hypocaust, Room 2 (from rubble).
5. Flooring or wall facing, Room 2.
6. Piece of hot bath floor or walls (primary).
A.M. No. 610121. Fragment from well filling.

Mr. Biek reports that the material falls into two main group:- Basically (A) comprises Nos. 3 and 6; and (B) Nos. 1 and 4. In addition, No. 5 is essentially similar to Group B, and 610121 shows similarities to Group A. As would be expected, No. 2 is entirely distinct, but as it is the only sample of wall mortar available no further comment is possible. The results of the work indicate that the well was still open during (or just after) the destruction of the (cold and hot) bath floors, suggest that Nos. 5 and 6 are from the floor rather than wall, and allow greater confidence in relating the floor fragments from the rubble (No. 4) to the material found in situ (No. 1).
11) Animal Bones

A sawn piece of Red Deer antler tine (A.M. No. 9810), from the south wall trench, as well as the bone objects (which were unidentifiable) and the bones from the well filling were kindly examined by Miss J. E. King, Osteology Room, British Museum (Natural History).

12) The Human Burials

The fragmentary bones found scattered throughout the rubble filling of the main hypocaust represent in all probability the remains of three individuals. There can be little doubt that the burial positions were originally within the limits of the bath-house, and it can be suggested that the large holes in the north and south walls of the main hypocaust are most likely the sites of two of them.

Considering that Saxon burials were found intact within the villa rooms, there is no reason why the scattered bones from the bath-house should not represent other burials of this period. In view of their 'broken up' condition there is no archaeological evidence to prove their date, except to suggest that the interments took place before the bath-house was completely wrecked. This suggestion is made on the strength of the following: had the burials been inserted after the building had been destroyed to below floor level, they would have been found intact. Instead, the bones were scattered and only small parts of the skeletons recovered. It seems certain that the burials were made after the bath-house had been abandoned, at the close of its use as a bath-house. The burials were inserted through the floors while these were still intact, but this need not mean that the walls and roof were still in situ, though this may have been so. It seems likely that the burials were found and destroyed when the floors of the building were wrecked in order to recover re-usable bricks from the hypocaust pilae.

The Human Remains from the Bath-house by C. B. Denston

Duckworth Laboratory of Physical Anthropology, Museum of Archaeology and Anthropology, Cambridge.

In all, there are nine separate skull fragments, one being of a maxilla, and two of mandible. The pieces of mandible represent two separate individuals and it is possible that the maxilla belongs with the larger fragment. The size and robustness of the latter specimen, and size of the teeth, suggest a person of male sex, and the dental wear points to him being fully adult. The teeth are rather irregularly aligned, the occlusal surfaces of the first and third molars being above the second molar, and the first premolar above the second premolar. The second molar has a small carie on the occlusal surface. The recession at the alveolar borders indicates a medium degree of periodontal disease, and some teeth have a slight enamel hypoplasia.

The second mandibular fragment consists of part of the left body only. It is possible that it represents an immature or young adult individual of the female sex.

Postcranial Bones

The remains are all very fragmentary except for a few bones of the feet and hands. They may be listed briefly as follows:

Femur (6), Tibia (2), Humerus (6), Radius (3), Ulna (3), Fibula (3), Clavicle (2), Pelvis (2), Vertebræ (6), Sacrum (1), Talus (2), Metatarsal (5), Metacarpal (4).

At least three individuals may be represented although probably the majority of pieces belong to one individual. In the case of the more complete skeleton, the age is approximately 25 years, the person being of male sex.
THE ROMAN VILLA AT DENTON, LINCOLNSHIRE

A second individual is represented by a pelvic and a femoral fragment which may be of more advanced age as evidenced by considerable osteo-arthritisic changes. The rheumatic disorder has resulted in joint deformity, "lipping", and "polishing" as a result of the movement of bone on bone.

A third individual is represented by the proximal end of a humerus, and is obviously immature for it lacks the epiphysis.

One distal fragment of humerus displayed changes typical of a localised osteitis.

Notes

3 Thanks are due to D. W. Haw, W. B. Punchard, E.L.A.S., (Agent for Welby Estates), and to the staff and quarrymen of Messrs. Stewarts and Lloyds Minerals Ltd. Also to J. M. Young for his advice and help.
4 I am grateful to P. A. Rahtz, M. Gray, D. W. Haw, L. Biek (Ancient Monuments Laboratory) N. S. Angus, A. K. Tiller (National Physical Laboratory) and to Miss S. A. Butcher (Inspector of Ancient Monuments) who arranged the excavations.
6 Reports in preparation.
8 Young, p. 45 - 6.
9 The finds from the site have been deposited at the City and County Museum, Lincoln.

* * * *

APPENDIX I

THE SOIL AND ECOLOGICAL BACKGROUND

By Ann P. Conolly, Dept. of Botany, University of Leicester, and L. Biek, Ancient Monuments Laboratory, with contributions by Dr. D. H. Dalby and J. F. Levy, Dept. of Botany, Imperial College of Science; Judith E. King and Dr. E. B. Britton, British Museum (Natural History); and Dr. G. H. Booth and A. K. Tiller, National Physical Laboratory, Teddington.

a) SUMMARY

The following information is derived mainly from a study of the basal organic levels in the well filling and the adjacent subsoil profile undisturbed until present quarrying - which alone were seen - but an attempt has been made to relate it to the comparatively very meagre evidence from the Bath-house and Villa. The well was dug through the Lincolnshire Limestone; and then through thin sands down to clay (both the latter belong to the Lower Estuarine Series; for geological background see Part I, p. 103). The quarry section is shown in Figs. VIII and XVI; samples were taken as indicated, and subjected to the usual ignition and sedimentation tests in the A.M. Laboratory (see Table I). Samples of the three layers seen at the very base of the well filling were examined for pH and microbiological activity at Teddington. Samples of the basal organic mud were
THE ROMAN VILLA AT DENTON, LINCOLNSHIRE

Table I. Examination of Quarry Section

<table>
<thead>
<tr>
<th>Soil Sample A.M. No.</th>
<th>Relative Dry Colour</th>
<th>Field Description (Depth, ft.)</th>
<th>Laboratory Report Relative Contents</th>
<th>Saturation Water Index**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>original</td>
<td>oxidised</td>
<td>reduced</td>
<td>iron</td>
</tr>
<tr>
<td>610124</td>
<td>ferruginous brown</td>
<td>maroon</td>
<td>grey maroon</td>
<td>very high (with other heavy metal oxides — manganese)*</td>
</tr>
<tr>
<td>610125</td>
<td>greyish white</td>
<td>pinkish yellow</td>
<td>pale grey brown</td>
<td>white sand (to 14)</td>
</tr>
<tr>
<td>610126</td>
<td>pale buff</td>
<td>pinkish buff</td>
<td>grey brown</td>
<td>(transitional horizon)</td>
</tr>
<tr>
<td>610127</td>
<td>yellow</td>
<td>orange</td>
<td>brown</td>
<td>yellow brown sand</td>
</tr>
<tr>
<td>610128</td>
<td>brownish buff</td>
<td>purplish red</td>
<td>dark brown</td>
<td>iron pan (15)</td>
</tr>
<tr>
<td>610129</td>
<td>greyish buff</td>
<td>reddish buff</td>
<td>grey</td>
<td>(transitional horizon)</td>
</tr>
<tr>
<td>610130</td>
<td>ferruginous yellow</td>
<td>purplish red</td>
<td>red-speckled greyish brown</td>
<td>laminated sandy clay, pale brown and grey</td>
</tr>
<tr>
<td></td>
<td>grey speckled with yellow</td>
<td>red</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>610131</td>
<td>blue grey</td>
<td>pale greyish brown</td>
<td>dark grey</td>
<td>blue Estuarine Clay (17)</td>
</tr>
</tbody>
</table>

*Anomalous colours were obtained in some cases, especially with iron pans, as previously noted (in P. A. Rahtz and E. Greenfield, Chess Valley Lake 1953 - 5; forthcoming) and are thought, again, to be due to an absence of a ‘reducing’ atmosphere here, caused by oxidising agents such as manganese oxides(*).

**A semi-quantitative appraisal of relative "wetness".
THE ROMAN VILLA AT DENTON, LINCOLNSHIRE

taken for microscopic examination at Leicester. Biological material noted during washing and examination of the artifacts from the organic mud was also recorded, and in some cases examined by specialists.

Information on the soil and most of the microscopic specimens and fragments of biological origin seen in the organic layer follows below; for worked items see pp. 00. A.M. Number have been given to make distinction possible but are not stratigraphically significant.

In the following summary all the information is considered together.

The subsoil profile gives a clear picture of drainage impedance and iron movement under alkaline conditions. It demonstrates and delimits the effectiveness of the well. There is little if any organic material. The calcium-rich status of the entire profile may be assumed to be of geological age, and to have influenced the Roman (as it has the modern) soil profile and cultivation, despite the obviously deep weathering of the upper limestone layers. This is clearly reflected in the botanical content of the soil.

As in other cases, the state of preservation of the material found in the basal layers deserves comment. Exclusion of air due to waterlogging, and maintenance of anaerobic conditions by substantial quantities of organic material, clearly dominated the situation. For iron objects, the conditions appear to have been intermediate between those at e.g., Thistleton, where preservation was complete probably owing to high (calcium) alkalinity alone, and e.g., at the South Corner Tower in York where equally alkaline but somewhat aerated magnesian limestone drainage was thought to have favoured corrosion. Here the degree of alkalinity is reflected in the bacterial culture time, and the soils are moderately or not aggressive.

The compact small iron objects were well preserved, carrying in the main a thin black skin faithful to the (presumed) original outline, and (from X-radiographs) largely sound. No viable salt was seen on the iron although traces appeared on bones. A few areas of weakness, and even perforation (especially e.g. A.M. No. 610071/C) could pre-date burial, but on drying many rust-coloured areas appeared. The bloom, presumably very porous and contaminated when buried, had corroded considerably at all surfaces.

No copper in any form was found. Lead (Appendix II) was very well preserved. Although the presence of sulphide was inferred its effect was clearly not serious.

Botanical material was in the main morphologically intact though materially weakened, as would be expected. The presence of copper is clearly not essential for this. The mention of "fresh-looking" mosses, etc., raises an interesting problem. Although field work was as careful as it could be in the circumstances, direct contamination from the present surface cannot obviously be excluded. Yet the quantity and situation of the material makes it doubtful (e.g. 610071/C and D were picked off the surface of the iron bloom). Slow translocation via cracks and lateral movement underground remains an intriguing possibility. The appearance of "fresness" may conceivably be deceptive in such circumstances; unfortunately the problem was not recognised until after all the available material in question had been altered by exposure to the atmosphere. To what extent this consideration can modify the impression gained from the well evidence remains to be seen.

The general picture suggests, as far as such inferences are valid, the proximity of a mixed forest with bracken undergrowth, and both grass-covered and cultivated clearings, in addition reflecting the localised conditions around an obviously "damp" well. Red (and probably roe) deer were evidently hunted.

The dung beetle remains indicate that domestic animals, here represented probably by meal residues, were kept in the grounds. The absence of sheep and pig is probably not significant in view of their abundance in the villa material which otherwise compares well in its animal remains (see Part I, p. 103 where the relative proportions are not given, however). Total number of bone specimens is 486, representing ox (ca. 38%), horse (15), sheep (14), pig (6), red deer (23) and dog (2), with some bird and hare.)
b) **Soil Samples from the Well, by G. H. Booth and A. K. Tiller.**

Three samples were taken, one from each of the three layers below the organic layer and numbered in order of increasing depth.

Sample 1. **pH – 8.9**
- No growth of sulphate-reducers in 7 days.

Sample 2. **pH – 8.5**
- Growth of sulphate reducers in 6 days, but only in the absence of cysteine; *i.e.* probably *D.orientis* type.

Sample 3. **pH – 8.1**
- Growth of sulphate-reducers in 4 days in the presence of cysteine; 5 days in the absence of cysteine.

As may be seen, all the samples were alkaline and the degree of alkalinity is reflected in the SRB culture time. We would regard the samples 1 and 2 as non-aggressive, and sample 3 as moderately aggressive only. Although sulphide was clearly present, and bacterial activity could be inferred, this would not have been serious enough to cause severe corrosion of iron. This circumstance was in fact clearly reflected in the condition of the iron objects found.

c) **The Animal Bones by J. E. King and L. Biek**

The presence of ox (femur and humerus, skull fragments, rib bones, cervical vertebrae), horse (young feet, rib bones), red deer (worked antler tines only) and roe deer (cervical vertebrae), is recorded but the bones were few in number and had been picked out of the basal mud as and when they were noticed. A few cat, frog, field vole and bird bones (some domestic fowl): “immature Gallus sp.” kindly identified by Mrs. M. Jope, Queens University of Belfast were also noted. Many of the bones were black or grey when found, but turned dark (reddish) brown or yellowish brown, respectively, on drying and aeration. The initial coloration is therefore taken to be due to iron sulphide and not to any charring. *Vitrianiite* blue patches were observed on some of them.

d) **Beetle Fragments by E. B. Britton**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>610071E</td>
<td><em>Geotrupes vernalis</em> (Linn.): part of head</td>
</tr>
<tr>
<td></td>
<td><em>Pterostichus</em> sp.: head and part of elytron</td>
</tr>
<tr>
<td>610072</td>
<td><em>Geotrupes spiniger</em> (Marsham): fragments (common)</td>
</tr>
<tr>
<td>610109B</td>
<td><em>Aroma</em> sp.: 1 elytron</td>
</tr>
<tr>
<td>610111E</td>
<td><em>Geotrupes stercorarius</em> (Linn.): fragment (common)</td>
</tr>
<tr>
<td></td>
<td><em>Pterostichus</em> sp.: 2 heads</td>
</tr>
<tr>
<td></td>
<td><em>Athous hirtus</em> (Herbst)</td>
</tr>
<tr>
<td>610122B</td>
<td><em>Pterostichus</em> sp.: 3 heads</td>
</tr>
<tr>
<td>610120</td>
<td><em>Carabus violaceus</em> Linn. var <em>asperipennis</em> Lapouge: 1 elytron (common)</td>
</tr>
<tr>
<td></td>
<td><em>Geotrupes vernalis</em> (Linn.): 1 elytron (local but widely distributed)</td>
</tr>
</tbody>
</table>

e) **Plant Remains by Ann P. Conolly**

The samples so far examined are very rich in plant remains especially No. 610114. The material consists of wood fragments and small sticks, leaves and fruit and seeds, and unidentifiable debris; also a number of moss fragments, some of these contain chloroplasts.
THE ROMAN VILLA AT DENTON, LINCOLNSHIRE

The Wood includes a short length of split stake with a clean-cut end, identified as Castanea, the Sweet Chestnut, a tree generally accepted as introduced by the Romans⁶, and a small length of stick probably Corylus, the Hazel (but this has not yet been compared adequately with fresh material).

The Leaves include very numerous bits of Oak-leaf sample (610114) probably but not certainly Quercus robur L.; and also many fragments of Fern leaves, mostly of Bracken, Pteridium aquilinum (L.) Kuhn, but some may prove to be Dryopteris filix-mas, the Male fern, on further examination. These all point to an Oak wood having grown in the vicinity.

The Seeds and Fruits so far determined fall into several categories, of which the most important is a long list of species always or frequently associated with human settlement; some as weeds, some as certain cultivated species, others as 'Apophyta' or followers of man. Of these several are species already recorded from Roman sites but not earlier in the post-glacial period, though for one or two there are good inter-glacial records as well. The most interesting so far identified in this category are a few seeds of Papaver somniferum L. clearly originating from human use though not necessarily implying local cultivation as presumably importation of seed was not unknown. Other species associated strongly with human settlement are Ballota nigra L., the Black Horchound, Malva sylvestris L., Common Mallow, both with only one or two previous Roman records, Conium maculatum L., Hemlock, Linum usitatissimum L., Flax, and Coriander which has no pre-Roman record⁴,⁸.

Two seeds of Hyoscyamus niger L. are particularly interesting as this is an important drug plant, although the native status, anyway along the coast, is always assumed. There are two previous reports: one from a Roman (Sussex) site, and the other a doubtful medieval record (York)⁴. Other weedy species, some of arable land, others of wayside habitat also common around buildings, are:— at least two species of Poppy; Papaver argemone L. and probably Papaver rhoeas L.; Rumex obtusifolius L., the Broad-leaved Dock (very numerous); Urtica dioica L., the Stinging Nettle, also very numerous (but this is a species of native-natural communities too), Urtica cf. arenosa L., the Small Nettle; cf. Torilis nodosa (L) Gaertn.; Chenopodium album L., Fat Hen, and Sonchus oleraceus L. (Sow Thistle). There are also several other Umbellifers and Cruciferae some of which will certainly fall in this category.

Seeds of Linum catharticum L., and Saxifraga granulata L., suggest nearby grassland, possibly meadow communities with wetter areas supporting rushes, Meadowsweet, and Scirpus setaceus.

f) The Larger Wood Remains by J. F. Levy

The mass of larger wood remains separated from the basal wall layers consisted of small branch fragments of oak and ash, approximately seven different species of diffuse porous hardwoods not further identified, and fragments of various kinds of bark.

g) Mosses and Ferns, by D. H. Dalby

610071 D, small portion of tip of pinna of bracken frond Pteridium aquilinum (L.) Kuhn. This specimen is heavily coated with scales of rusty material.

The bryophyte specimens consist mostly of partially abraded or decayed stems and leaves but many could be identified. These include Brachythecium plumosum (Hedw.) B. & S., B. rutabulum (Hedw.) B. & S. (610071 C); Drepanoclados c.f. aduncus (Hedw.) Warnst. (610072 B); Eurhynchium striatum (Hedw.) Schimp., Rhytidium squarrosum (Hedw.) Warnst. (610114); Thuidium tamariscinum (Hedw.) E. & S. (610115); Antitrichia curtipendula (Hedw.) Brid., Eurhynchium prolongum (Hedw.) Hob., E. c.f. confertum (Dicks.) Milde, Hypnum cupressiforme Hedw., Neckera complanata (Hedw.) Hüb., and Ulota sp. (610117).
## Table II Plant Identifications

Unless specified all identifications refer to seeds, fruits, or fruit parts such as fruitstones, nutlets, carpyopes.

<table>
<thead>
<tr>
<th></th>
<th>610113</th>
<th>610114</th>
<th>610115</th>
<th>610116</th>
<th>610117</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Achillea millefolium L.</strong> (Yarrow)</td>
<td>1</td>
<td>cf. 1</td>
<td>cf. 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Aegopodium podagraria L.</strong> (Ground Elder)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Aethusa cynapium L.</strong> (Fool's Parsley)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Anthemis cotula L.</strong></td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Anthriscus caucalis Bieb.</strong></td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Balanta nigra L.</strong> (Black Horehound)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Beta vulgaris (Beet)</strong></td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>cf. Calluna vulgaris L.</strong></td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Castanea sativa Mill.</strong> (Sweet Chestnut)</td>
<td></td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Centaurea nemoralis Jord.</strong> (Knapweed)</td>
<td>1 phyllary</td>
<td>1 phyllary</td>
<td>cf.</td>
<td>1+</td>
<td>1+</td>
</tr>
<tr>
<td><strong>Centaurea sp.</strong></td>
<td>2+</td>
<td>2+</td>
<td>1+</td>
<td>1+</td>
<td>1+</td>
</tr>
<tr>
<td><strong>Cerastium arvense L.</strong> (Chickweed)</td>
<td>1</td>
<td>2+</td>
<td>1</td>
<td>1+</td>
<td>1+</td>
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<tr>
<td><strong>Cerastium sp.</strong></td>
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<td>2+</td>
<td>1</td>
<td>1+</td>
<td>1+</td>
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<tr>
<td><strong>Cerastium cf. holostroides Fr.</strong> (Mouse-ear Chickweed)</td>
<td>2</td>
<td>1+</td>
<td>1</td>
<td>1+</td>
<td>1+</td>
</tr>
<tr>
<td><strong>Chenopodium album L.</strong> (Fat Hen)</td>
<td>5</td>
<td>3+</td>
<td>1+</td>
<td>3+</td>
<td>3+</td>
</tr>
<tr>
<td><strong>Chenopodium spp.</strong></td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>cf. Circuta virosa L</strong></td>
<td>6</td>
<td>3+</td>
<td>1+</td>
<td>3+</td>
<td>3+</td>
</tr>
<tr>
<td><strong>Cirsium or Carduus</strong> (Thistle)</td>
<td>8</td>
<td>8+</td>
<td>1+</td>
<td>3+</td>
<td>3+</td>
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<tr>
<td><strong>Conium maculatum L.</strong> (Hemlock)</td>
<td>3</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Conopodium majus (Gouan) Lorett</strong></td>
<td>1</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Coriandrum sativum L.</strong> (Coriander)</td>
<td>6</td>
<td>6+</td>
<td>1+</td>
<td>3+</td>
<td>3+</td>
</tr>
<tr>
<td><strong>Coronopus squamosus (Foek.) Ascherson (Swine Cress)</strong></td>
<td>3</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Crataegus (Hawthorn)</strong></td>
<td>3</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Festuca ovina</strong></td>
<td>1</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dryopteris sp.</strong></td>
<td>cf.</td>
<td>leaf</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Filipendula ulmaria</strong> (L.) Maxim. (Meadow Sweet)</td>
<td>1</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Heracleum sphondylium L.</strong> (Hogweed)</td>
<td>1</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hypoxis niger L.</strong> (Hemibane)</td>
<td>1</td>
<td>cf.</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Juncus spp.</strong></td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lactuca sp.</strong></td>
<td>3</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lapsana communis L.</strong> (Nipplewort)</td>
<td>1</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Linum catharticum L.</strong> (Purging Flax)</td>
<td>3</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Linum cf. usitatissimum L.</strong> (Flax)</td>
<td>1+</td>
<td>3+</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Luzula sp.</strong> (Woodrush)</td>
<td>2</td>
<td>cf.</td>
<td>1</td>
<td>1</td>
<td>1+</td>
</tr>
<tr>
<td><strong>Malva sylvestris L.</strong> (Mallow)</td>
<td>1</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Moehringia trinervia</strong> (L.) Clairv. (Three-nerved Sandwort)</td>
<td>1</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Myosotis sp.</strong> (Forget-me-not)</td>
<td>2</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oenanthe fluviatilis (Bab.) Colem.</strong></td>
<td>1</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Poppy cf. argemone L.</strong> (Poppy)</td>
<td>2</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Papaver cf. rhoas or dubium L.</strong> (Poppy)</td>
<td>3</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>cf. Papaver somniferum L.</strong> (Opium Poppy)</td>
<td>1+</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plantago major L.</strong> (Plantain)</td>
<td>1</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Polygognum aviculare L.</strong> (Knotgrass)</td>
<td>1</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Potentilla spp.</strong></td>
<td>3</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prunella vulgaris L.</strong> (Self-heal)</td>
<td>1</td>
<td>cf.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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ERNEST GREENFIELD

Table II—cont.

<table>
<thead>
<tr>
<th>Species</th>
<th>610113</th>
<th>610114</th>
<th>610115</th>
<th>610116</th>
<th>610117</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pteridium aquilinum (L.) Kuhn (Bracken)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quercus cf. robur L. (Oak)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ranunculus repens or bulbosus or acris (Buttercup)</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>cf. 1</td>
</tr>
<tr>
<td>Rhinanthus sp. (Yellow Rattle)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Rubus idaeus or fruticosus (Raspberry or Blackberry)</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rumex acetosella L. (Sheep's Sorrel)</td>
<td>c. 12</td>
<td>++</td>
<td>+</td>
<td>+</td>
<td>cf. 2</td>
</tr>
<tr>
<td>Rumex cf. obtusifolius L. (Dock)</td>
<td>c. 6</td>
<td>++</td>
<td>1</td>
<td>1</td>
<td>c. 11</td>
</tr>
<tr>
<td>Rumex sp. (Docklets only)</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saxifraga granulata L. (Meadow Saxifrage)</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<td></td>
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<tr>
<td>Scirpus saccatus L.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cf. Sciranthus sp. (Knavel)</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sisymbrium officinale (L.) Scop. (Hedge Mustard)</td>
<td>1 silqua</td>
<td>1+</td>
<td>1</td>
<td></td>
<td>1+</td>
</tr>
<tr>
<td>Sonchus asper or oleraceus L. (Sow Thistle)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stellaria media (L.) Vill (Chickweed)</td>
<td>4</td>
<td>9</td>
<td>cf. 1</td>
<td>cf. 1</td>
<td>cf. 3</td>
</tr>
<tr>
<td>Stellaria palustris or graminea L.</td>
<td>55</td>
<td>49</td>
<td>16</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Taraxacum sp. (Dandelion)</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torilis rostrata (L.) Gaertn.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trifolium Sect. pratense (L. (Clover)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>flowers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trifolium sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typha sp. (Reedmace)</td>
<td>3</td>
<td>3</td>
<td>c. 100</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Urtica dioica L. (Stinging Nettle)</td>
<td>46</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Urtica urens L. (Small Nettle)</td>
<td>3</td>
<td>9</td>
<td>2</td>
<td>2</td>
<td>24</td>
</tr>
</tbody>
</table>

There are also a number of seeds and fruits belonging to the families Cruciferae, Compositae, Caryophyllaceae, Graminae, Umbelliferae and Labiatae not yet identified to a genus.

The two specimens of Brachythecium have fresh-looking chloroplasts in the leaf cells and I believe that they are recent contaminants. Some of the other specimens also have some cell contents, but these do not look so fresh and the cell walls are brown, and at present I see no reasons for doubting their provenance. So apart from sample 610071 C, we have a coherent picture of woodland nearby, probably with small trees or shrubs near the margins, and with open grassy clearings. Antitrichia is of interest in that it is now extinct in Lincolnshire.

Notes
4 In E. Greenfield (forthcoming).
8 The specimen from Minnis Bay (a Bronze Age site) was a modern contaminant.
APPENDIX II

THE LEAD SHEET FRAGMENTS FROM THE WELL FILLING

a) Examination by L. Biek (Ancient Monuments Laboratory).

A.M. No. 610118 (Fig. XIV). Fragment of sheet ca 0.7 in. thick on the average except in the overlap which is about half that thickness. A triangular portion ca. 6 in. wide and 5 in. high is folded back on the main body, presumably for convenience in handling. Except for the original, hammered, edge along the overlap, all edges have been crudely cut, seemingly by using a chisel-like tool; this would be consistent with fairly rapid dismantling. The overlap is about $\frac{3}{4}$ in. wide, and near the edge there is a row of nine nail holes, mostly of square section. Countersunk impressions of usually oval, but sometimes sub-rectangular, nailheads remain in nearly all cases, more or less distinctly. One hole contains the corroded residue of the portion of the (iron) shank passing through the lead and shows a similar 'rusty' outline of the head.

Corrosion of the lead has been slight; there are some black (?sulphide) patches but the rest is uniformly and smoothly off-white (? basic carbonate). There is no immediately obvious evidence on either surface to suggest use or purpose. Mr. W. W. Robson (see below) confirmed that the fragment could have come from the side of a tank or tank lining. There is no technical objection to water having been heated in such a tank - some modern practice employs similar evaporating tanks, 10 ft. by 6 ft., usually shallow (ca. 1 ft. deep), of $\frac{1}{4}$ in. thick sheet heated from a flue below. From the large size of the nail holes it would seem that the overlap would originally have been at right angles to the side, and fastened to a horizontal surface. If one accepts this, the remaining nail residue suggests that corrosion of the iron in this case had proceeded to a stage where the nail could simply be broken by, or after, removal of the lead, and before the overlap was folded back.

A.M. No. 610119 (Fig. XIV). Similar but larger fragment, with a rectangular fold ca. 7 in. by 5 in., greater variety among the eleven nail holes in section and head impression, narrower overlap (ca. 3 in average) and showing some red oxid in the section of the fold, indicative of alkaline conditions of corrosion.

(b) Analysis and Comments by W. W. Robson and T. A. Read (Associated Lead Manufacturers' Research Laboratories).

The results of spectrographic analysis are given below. In our opinion the two pieces from the well base (L.2 and 3, Lab. Nos. 610118 and 610119) are identical and could have come from the same sheet, or at least from the same pot, but the small piece from the top half of the filling of F.7, (L.1, Lab. No. 9831) is different as it contains very much less antimony and has only a faint trace of arsenic.

<table>
<thead>
<tr>
<th>Element</th>
<th>L.1 9831</th>
<th>L.2 610118</th>
<th>L.3 610119</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cu</td>
<td>0.005%</td>
<td>0.005%</td>
<td>0.005%</td>
</tr>
<tr>
<td>Ag</td>
<td>0.004%</td>
<td>0.004%</td>
<td>0.004%</td>
</tr>
<tr>
<td>Bi</td>
<td>Not detected</td>
<td>&lt; 0.005%</td>
<td>&lt; 0.005%</td>
</tr>
<tr>
<td>Sn</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Ni</td>
<td>&lt; 0.005%</td>
<td>trace</td>
<td>trace</td>
</tr>
<tr>
<td>As</td>
<td>Faint trace</td>
<td>0.005%</td>
<td>0.005%</td>
</tr>
<tr>
<td>Sb</td>
<td>0.01%</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
</tbody>
</table>
THE ROMAN VILLA AT DENTON, LINCOLNSHIRE

APPENDIX III

METALLOGRAPHIC EXAMINATION OF THE BLOOM by G. T. Brown, GKN Group Research Laboratory, Wolseley Works.

(Arranged through the kind offices of Mr. H. F. Cleere, Iron and Steel Institute)

After removal of the surface coating of scale, clay, etc., the weight was approximately 2½ lb. In shape the appearance was rather like a very crude axe-head. The thick end had a spongy appearance and when the surface coating was being removed it was noticed that there was a spongy mass of slag type material attached.

A section was cut along the whole length perpendicular to the 'flat' of the 'axe'. This was prepared by standard metallographic methods and examined after etching. The microscopic appearance confirmed that the thick end was of a spongy and relatively unconsolidated nature whereas the thin end showed evidence of slag elongation and a much higher density.

Dark etching areas on the micro-section were confirmed, on microscopic examination, to be areas of high carbon content (up to about 0.5%) whereas the light areas were very low in carbon (i.e. less than 0.1%). The general heterogeneous appearance was typical of Roman bloomery i.e. high carbon areas were totally enclosed by low carbon ones. The grain size was in places very coarse.

The microstructure gave indications that a considerable phosphorus content was present. Quantovac analysis suggested that there was unlikely to be any other alloying element of any significance.

Drillings were taken sparingly from the centre of the other cut-off piece and analysed chemically, the results were Manganese nil, Sulphur 0.032%, Phosphorus 0.32%. On considering the evidence, what at first appeared to be an axe is almost certainly a part-forged bloom. The lack of consolidation on the thicker end is clear indication of this. There is no obvious reason why it was not finished; the microstructure suggests that the last temperature of heating was a high one, i.e. as for forging. There is no evidence to suggest that by the time the thin end was forged to its present shape the bloom was anything but still hot; normally one would have expected that it would have then been put back into the forge hearth for re-heating to finish the thick end. Why this was not done is a matter for speculation.

Equally there is no real evidence as to the ultimate use of the bloom; possibly since a flat shape was being prepared it may have been intended for an edge tool but this is by no means certain.

APPENDIX IV

THE LEATHER FRAGMENTS FROM THE WELL SITLING by J. H. Thornton (Northampton College of Technology) and Betty M. Haines (British Leather Manufacturers' Research Association)

(Fragments noted during the examination of the well sitling (p. XXX) were packed as found between polythene in two boxes (A.M. Nos. 610109 and 610110) containing two layers each. The material is kept and considered for convenience, only, in these groups which have no other significance. L. Biek)

A. M. No. 610109. First layer - assorted fragments including pieces of thong. Nothing identifiable. One piece about 1½ x 1 in. with thongs through slots on grain side. One thong was found to have been made of full thickness cattle hide and tanned throughout the thickness.

Second layer - assorted fragments. The largest piece is a tongue with three cut edges and one torn one, about 2 x 1 in. tapering to ½ in. at the narrow (cut) end. This has zig-zag
thonging either side with a fragment of the adjoining section remaining in one place. There is also a central thong resting on the grain side of the specimen and passing in and out again near the narrow end of the tongue. A surface groove passes across the tongue at the wider (torn) edge as though a thong had rested on it. The back appears to be covered with an additional layer of leather, lighter brown in colour. A section prepared from the thonged tongue suggests that the two layers are separate pieces of leather and not due to the breaking apart of one thickness. They are from cattle hide, as are various assorted fragments also examined.

A.M. No. 610110: First layer - assorted fragments. Two pieces, about $1\frac{1}{2} \times 1$ in. and $2 \times 1\frac{1}{2}$ in., each show butted sections joined by zig-zag thonging. The larger specimen has the surface layer of one piece broken away, revealing the underpart of the thonging resting on what seems to be an additional layer of leather. There is also an interesting knotted specimen but it is difficult to trace the actual path of the thong. Under the microscope, the double layer with thonging is seen to consist of two pieces of leather and is thus not due to delamination of a single piece. This fragment and several others examined all appear to be from cattle hide.

Second layer - assorted fragments. One specimen, about $2\frac{1}{2} \times 1\frac{1}{2}$ in., shows a thonged butted joint. Another, $2 \times 1\frac{1}{2}$ in., is the only one with traces of a stitched butted joint. No stitching remains but the two adjoining cut edges are indented where the seam has pulled them in to each other and the grooves made by the thread at about $45^\circ$ to the edges are still visible. As the cut never went right through but was a surface cut only, it must have been stitched for decorative purposes, however improbable this may seem. Although there is a definite groove cut in the grain surface there is no evidence, in the region that was sectioned, of the cut continuing through the full thickness of the leather.

General comment is difficult as the specimens are so fragmentary. The zig-zag thonging, widely spaced, which appears in several of them, suggests leather garments rather than shoes. Such coarse thonging is not found in shoes and in any case the Romans normally used nails for attaching bottoms to uppers. The stitched fragment could be part of a shoe upper as such seams are fairly common in the sides of Roman shoes and the back seams of moccasins and sandals (there are several examples in the Guildhall collection).

APPENDIX V

THE MOSAICS FROM THE VILLA by D. J. Smith

So far as known, the Denton villa had no more than five rooms with tessellated pavements, of which three contained decorated panels. All belonged to the suite in the western half of the house, which was rebuilt with stone footings at a date not earlier than c. A.D.370. Two of the decorated panels - those in Rooms 2 and 7 - had disappeared before the excavations of 1948 - 49, but their patterns are known from the coloured engravings published in 1800 by the Rev. William Fowler. These engravings are convincing and the following descriptions of the mosaics of Rooms 2 and 7 are based upon them. The mosaic of Room 9 is described from a photograph and notes provided by Mr. J. T. Smith.

Four colours - blue, grey, white and red - were employed in the patterns. The red were presumably of tile, the blue, grey (greenish grey in Room 7) and white of local limestones. In rooms 2 and 7 these tesserae appear to have averaged $\frac{1}{2}$ in. square. In Room 9 they averaged $1\frac{1}{2}$ in. square, like the plain grey (or pale blue) tesserae, also of local limestone, which formed the plain surround in all three rooms.
THE ROMAN VILLA AT DENTON, LINCOLNSHIRE

The mosaic in Room 2.

Room 2 measured 19 ft. × 7 ft., its decorated panel 8 ft. 10 ins. × 3 ft. 2 ins. Fowler's engraving shows an arrangement of red bands, two tessereae wide, outlined in blue, forming a pattern of intersecting octagons and half octagons. The background is white, relieved by small red squares, each of four tessereae, and red bands, two tessereae wide and pointed at either end, which are set centrally on the white ground in the interstices of the red and blue pattern.

The mosaic in Room 7.

Room 7, evidently the most important, measured some 23 ft. × 17 ft. and contained a decorated panel 8 ft. square. The geometric pattern of this panel was of essentially simple construction, but its components were executed in broken lines which at first sight tend to mask its simplicity. The centrepiece was a star formed of eight lozenges, each outlined in broken grey line on a white ground. Each lozenge was subdivided into four smaller lozenges, of which two - those on the long axis - were white with a grey lozenge-shaped centre, while the other two were red.

Eight grey squares containing guilloche knots surrounded this central star, the squares fitting into the angles between the lozenges. Like the lozenges, the squares were outlined in broken grey line on a white ground. In the corner of each was a small white square formed of four tessereae. The knots were of white, their strands outlined in grey on the inner side and in red on the outer.

The angles of the pattern were occupied by pairs of lozenges identical with those of the central star, and two small triangular spaces on each side, outlined in broken grey line on a white ground, contained a stepped-gable pattern in red, white and grey.

The entire pattern was framed by a simple guilloche of white strands outlined in red on one side and grey on the other.

The mosaic in Room 9.

Room 9, which may actually have been a partly open verandah, measured 32 ft. 6 ins. × 7 ft., its decorated panel 18 ft. × 2 ft. 6 ins. This was the plainest of the three. It consisted simply of a rectilinear grid, formed of red bands two tessereae in width framing twenty-six white squares of approximately 1 ft., each square containing one hundred tessereae.

The patterns

Apart from its exceptional elaboration the pattern of intersecting octagons of Room 2 adds nothing to the known repertory of Romano-British mosaics. The same may be said of the rectilinear grid pattern of Room 9. The pattern of Room 7 is, however, of greater interest. Without its broken lines and subdivisions it would be almost exactly a replica of one of the panels of the pavement discovered in 1795 at Scampton (Lines), some twenty-five miles east-north-east of Denton. There each of the eight lozenges of the central star contained a smaller lozenge, the angles between pairs of lozenges were occupied by squares with guilloche knots, and the lozenges and triangles which filled out the pattern contained respectively smaller lozenges and triangles.

The difference between the pattern at Denton and that at Scampton lies principally in the chequered effect produced at Denton by the use of broken lines. This is indeed the most striking feature of the Denton mosaic, and it is an exceedingly rare feature. The only other mosaic in Britain known to have exhibited a comparable effect is the latest of the ten pavements at Lydney Park (Glos.), which consisted of a pattern of running peltae with broken outlines and was thought to have been laid "a few years later than A.D.357."
ERNEST GREENFIELD

The Lydney pavement, then, was closely contemporary with the mosaics at Denton. This raises the possibility of contact in the period *circa* 370 between mosaicists working in what is now Gloucestershire and those who laid the Denton pavements. Such a possibility is not out of the question but there appears to be no other evidence which might support it: indeed, not one of the Lydney pavements exhibits any form of lozenge pattern and even the common guilloche knot appears only once in their patterns. On the other hand, more or less close parallels for all three of the patterns at Denton can be found much nearer home. Patterns of intersecting octagons and hexagons - plain linear versions of the mosaic of Room 2 are recorded at Haceby (Linca.), Leicester ("the Cherry Orchard"), (?) Tixover Grange (Rutland), and Great Weldon (Northants), and rectilinear grid patterns like that of Room 9 at Haceby and at Medbourne (Leics.), while the star of eight lozenges which forms the centrepiece of the pavement of Room 7 is particularly common as a central or repeating pattern-unit in mosaics of the east midlands, being known in Huntingdon at Great Stoughton, in Leicestershire at Medbourne, in Lincolnshire in Lincoln itself and at Scampton, in Northamptonshire at Castor (Mill Hill), Nether Heyford and Great Weldon, in Nottinghamshire at Mansfield Woodhouse and in Rutland at Great Casterton. There is reason to think that the pavements of most, if not all, of these sites can be attributed to a single school of mosaicists, that this school was most probably established at Castor - *Durobrivae*, and that its period of activity appears to be, more or less, the third quarter of the 4th Century. The mosaics of Great Casterton, Nether Heyford, Medbourne, Scampton and Great Weldon appear to represent the earliest works of this school, preceding those of Mansfield Woodhouse, Mill Hill and Great Stoughton, while the pavements of Denton are possibly its latest recognisable products.

Notes

1 W. Fowler, *Engravings of the principal mosaic pavements, etc.*, No. 10, published 1st Dec. 1800. According to Fowler's superscription this engraving was made from a copy by Mrs. Welby of "an original drawing of Dr. Stukeley now in the possession of William Earle Welby, Esqr. Denton House."  
3 W. Fowler, *Engravings, etc.*, No. 8, published 1st May, 1800 and reproduced as frontispiece in C. Illingworth, *A topographical account of the Parish of Scampton* (1808).  
5 W. Fowler, *Engravings, etc.*, Appendix 2, No. 22, published 17th Sept. 1823.  
7 My only knowledge of this mosaic is a brief description in a letter from Dr. Graham Webster.  
8 *Victoria Hist. of Northamptonshire*, I, Fig. 22.  
9 *Victoria Hist. of Leicestershire*, I, pl. VII.  
11 W. Fowler, *Engravings, etc.*, No. 4, published 12th April, 1799.  
12 E. T. Artsis, *Antiquities of the *Durobrivae* (1828), Pl. XIX.  
13 *Victoria Hist. of Northamptonshire*, I, Fig. 24.  
APPENDIX VI

FINDS FROM THE VILLA

COARSE POTTERY by Graham Webster

Stratified

1. Flanged rim of a bowl in cream ware with a dark red colour-coat. This is probably a wide-mouthed bowl (cf. Gt. Casterton II, Fig. 6, No. 2) late third to early fourth century. From the mortar bed underlying the tessellated pavement in Room 3.

2. Mortarium with reeded rim. This is similar to a Jewry Wall type (Fig. 18, No. 26) and probably dates to the late third to early fourth century. From the burnt level in the southern half of Room 6.

3. Mortarium with reeded sloping rim in a cream-brown ware with large black grits, probably mid-late third century. From the southern ditch under Room 1.

4. Rim of a large stone jar in light red, calcite gritted ware. These jars are very common at the Jewry Wall (Fig. 29) at all periods and are difficult to date. From a section of the central ditch outside the villa.

5. Bowl with heavy bead and blunt flange in red calcite gritted ware with large white grits, of a type which seems to belong to the fourth century (cf. Park Street, Fig. 20, No. 5, etc.; Gt. Casterton I, Fig. 9, No. 32). Associated with the cobbled yard north-west of the villa.

6. Small bowl with bead and flange in cream ware with a grey core and a black colour-coat; a typical fourth century form. Associated with the curved path east of the villa.

7. Bead and flange bowl with large bead in cream-brown ware with a black colour-coat. Found with No. 6.

8. Large jar with two countersunk handles decorated with notching below the rim and grooves and a line of notches on the body; in light grey ware. A typical fourth century type for this area, similar to the types from Swanpool, C. 41 and 42, etc., and for handles F, 1 and 2. (Illustrated in original report, pl. 8). The form continues to the end of the occupation (cf. Gt. Casterton I, destruction deposit, Fig. 8, Nos. 7, 8 and 9). Found with Nos. 6 and 7.

Unstratified

9. A small incurved bowl with flange in hard grey ware, probably an earlier version of No. 5.

10. A similar bowl in light grey ware decorated with scored lines on the lower part of the body.


12. Mortarium with reeded flange in cream ware and black grits, probably of similar date to No. 11.

13. Large wide-mouthed bowl in light grey ware. A typical fourth century form (cf. Gt. Casterton I, Fig. 9, No. 26; Swanpool, D. 37 - 43, etc.)


15. Bowl with everted rim which oversails the body, in light grey ware (cf. Jewry Wall, Fig. 24, No. 18).
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16. Hemispherical bowl with centre flange in light red ware. A typical fourth century form probably derived from the Dr. 38 and occurs in a variety of fabrics. (Cf. Swannpool, D. 33 - 36; *Gt. Casterton I*, Fig. 9, No. 31, etc.).
17. A smaller version.
18. Two fragments of an amphora rim and cylindrical neck in light red ware.
19. The lower part of a small beaker in cream ware with a light grey core and a black colour-coat; probably a fourth century version of a common type.

**SMALL FINDS Fig. XVI.**

**No. Objects of Bronze**

1. Brooch, with plain bow, solid catch-plate and long moulded side pieces. Below the head is the hook for the chord of the missing spring. Collingwood, *Archaeology of Roman Britain*, Group H. (15), dated to first half of 2nd century. The customary explanation of a brooch of this type on a late-Roman site is that it was an heirloom. If so it was a rather miserable one.
2. Bracelet, fragment.
3. Strip, decorated, in two pieces with a hole for a rivet or other fastening: part of a pair of tweezers?
4. Pin of buckle. Cf. *Jewry Wall*, Fig. 82, No. 11.
5. Pin of brooch with ribbed decoration.
6. Ring, open.
7. Bowl of spoon, flattened and broken.

**Objects of Bone**

8. Part of a knife handle intended to be riveted through haft.
9. Fragment, of different section from 8 but perhaps serving same purpose.
10-14. Incised fragments, perhaps the inlay of a box.

**Objects of Stone**

15. Polished axe of oval section with squared sides; a fine-grained greenstone with brown band in section. The Stone Axe Sub-Committee of the South-Western Group of Museums and Art Galleries reported as follows:

  No. 395 Petrology.
  *Macro:* A slate-coloured igneous rock.
  *Micro:* Usual characters of Group VI (Stake Pass).


**Notes**

3 *Excavations at the Jewry Wall Site*, Leicester, 1948.
5 *The Roman Town and Villa at Great Casterton*, Rutland, 1951.

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