Processes of Collapse in Romano-British Buildings:
A Review of the Evidence

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Summary

Roman archaeology has always involved a strong element of buildings study. In many areas of the Empire this has included investigation of substantially intact structures. In the western Empire, however, archaeologists have of necessity kept their eyes closer to the ground. This has led to a great deal of research into building plans, but superstructural evidence has largely been neglected. This paper will be in two parts. The first will review the evidence for building superstructures in the form of collapsed walls. These have been excavated in Italy, Germany, Britain, and elsewhere. The second part will discuss the means by which structures collapse, and the ways this can be studied in the archaeological record.

Introduction

Buildings are multi-dimensional entities in space and time. They can be extended, divided, reduced and destroyed. They may be available for study as standing structures, but they also occur commonly on excavations where they may have been subjected to a wide range of “post-depositional” processes such as truncation, robbing or animal disturbance (especially, but not exclusively, in the case of timber buildings).

An intermediate stage often occurs between the life of a building in use and its entry into the world of “buried” archaeology; indeed a ruined building such as an abbey can occupy both the standing and buried worlds at the same time. When a building is abandoned it will begin to decay and the products of this process may find their way into the archaeological record as a distinctive deposit. The precise nature of this deposit will be determined to a large degree by the parent material of the structure concerned, i.e. what it was made of. The deposit may be subject to post-depositional processes like any other archaeological entity, but this need not affect its value in the interpretation both of its parent structure, and of site formation processes. This paper seeks to demonstrate that detailed analysis of these deposits can elucidate the different processes of decay, collapse and demolition. The discussion will largely be confined to masonry structures (in a broad sense) of the Roman period.

The Nature of the Evidence and Limitations of the Study

A number of recent projects have provided the opportunity to study excavated Roman buildings in three spatial dimensions - plan and elevation - because substantial areas of collapsed masonry were recognised. Some of these discoveries have been truly spectacular, but if others have been more mundane they have often been just as useful for interpretative purposes. The projects have been widely distributed geographically, both within England and Wales (Fig.1) and in Europe, and a brief review of evidence from earlier excavations has shown that a surprisingly large number of collapsed structures were already known before the recent spate of discoveries.

My interest in collapsed buildings began in 1990 during the excavation of a small Roman villa in Northamptonshire (Keevill 1990). Several areas of collapsed masonry were found, including a virtually intact gable end wall. Informal contacts and research in the coming months began to show the quantity of collapsed structures already known about or being discovered and also demonstrated the quality and research value of the data. The sheer quantity of data (or certain elements of it), allied to the frustration of not being able to undertake detailed analysis of my own villa excavation, has limited the amount of research I have been able to undertake in subsequent years.

It is therefore impossible to present more than a general overview of this extensive subject here. I have been able to make extensive (but by no means exhaustive) searches for collapsed Romano-British buildings (although no attempt has yet been made to examine sites between the Hadrianic and Antonine frontiers), and a map of the Roman sites mentioned in this paper is presented in Figure 1. Research into parallels in continental Europe and beyond has been on an ad hoc basis and has relied especially heavily on information from excavators and others. I am
Figure 1: Map of English and Welsh sites mentioned in the text (Oxford Archaeological Unit)
therefore happy to acknowledge my debt to the many colleagues who have brought examples to my attention, although space precludes a complete listing.

The study area has been restricted to Roman buildings for convenience, although Saxon (Keevill and Chambers 1991, 102) and medieval examples are also known (Klein and Roe 1987, 59; Sherlock and Woods 1988, 47-53). Roof structures are only dealt with in a very summary manner because so many collapsed roofs have been excavated; they deserve a major study in their own right, but there is not enough space here to deal with anything other than the largest examples, all of which are from military or municipal *Thermae*. Most of the buildings cited below had masonry superstructures in various materials, although timberwork was often an integral element of framing.

**Excavated Evidence for Collapsed Roman Buildings**

i) **Redlands Farm, Northamptonshire** (Keevill 1990, 1992, forthcoming): The Redlands Farm villa was discovered by the Oxford Archaeological Unit in 1990 during an excavation in advance of gravel extraction on land in the floodplain of the River Nene. The villa lay at the centre of a small farmstead comprising rectangular barns, later replaced by roundhouses, enclosed by a perimeter wall and associated with field systems (Figs.2a & b). The villa began its life in the 2nd century as a mill, powered by leats draining subsidiary channels of the River Nene. In the early 3rd century the mill was converted to domestic use by the addition of a rear corridor on the north side of the mill, with wings on the east and west sides projecting beyond the south façade. The 3rd and 4th centuries saw various developments, including the addition of a verandah to the front façade and successive divisions of the wings into two rooms each. The central suite of rooms (ie within the old mill building) included a hypocaust and tessellated pavements. Construction was in limestone throughout the life of the building, with tufa also present. Roofs were tiled.

The villa went into steady decline from the late 4th century onwards. Most rooms in the building were covered with stone rubble characteristic of the gradual decay of masonry over a long period of time, while the rear corridor contained a mass of broken tile which probably represents a fallen roof; there is evidence to suggest that this roof was maintained when others were abandoned (see below). In the hypocausted room, the rubble filled most of the cellar and had destroyed most of the *pilae*. A few fragments of masonry were still bonded together, including part of a wall flue, while numerous lumps of wall plaster were also present. One substantial area of masonry facing at the south-east corner of the room had collapsed inwards with its painted wall plaster still *in situ*. Small areas of collapsed masonry were found in other rooms as well.

The most impressive evidence came from the rear of the two wings. The west wing was the only part of the villa to suffer later stone robbing, but even so four intact courses of collapsed masonry survived lying 1.2 m north of the gable wall. The east wing, however, was largely undisturbed. The northern gable wall (ie at the rear of the villa, Fig.3) had collapsed outwards, and survived virtually intact where it had fallen. The roof may have been removed prior to collapse, as intact *imbreces* had been stacked in the rear corridor, although several of them had been smashed during the later dereliction of the surviving masonry (including the collapsed roof noted above).

Twenty nine courses of masonry were present in the collapsed gable, in addition to the three standing courses of the rear wall. A course of tegulae and imbreces towards the top of the wall apparently protected an offset in the masonry. The collapsed fragment was 6.4 m long, but had clearly expanded and twisted slightly as it fell; detailed recording showed that its actual height would have been c. 5.7 m to the roof ridge, or 6.5 m including the standing masonry. The roof appears to have had a pitch of only 22.5°. Quoins were used, but were absent in all of the seven lowest courses of collapsed masonry. The west side of the wall also had quoins in the eight surviving courses below the roof eaves. Below this the wall would have continued across the rear corridor. The latter evidently survived in use, as the lower courses of the east wing collapse stop at a point corresponding with the end wall of the corridor.

ii) **Meonstoke, Hampshire** (King and Potter 1990): Work began on the site of a presumed villa at Meonstoke in 1986 and a 3rd- to 4th-century aisled building was found, measuring 15 m wide and at least 30 m long. The flint and chalk block masonry showed evidence of several constructional phases, the most important of which involved a 2.6 m extension of the building and the associated construction of a new façade with a central door 2.85 m wide.

The most significant discovery was made in front of the south-east façade, where an extensive area of collapsed masonry was revealed (Fig.4). This is undoubtedly the most impressive excavated example so far from Roman Britain, containing as it does both windows and a blind arcade above them, along with
Figure 2a: Phase plan of the Redland's Farm excavations (Oxford Archaeological Unit)

Figure 2b: Phase plan of the Redland's Farm Roman Villa (Oxford Archaeological Unit)
Figure 3: Plan of the collapsed east wing gable at Redland’s Farm (Oxford Archaeological Unit)
evidence for a highly decorated overall design scheme. This involved the use of coursed flint, tile and mortar to create an extraordinary striped and chequered effect. The windows and blind arcade used tile pilasters incorporating projecting and moulded tiles and greenstone bases and capitals, springing into semi-circular arches. The façade also incorporated a projecting hood between the windows and the blind arcade. The hood was angled downwards and consisted of two tile courses, the lower one in stone and the upper comprising tegulae and imbreces.

The collapsed masonry derived from the ‘nave’ of the building and the lower part of the façade, including the aisles, was not present. The upper portion therefore represents a clerestory, and the lower walls probably remained standing. Evidence from the collapsed masonry shows that the roof pitch was 47.5° over the clerestory, an angle made possible by the use of stone tiles (presumably pegged). King and Potter (1990, 197) suggest that the aisle roofs were tiled, with a much lower pitch of c. 30°.

iii) Lebach, Saarland, Germany (Miron 1990): Perhaps the most spectacular example of collapsed masonry in Europe comes from a 1989 excavation in the Saarland, Germany, where an agricultural building measuring some 23 m x 12 m was found within a villa estate. Opposed 2.5 m-wide central doorways were found in the long walls of the building, but otherwise the architectural detail of the groundplan is unremarkable. However, all four walls had collapsed in the mid-4th century (Fig. 5), allowing for an extraordinarily detailed reconstruction of the superstructure. The walls were 10 m or more high, and the regular stone courses of the facing were extremely well preserved in places. The arches of both central doors can be seen in the collapsed long walls, with possible evidence for subsidence of the original superstructure in the form of displaced voussoirs in the southern arch. The evidence suggests that the doors were about 6 m high. The south wall also preserves one round-headed window, while a further three can be seen in the north wall. All of the windows occur in the east half of the building, but unfortunately insufficient detail survived in the west half to determine whether matching windows were present there. It is clear, though, that the heads of the windows were level with the crown of the door arches, producing lights high up within the masonry.

iv) Pianabella, Ostia, Italy (Coccia and Paroli 1990): Excavations took place at the funerary basilica at Pianabella in the 1970s and again in 1988-89. The basilica, which was built c. AD 400, is simple in plan, with a narthex, nave and atrium; it remained essentially unchanged until about AD 1000. The 1988-89 excavations revealed a substantial part of the collapsed south wall. This survived to roof height, while five windows and a section of narthex arcade were also preserved within the masonry. Once again this provided the excavators with the kind of architectural and superstructural detail which could only have been guessed at from the groundplan.

v) Other examples: At Batten Hanger, near Chichester in Sussex, the virtually intact collapsed gable of an ailed building was excavated in 1990. The wall was built of coursed flint, with the necessary string courses in greensand. At least one string of tegulae and imbreces was included, possibly again to protect an offset. The wall had evidently been faced in plaster externally (information from John Magilton). Collapsed flint walls have also been excavated at Feltwell, Norfolk (Gurney 1986, 8 and 45-6), Sparsholt, Hampshire (information from David Johnston), Dicket Mead, Welwyn, Hertfordshire (Rook 1983-6, 91 and Fig.13), Littlecote, Wiltshire (information from Bryn Walters) and Dewlish, Dorset; the latter incorporated a semi-circular brick arch from the verandah (Putnam and Rainey 1975, 54).

Limestone was used at the Roman villa at Piddington, Northamptonshire (Friendship-Taylor and Friendship-Taylor 1989). Here the inner face of a wall, perhaps 5.5 m high in its original state, had slumped into a cellar. The remainder then fell over this and partly covered an adjoining room to the north (information from Roy Friendship-Taylor). Other stone examples such as the upper part of a gable from Carsington, Derbyshire (Ling and Courtney 1981, Ling 1992) and parts of three walls from one villa room at Medbourne/Drayton, Leicestershire (information from Richard Pollard) are of interest not only structurally but also because they were not immediately recognised as collapsed walls; one wonders how many such structures lie hidden in published references to "rubble/stone spreads". Collapsed stone walls have also been found at a roadside settlement at Bainesse Farm, Catterick (information from Peter Wilson), and on a villa site at Taversham, Cambridgeshire (Frear 1989, 296). Three examples were found at Cold Knap, South Glamorgan, Wales, comprising two walls of one room and a terrace wall (Evans et al 1985, 64, 68). Another Welsh example comes from the civil settlement at Caerleon, where part of a wattle and daub building collapsed due to fire damage (information from Edith Evans).
Not all collapsed walls occur on rural sites. Examples have been found at Canterbury (information from Maggy Taylor), suburban Leicester (Mellor and Lucas 1978-9), London (Perring and Roskams 1991, 77-84), Cirencester (McWhirr 1978, Plate XXXVII), Lincoln (information from Alan Vince), Collitton Park in Dorchester (Dorset; Drew and Collingwood-Selby, 1937) and Caister-on-Sea (Darling 1993). The latter included timber partitions as well as roof structures, while the Cirencester example comprised stone infill to a timber frame. The London and Leicester examples are of mud-brick.

Sections of collapsed fort wall have been found at Dover (Philip 1984) and Pevensey (Peers 1985), while fallen masonry from a barrack block was found in the fortress at Caerleon (information from Edith Evans). A further example of a collapsed fort wall comes from the Valkenburg at the mouth of the Rhine west of Leiden (information from Dr L P Louwe Kooijmans). Other continental collapsed walls are known at Winkel, Switzerland, and the Villa di Patti, Sicily (information from Peter Johnson and Bryn Walters). A notable example from another continental villa is the fallen wall at Newel, north of Trier in Germany, where the height of the masonry suggests the existence of an upper storey (Wahtman 1970). Further afield one must note the exedra of the Severan Nymphaeum at Lepcis Magna (Bianchi-Bardinelli et al 1966, Fig. 149).

Roofs only form an incidental part of this paper, but three examples from Thermae deserve mention. At Bath, substantial elements of the stone vaulting were found when rubble was cleared from the main bath (Cunliffe 1969; see especially Figs XX and XXI); the masonry included several articulated vault ribs, some of which are still on display at the site. At Canterbury, voussoir tiles in opus signinum were found, representing part of the collapsed vault of the lacoicum (Blockley et al forthcoming). At Chester, a similar tiled vault was found in the legionary baths. The roof structure comprised hollow tile voussoirs forming an internal skin with a thick layer of opus signinum poured over it; this was then protected by a standard pitched roof of tegulae and imbreces. An unusual facet of the construction was the use of hollow, interconnected ceramic tubes in the formation of vault ribs (Mason 1990).

**Processes of Collapse and their Archaeological Representation**

There are several processes which may lead to the collapse of a building, and these need not be restricted to the period following abandonment. Neither is it inevitable that one process will occur in isolation. Partial collapse caused by structural instability or weather damage, for instance, may be followed by deliberate and systematic demolition. Sometimes interpretation of fallen walls is reasonably straightforward, as in the case of the wattle and daub building at Caerleon noted above where the collapse had clearly been caused by fire. It is also possible in some instances to speculate on genuine catastrophe as the cause of collapse. The basilica at Pianabella is one such case (Coccia and Paroli 1990) where an earthquake may have been responsible, although even here the completeness of the masonry suggests that a degree of deliberate action was involved in the fall. It is less easy to accept earthquakes as a cause in England, although this is not absolutely impossible and has been put forward in at least one case (Philip 1984).

The vast majority of collapses, however, are likely to have occurred through three principal processes: structural failure, demolition, and dilapidation. The first and last of these could be closely linked in that gradual decay might cause severe structural problems, and it may not be easy to disentangle them in the archaeological record. This will tend to be accentuated where bonding materials are either absent or of poor quality. Drystone field walls, for example, tend to fall apart because of water and/or frost penetration, sometimes exacerbated by an unusual process: the regular use of defined `runs' by animals such as foxes and badgers tends to cause serious erosion of masonry.

Collapse through decay - ruination - tends to be easily recognisable even in mortared walls. At Redlands Farm, for instance, it was clear that walls in the central suite of rooms had fallen apart gradually after abandonment. This led to the accumulation of apparently random rubble spread over the rooms, although occasional "articulated" fragments of masonry were present indicating one substantial panel in the hypocaust. Similarly the collapse of the rear corridor roof appears to have happened piecemeal, and the tile debris was intermixed with stone rubble rather than appearing as an obvious roof structure (cf Mason 1990).

A spectacular example of collapse through gradual decay occurred very recently in the medieval curtain

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Figure 5: Plan of the agricultural building at Lepcis, showing collapse of all four walls (courtesy of Dr A. Miron).
wall of Ludlow Castle. A part of the wall face near the south-east angle fell away after wet weather early in 1990, and an attempt was made to scaffold the relatively small area straight away. Before this could be completed, a 15 m length of the whole 1.8 m thick elevation collapsed; fortunately no-one was injured. The most significant aspect of the incident for this paper, however, was the extent to which the masonry literally fell apart. Articulated fragments of masonry were rare and generally small, and architectural features such as loops simply disappeared. Most of the wall was reduced to rubble, although face stones could at least be separated from core material by their weathered surfaces. Most of the masonry comprised random rubble skins on an earth and stone core, and had not been repointed for many years. This seems to have contributed to the massive water penetration which is believed to have caused the collapse (Morriss and Shoesmith 1990; I am grateful to Ron Shoesmith for drawing this case to my attention).

This picture of collapse into jumbled chaos contrasts sharply with the most spectacular Roman examples noted above (eg Redlands Farm, Meonstoke, Lebach, Batten Hanger, and others). It seems clear that a quite different process was at work in these cases, and the completeness of the masonry surely argues for a deliberate cause: demolition. This is certainly my interpretation of the gables at Redlands Farm, where there is both direct and indirect supporting evidence. The indirect evidence comes from the contrast between the intact east wing gable and the mostly random rubble elsewhere (the west gable had suffered robbing and so interpretation is more problematic).

The direct evidence derives from the east gable itself. Firstly, the lowest seven quoins were absent from the external corner of the collapsed wall. This is interpreted as a deliberate action: removal of cornerstones will inevitably lead to complete destabilisation, as these are the critical elements which lock the structure together. Secondly, the fallen portion stopped on the line of the division wall between the east wing and the rear corridor: evidently an effort had been made to retain the latter. Finally, a distinct 'fault line' could be seen in the masonry where the regular courses had distorted during collapse. This line occurred at the point where the wing was built over a leat feeding water into the original mill building. Insufficient account appears to have been taken of this feature in building the wing, causing instability in the masonry. A substantial buttress was added to the east face of the rear gable corner, but this seems to have been unsuccessful and the wing had to be demolished. The roof was probably removed in advance and imbraces were found stacked in the rear corridor. The north end of the west wing was also built over a leat. Thus at least two quite distinct processes were at work in the same building - dereliction and demolition.

The Meonstoke façade exhibits similar evidence of deliberate action. In this case it is clear that only the 'nave' clerestory is represented in the collapse, and this lay only just in front of the foundations for the extended façade. These were very substantial, and it seems plausible that the upper masonry was deliberately brought down while the lower masonry was equally deliberately left standing. When one turns to Lebach, by contrast, all four walls were brought down, including architectural features. It is scarcely conceivable that the masonry could survive intact during accidental collapse. Catastrophe must remain as a possibility, but even here one would expect a much greater degree of disintegration (witness recent disasters such as the Kobe earthquake, where many masonry buildings suffered severe damage and walls did not survive intact). One of the door arches and perhaps two windows at Lebach showed signs of structural stress in the form of displaced voussoirs; this could have been caused by the collapse, but it is at least possible that such stress led to a decision to demolish. Dr Miron, the excavator, also believes that the building was demolished.

Conclusion

One could go on, but space is restricted. There are a number of cases which do not wholly fall into the categories of random rubble (dilapidation) or intactness (demolition). These include examples such as the wall panels from London, Cirencester and Cold Knap. They could conceivably represent decay processes; this certainly seems to be so at Piddington, where one face of a wall slid into a cellar and the other then fell across it. In the end interpretation of such cases will be a matter of personal opinion, but I hope I have shown that there can be less doubt about the mechanisms involved at the ends of the spectrum of collapsed Roman buildings.
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