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Downpipes and upper story latrines in Pompeii

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ABSTRACT

Research into Roman sanitation has expanded greatly in the past two decades, however little research has focused on downpipes and upper story latrines. Recent field work at Pompeii has culminated in the identification and description of twenty-nine upper story latrines. Furthermore, the presence of 286 wide-bore downpipes indicates a dynamic and complex system of upper story drainage across the site with consequences on our understanding of toilet use and urban infrastructure. Variation in construction of upper story latrines and downpipes has not previous been acknowledged. The socioeconomic implications for low and middle class housing and sanitation needs are also discussed.

1. Introduction

Running in the walls of the city of Pompeii, there are many terracotta pipes. The upper ends of the vast majority of these pipes are absent and give no hint of where they went. The destruction of the upper stories of Pompeii has left many questions unanswered about the usage of the upper floors. Although the existence of downpipes is said to confirm upper floors (Pirson, 1997), it has also been suggested that these may have carried water from roofs. Recent laboratory analysis of the contents of ten downpipes confirms that some downpipes carried excrement from latrines based on the presence of human intestinal parasites (Love, 2007; see also Camardo and Notomista, 2015).

Upper story latrines were commented upon in an article discussing private latrines in Pompeii (Jansen, 1997), but there has been no further research into these over the past ten years. Whilst working with the Anglo-American Project in Pompeii, the authors compiled a photographic catalog of all the latrines and associated downpipes within the excavated areas of the city (Hobson, 2009a). This article seeks to provide more information about the abundance, construction and social importance of upper story sanitation features and about the downpipes which are commonly found in association.

2. Methods

The authors began working together in 2006. The initial research goal was to create a photographic catalog of sanitation features in Pompeii including downpipes and latrines (Hobson, 2009a). Hobson's project had two goals: to photograph all the sanitation features present in Pompeii and to create a reference for each property using Eschebach's detailed city map (Hobson, 2009a, 41–540; Eschebach, 1993, inserts). Trusler has completed subsequent work on the distribution and placement of sanitation features within the site (Trusler, 2010, 2013, 2014). The projects aimed to systematically survey all accessible properties with permits from the Soprintendenza Pompei for evidence of waste management features. We worked with a team of 2–4 field assistants each season.

For this current project, we focused the research on downpipe and upper story latrine construction and design. Field research, including additional survey, revisiting known features, taking additional photographs, and collecting measurements, was conducted in the summer of 2016. Combining nearly 30 years of field work in Pompeii between the authors, identification of sanitation features was based on diagnostic features described by Hobson (2009a), including slots in the wall for wooden seats; slanted floors; niches; and pedestals. For upper story latrines, the presence of a visual downpipe or downpipe scar (wall cut) was also recorded.

Several measurements were taken in an attempt to gain a better understanding of pipe construction and standardization. Four measurements were taken of pipe segments: length of the pipe (excluding the male end), length of the male end, external diameter (taken at the female end or midshaft) and internal diameter (taken at the female end or midshaft). All measurements were recorded in centimeters. Not all recorded pipes are suitable for measurement being either only partly visible, or more frequently, almost totally enclosed within masonry. A substantial number were inaccessible because the visual aspects of the pipe could not be reached. Several pipes could be measured for length

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Fig. 1. Wide-bore downpipe in VI.14.7 with two narrow-bore water pipes visible in the adjoining property (VI.14.6).

only and unfortunately diameters could rarely be recorded due to connected pipe sections. Measurement data are preliminary in this paper as access difficulties and time limitations prevented more extensive data collection.

Previous research identified two sizes of downpipes. Narrow-bore downpipes have a maximum external diameter of about 12 cm (Hobson, 2009b). Narrow pipes have been interpreted as water pipes for the collection or removal of rainwater from rooftops and several have been found to carry rainwater into cisterns (Hobson, 2009b; VII.15.9 has an example of a narrow diameter pipe associated with a cistern mouth). Sixty-three narrow pipes have been identified at Pompeii. Based on measures collected in 2010 and 2016, wide-bore downpipes have an average external diameter of 19.9 cm. Visually, the two sized pipes are easily distinguishable (Fig. 1). It is our argument that the primary function of wide-bore downpipes were to drain upper story latrines and those pipes in particular are the focus of the remaining discussion in this paper. This is supported by the association of some of them with preserved upper story latrines and others with connecting cesspits (Bustamente et al., 2009; pers. comm. Ribera i Lacomba 2009).

3. Downpipes and drainage

Throughout the city the authors have identified 286 wide-bore downpipes (Fig. 2). In order to understand the use of the upper stories of buildings in Pompeii it is extremely important to understand exactly what function these pipes had as well as how they were constructed. Other than the identification of mineralised faecal material from within the pipes are there any other features which may help clarify their function? As mentioned earlier, most downpipes were constructed of terracotta (Fig. 3). However, one wide-bore downpipe made of lead is known from Pompeii and is associated with an upper story latrine. Several examples of downpipe scars (wall cuts) have been found in Pompeii and it is possible that some of these scars once held lead pipes. Much of the lead piping system in Pompeii was removed by early excavators (Rick Jones pers. comm. 2016). Another example of a wide-bore lead pipe is located in Herculaneum. While there is little variation in construction material, there is some variation in the shape of pipe segments. Most pipe segments are straight with parallel sides and neatly squared proximal and distal ends (Fig. 3). However, some pipe segments have rounded and slightly flared proximal ends (Fig. 4), while others have a bulbous shape that is reminiscent of an amphora (Fig. 5). Others still displayed a ribbed pattern and downpipes can be constructed out of a combination of several styles (Fig. 6).

Shape is not the only aspect that varies for downpipes. We found considerable variation in the length and diameter of wide-bore downpipes. Length ranged from 37 to 86.5 cm with an average of 47 cm (n = 91) (Fig. 7). It may be a complete coincidence, but 63% of the pipe lengths are within 4 cm of the Roman cubitus (i.e. 444 mm or six palm widths). The single example of an 86.5 cm pipe could then be viewed as a double cubitus length pipe. Internal diameter ranged from 11 to 21.5 cm with an average of 16 cm (n = 13), which is similar to half a Roman foot (i.e. Roman foot is 296 mm). External diameter ranged from 17 to 24 cm with an average of 20 cm (n = 13). We speculate that this lack of standardization may arise from the diversity in the number of pipe makers or a practice of using personal body proportions as measuring devices and variation in those length. Certainly, some terracotta building supplies (e.g. tiles, bricks) and vessels (e.g. amphora) seem to have reached greater degrees of standardization. These results should be viewed as preliminarily as we were unable to systematically revisit all known pipes to determine if the pipe could be measured.

In one case the name of the pipe maker can be seen, C. Juli(us) Nonors and in another case we have the Roman number thirteen or a mark "+ III", possibly a maker's mark or key for the installers (Figs. 4 and 6). Although there are indications of variation in the pipe maker's form, the overall form is similar in function. The illustration shows the flange or male end which secures a tight fit from the upper pipe into the one beneath it (Fig. 3). This type of construction will direct the passage of material downwards and will reduce seepage from the junction. However, we have now identified four locations where installation mistakes were made resulting in single sections or entire pipes to be installed upside down (Fig. 8). It is intriguing to speculate as to whether these are examples of poor quality work or hurried repairs following the 62 CE earthquake.

Other pipe building features may also have played a part in reducing other problems, such as smell, which might be associated with transmitting feces and urine. One such obvious building technique is enclosure of the pipe within plaster or stone construction. That walls were plastered after the pipe had been built into the wall is seen at VII.13.25 and IX.1.9 (Fig. 9). Pipes could also be covered with a thin layer of masonry fill or bricks before plastering. Masonry buttress work can be a simple fill across a corner creating a rounded buttress as seen in VII.4.38 or square as in VII.3.35 (Fig. 3). Occasionally the pipe may be enclosed in an exterior buttress on the side of a wall as in VI.1.1. However, in most cases, the pipe fits closely within the masonry of the wall and is only visible because some of the outer covering, be it plaster or stonework, has fallen away. At ground floor level, double downpipes can be seen at IX.1.9 and IX.3.15 (Fig. 9). It is likely that these are coming from separate sources, and may also indicate second and third story latrines.

The placement of these pipes within the properties in most cases suggests that they are emptying into cesspits, similar to ground floor latrines. Approximately half of all downpipes were not located close enough to the street to have cesspit access outside the property. This means interior floors would have been disrupted during periodic cleaning. This scenario has implications for maintenance as well as possible expenses associated with modifying sidewalks. In a considerable number of cases the latrine on the ground floor within the property has a downpipe associated with it. Thirty-seven properties have latrine and downpipe features that share common drainage and in some cases, placement of features in adjoining properties suggests shared drainage between properties. This suggests efforts were made to make use of existing drainage features, cesspits or very rarely sewers, when placement and construction of upper story latrines were considered.

It would be of prime importance to date these pipes. That would require archaeological evidence and phasing and has yet been beyond the scope of research for this project. The masonry of one of the enclosed pipes is composed of *opus reticulatum* (VI.14.30,31,32) (Fig. 10). This is suggestive of first century CE construction technique. Research by the Anglo-American Project in Pompeii also suggests a first century CE construction date for most of the downpipes in VI.1 (Rick