




Research Article

Disease control and the disposal of infectious materials in Renaissance Rome: excavations in the area of Caesar's Forum

Cristina Boschetti¹, Laura di Siena², Jan Kindberg Jacobsen², Gloria Mittica², Giovanni Murro², Claudio Parisi Presicce³, Rubina Raja^{1,4,*}  & Massimo Vitti⁵

¹ Centre for Urban Network Evolutions (UrbNet), Aarhus University, Denmark

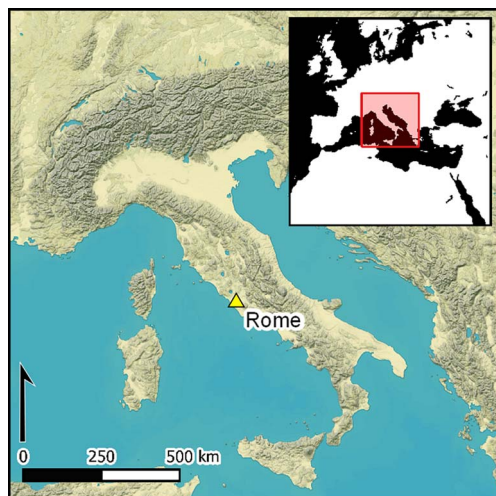
² Accademia di Danimarca, Rome, Italy

³ Sovrintendenza Capitolina ai Beni Culturali, Direzione Musei archeologici e storico-artistici, Rome, Italy

⁴ Department of History and Classical Studies, Aarhus University, Denmark

⁵ Sovrintendenza Capitolina ai Beni Culturali, Rome, Italy

* Author for correspondence ✉ rubina.raja@cas.au.dk



Excavations in Rome have long focused on the early city; only recently has attention turned to the archaeology of the medieval and later periods. Here, the authors present a rare sixteenth-century context, dating to a time when European cities contended with repeat epidemics and implemented measures to control the spread of disease. A contextual approach to the assemblage leads to its identification as a 'medical dump' of clinical equipment, including glass urine flasks and 'single-serve' ceramics, many of the latter specifically produced for the Ospedale dei Fornari. Drawing on Renaissance medical treatises, the authors argue that this material represents the disposal of potentially infected objects, shedding light on urban waste-management practices.

Keywords: Early modern, Italy, hospitals, disease control, hygiene and sanitation, medical equipment, waste disposal

Introduction

Early Renaissance medical doctors knew that diseases could not only spread directly between individuals, but also through the touching of objects (Hirst 1953). Protocols were therefore established for the disinfection or disposal of items that had been in contact with patients (Bianucci *et al.* 2013). It is well documented that Italy played a pioneering role in the

Received: 23 March 2022; Revised: 24 June 2022; Accepted: 14 July 2022

© The Author(s), 2023. Published by Cambridge University Press on behalf of Antiquity Publications Ltd. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

development of hygiene measures intended to prevent the spread of epidemics. The protocols formulated at Tuscan hospitals and at the Paduan College, for example, served as models for hospitals established in England during the sixteenth century AD (Henderson 2010). One of the earliest protocols, the *Ectypa Pestilentis Status Algheriae Sardiniae* (Angelerio 1588), outlines protective measures such as the burning, cleaning and disposal of furniture, bedding, tableware and other objects that had been in contact with patients (Angelerio 1588; Bianucci *et al.* 2013). In this context, in 1637, immediately after the end of a major outbreak of plague, the register of expenses of the hospital of Santa Fina in San Gimignano (Tuscany) includes a large order of maiolica ceramic wares, most likely reflecting the need to replenish the stocks disposed of during the epidemic (Vannini 1981: 45–46 & 48–52). Medical dumps—concentrations of objects used in or associated with medical contexts—are occasionally documented by archaeological excavations of deposits dating to the Renaissance and later, but the topic has, until now, not been the subject of cross-contextual investigation.

Furthermore, the overall number of archaeological contexts securely identified as medical dumps remains low. This situation results from the difficulties in differentiating between the disposal of medical waste versus general rubbish dumping activities. Where they have been encountered, medical dumps are either related directly to hospitals (e.g. De Luca & Ricci 2013) or prisons (*Lugo ai tempi del colera n.d.*), or they may be the result of the deposition of the personal belongings of individual patients (Ciampoltrini & Spataro 2014). To advance the study of Renaissance medical dumps—and medical practices in general—here we present the results of our investigations of a medical dump from the second half of the sixteenth century, excavated in 2021 in central Rome. Based on a comparison with an extensive medical dump excavated in 2009, connected with the Ospedale dei Fornari (also in Rome), we argue that the newly excavated objects originally stem from the same hospital, bringing to the forefront discussions about medical disposal practices in Renaissance urban contexts.

Background

Between 1931 and 1932, the Alessandrino district of Rome was demolished as part of Mussolini's grand plans for the city, leaving little time and—plainly speaking—no interest in detailed archaeological recording of the area. Located in central Rome, on top of the remains of the Roman-period fora and between Piazza Venezia and the Colosseum, the Alessandrino district was established during the second half of the sixteenth century (Meneghini & Santangeli Valenzani 2010: 141–230; Bernacchio 2017; Jacobsen *et al.* 2020; Jacobsen *et al.* 2021).

Over the three-and-a-half centuries of its existence, the basic plan of the district and the footprints of individual buildings remained largely unchanged; the internal layouts of houses and individual room functions, however, were transformed (Jacobsen *et al.* 2019/2020). Recent excavations conducted in an area previously occupied by the buildings of Via Cremona 43 and 44 have permitted a partial reconstruction of architectural changes and aspects of daily life from the middle of the nineteenth century to the 1930s (Corsetti *et al.* 2022). Contextual evidence for the period between the sixteenth and nineteenth centuries, however, has proven substantially more elusive. This issue relates both to the excavation reported here, as well as to previous excavations in the forum area. Specifically, while the period is well represented in terms of material culture, the vast majority of these finds come from modern fills

containing archaeological materials dated between the Iron Age (tenth to sixth century BC) and the time of the deposition (infills at Fori di Pace: Fogagnolo 2012: 138–49; Forum of Caesar: Jacobsen *et al.* 2022). The few published examples of closed contexts containing only Renaissance material from the forum area amount to a closed sewer context in the area of Caesar's Forum (Tognocchi 2006), a waste dump in the area of Trajan's Forum (Mancini 2006) and wasters from a Renaissance pottery kiln (Delfino & Meneghini 2017).

The 2009 Ospedale dei Fornari dump

Excavated in 2009, the Ospedale dei Fornari medical dump provides unique insights into Renaissance hospital practices, the organisation of patient care, and waste disposal (Serlorenzi 2010: 151–54; De Luca *et al.* 2012; De Luca & Ricci 2013). The Ospedale dei Fornari, founded in 1564, was located in Piazza della Madonna di Loreto, which today corresponds to the south-eastern continuation of Piazza Venezia (Figure 1). Hundreds of intact and semi-intact ceramic vessels were excavated from the dump, together with a large quantity of glass vessels (for a detailed publication of the ceramics, see De Luca & Ricci 2013). The ceramics display a high degree of consistency in terms of typology, style and vessel capacities, the latter reflecting the needs of individual patients (for use and distribution of ceramic vessels in hospitals, see Mazzucato 1971: 12–14). Most of the ceramics were sourced by the hospital for its own use; painted letters (A.S.M.L. LORETO) on numerous vessels attest to their custom manufacture for the hospital. In addition, the presence of a small number of plates decorated with heraldic shields indicates that some patients may have brought their own 'family' tablewares into the hospital (De Luca & Ricci 2013: 185, fig. 45).

As deduced by Ilaria De Luca and Marco Ricci, once admitted to the hospital, each patient was equipped with a jug, a drinking glass, a bowl and a plate, as well as a one-handed bottle that was probably used for pouring liquid medication. Each patient was also provided with a chamber pot (De Luca & Ricci 2013: 165). Vessels for the preparation of food were, likewise, restricted to each individual patient, as illustrated by the presence of lidded cooking vessels (Italian: *pignatta*) used for reheating prepared food over an open fire (Ricci 2013: 408). The *pignatte* from the dump are of small and medium capacity, suitable for containing only a single meal. The dump also yielded approximately 300 small storage vessels with glazed interiors and unglazed exteriors. Glazed pottery is cited in 1498 by the *Nuovo Ricettario Fiorentino* (1, 8, 1–11; Collegio degli Eximii Doctori della Arte et Medicina 1968 [1498]), the first treatise of pharmacopoeia published in Italy, as ideal containers for the storage of medical products. Similar vessels are known from other Italian sites, where they are exclusively connected to medical practices (Ricci 2013: 427). The filling of the containers with medicines would take place in a pharmacy facility either within or outside the hospital (Mazzucato 1990: 77–78).

The medical dump from the excavations in Caesar's Forum

During the 2021 investigations in the area of Caesar's Forum, approximately 325m south-east of the Ospedale dei Fornari site, we encountered a vertical brick-built cistern (1.1m wide × 2.4m long × 2.8m deep; context 1154) in the eastern part of the excavation area

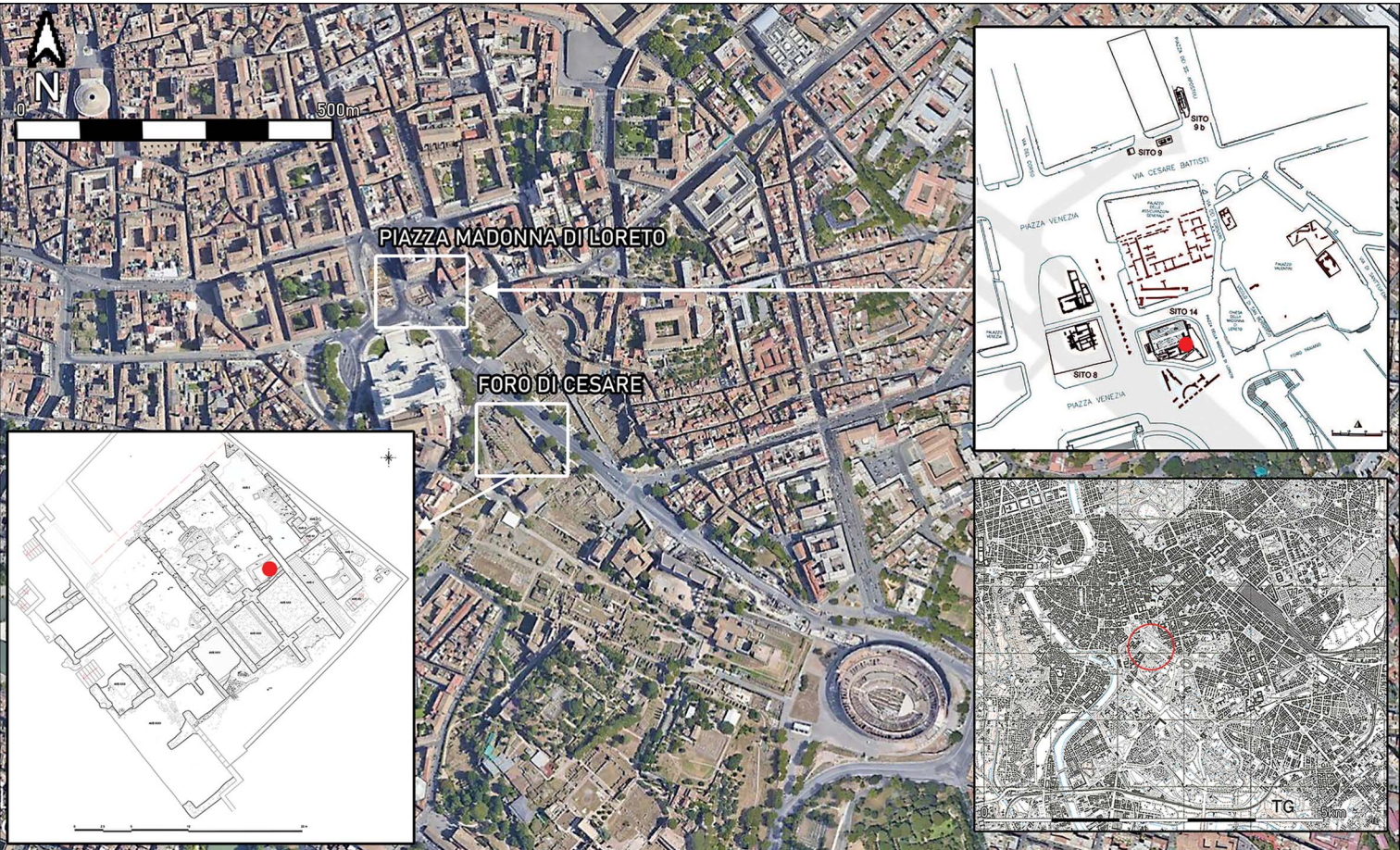


Figure 1. Aerial photo with indication of the Ospedale dei Fornari in Piazza della Madonna di Loreto and the 2021 excavation area on Caesar's Forum (photograph by Sovrintendenza Capitolina – The Caesar's Forum Project).

(Figures 1 & 2). Relating to the latter part of the Renaissance phase, the cistern was undisturbed by later rebuilding on the site. The cistern contained a series of closed archaeological contexts that are dated, based on the well-established typo-chronology of Renaissance ceramics and coins, to the second half of the sixteenth century. The absence of material culture from earlier or later periods indicates that the cistern had been empty when the sixteenth-century contexts were deposited, and that immediately following the deposition of this material, the cistern went out of use (Corsetti *et al.* *in press*).

Three contexts (1173, 1183 & 1197) contained a series of complete as well as fragmented ceramic vessels. In addition, a number of singular sherds pertaining to individual jugs and shallow open vessels were recovered, together with approximately 1200 fragments of thin-walled glass vessels and a range of small objects, such as coins and spindle whorls. Contexts 1197 and 1183 were separated by a thin layer of lime (context 1184), some 5–10mm thick, containing no archaeological material (Figure 3). The nature of the objects recovered from the cistern's fill, and their similarity to the assemblage from the Ospedale dei Fornari, clearly suggest that the discarded material was related to patient care (although a few of the objects from the cistern fill, such as spindle whorls and ceramic figurines, are not represented at the Ospedale dei Fornari dump).

The finds from the cistern fill can be divided into three main categories: medical vessels; vessels for the cooking and serving of food; and personal objects. Medical vessels are represented by small, intact ceramic medicine containers, identical to those from the Ospedale dei Fornari dump, and thin-walled blown glass vessels, including small footless bottles with a conical kick, and urine flasks, known as *matula* in the medieval Latin sources (Bynum & Bynum 2016) (Figure 4). During the medieval period the visual examination of urine—urinoscopy—had become a central diagnostic tool in medical practice and remained so into the eighteenth century (Eknoyan 2007; Henderson 2016: 297–302). The patient's urine would be poured into a flask to allow a doctor to observe its colour, sedimentation, smell and sometimes even taste (Bynum & Bynum 2016). Urine flasks can be difficult to identify in the archaeological record because they have a shape similar to oil lamps (Boldrini & Mendera 1994). Like other medical glass vessels and common glassware, they were a typical product of Tuscan glass workshops (Ciappi *et al.* 1995). Urine flasks are



Figure 2. The brick-built cistern (context 1154) during excavation in 2021 (photographs and illustration by Soprintendenza Capitolina – The Caesar's Forum Project).



Figure 3. Layer of lime (context 1184) deposited between contexts 1197 and 1183. Scale = 1m (photograph by Sovrintendenza Capitolina – The Caesar’s Forum Project).

rare in domestic contexts (Boldrini & Mendera 1994; Ciarrocchi 2009: 685, pl. 6), but are documented in large quantities in dumps found in connection with hospitals or care communities elsewhere in Rome, including the Ospedale dei Fornari (De Luca & Ricci 2013: 190, fig. 59), the Conservatorio di S. Caterina della Rosa (Cipriano 1984: 135–37, pl. XXX) and the Palazzo della Cancelleria (Del Vecchio 2009: 475–80, pl. 2, nos 41–43).

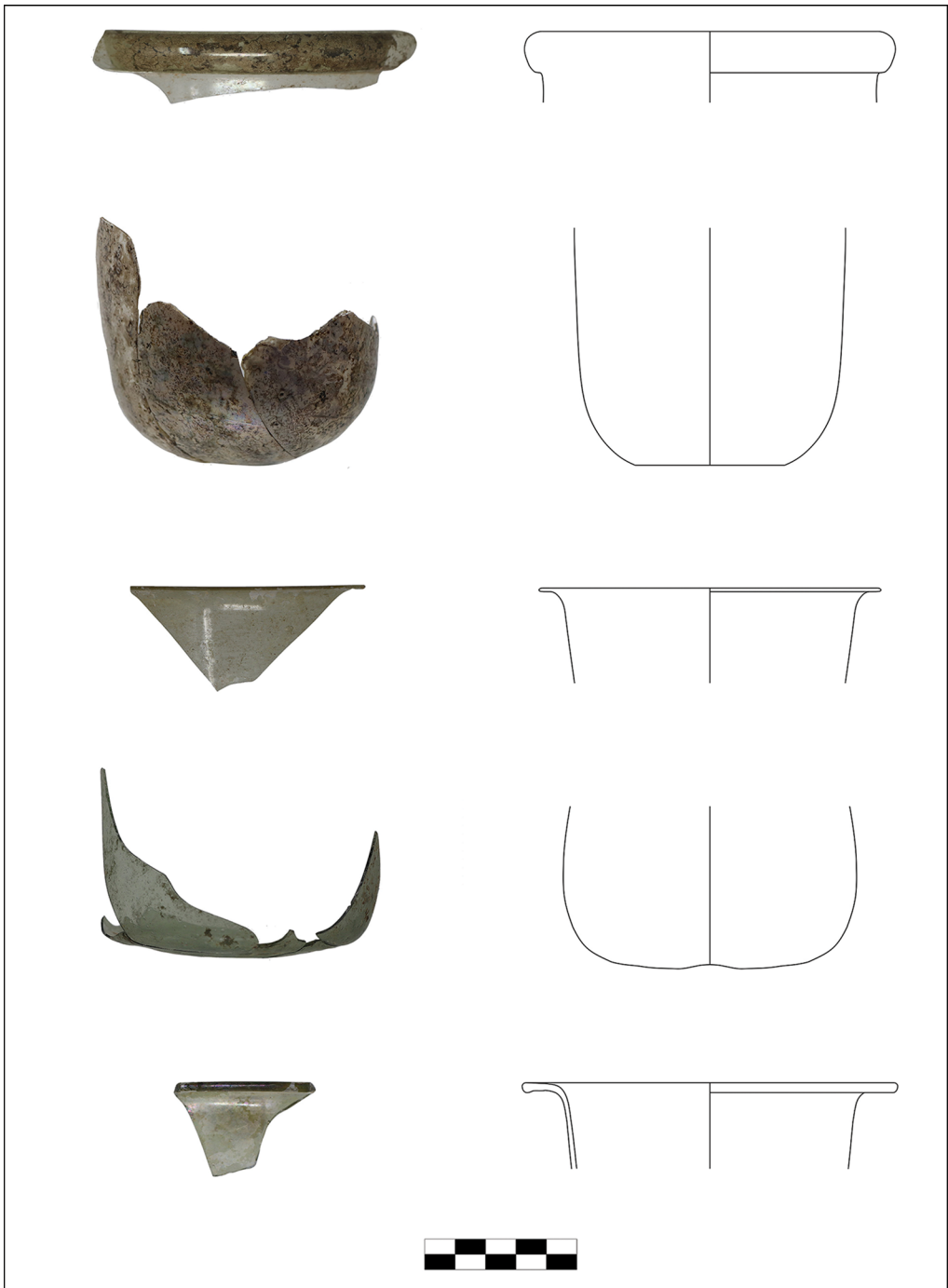


Figure 4. Glass urine flasks excavated from the cistern. Scale in cm (photographs and illustrations by Sovrintendenza Capitolina – The Caesar’s Forum Project).

The second category of finds recovered from the 2021 dump relates to those vessels given to patients on admission to a hospital for the preparation and consumption of food. In total, 30 plain and decorated plates were recovered, closely resembling those found in the Ospedale dei Fornari dump (Figure 5; De Luca & Ricci 2013: 176–87). Other finds in this category include a complete but fragmented jug, together with sherds from five other jugs (Figure 6); all of these are small and find close parallels among jugs from the Ospedale dei Fornari dump (De Luca & Ricci 2013: 168–78). Among the small, lidded cooking vessels recovered, the majority have glazed interiors and half-glazed exteriors with painted floral decoration (Figure 7). A few plain cooking vessels are also represented; these vessels are all of small or medium size, and several show signs of exposure to fire, confirming their use for heating food. Many of these vessels find direct comparanda in the Ospedale dei Fornari dump, leaving little doubt that they were produced by the same workshop—a distinct Renaissance Rome-based production whose output is attested at several sites (Pannuzi 2002). The close correspondence between the compositions of the 2021 dump and the Ospedale dei Fornari dump is striking.

Among the personal objects recovered from the 2021 dump are a number of ceramic figurines, among which is a dromedary (Figure 8A). These unpainted, simple figurines were common during the Renaissance and they are typically interpreted as children's toys or as figurines for nativity scenes (Pannuzi 2002: 169). Other personal objects include several spindle whorls (Figure 8E–F), a single rosary bead (Figure 8G), and two devotional bronze medals (Figure 8C–D), which were commonly used as the terminal component of rosaries or as individual amulets strung on necklaces or attached directly to clothing (medals: Manacorda 1984: 147; Baldassarri 2021; Bernacchio 2021; Renaissance spindle whorls: Lazrus 1985: 564, fig. 129). Devotional medals venerating saints were issued on specific religious occasions, although it is not possible to specify to which occasions these particular examples relate (Altamura & Pancotti 2014: 10). Also included in this category of finds are 18 coins, of which the majority are illegible; however, a silver coin was issued under Pope Julius III (1550–1555), whereas a bronze coin was issued by Pope Leo X (1513–1521) (Figure 8H–I).

A final group of objects recovered from the 2021 dump is an assemblage of 14 lead clamps, commonly used in furniture fitting (Figure 9). The clamps show variation in their dimensions, but their common features indicate a standardised use. The 10 narrow clamps all have a single horizontal cavity at one side, towards the top, and a narrow neck at the base, whereas four broad clamps have a transverse groove. Furthermore, the dump contained a notable quantity of carbonised wood. Some of these fragments have retained their original worked surfaces, demonstrating that they originally formed part of thin-walled, flat artefacts. Although currently difficult to verify, the burning of objects calls to mind measures specified in the 1588 manual by Quinto Tiberio Angelerio, cited above. Therein, instruction VII defines that “Fire must be set to mattresses, fittings, and furniture from all houses in which plague cases have been registered” (Bianucci *et al.* 2013: table 1, citing Angelerio 1588), while instruction XXVI specifies that “Fire must be set to the infected objects with no peculiar value. High-value furniture must be washed; exposed to the wind; or even better, disinfected in dry heated stoves/ovens” (Bianucci *et al.* 2013: table 1, citing Angelerio 1588) (Figure 10). As yet, it has not been possible on the basis of the visual examination of the lead clamps and carbonised wood to determine whether the material derives from burnt furniture or from other types of wooden objects, perhaps, for example, trays used for serving food.



Figure 5. Ligurian plate with depiction of a house, two Ligurian plates with floral decoration and a bowl decorated with a heraldic shield, produced in Emilia Romagna. All date to the second half of the sixteenth century AD. Scales in cm (photographs by Sovrintendenza Capitolina – The Caesar’s Forum Project).



Figure 6. Small jugs found inside context 1154. All date to the second half of the sixteenth century AD. Scales in cm (photographs by Sovrintendenza Capitolina – The Caesar’s Forum Project).

Connecting the medical dumps

The composition of the assemblage from the fill of context 1154 leaves little doubt that the objects pertain to a hospital of the second half of the sixteenth century. The intact or



Figure 7. Small, lidded cooking vessels with yellow floral decoration. Roman production from the second half of the sixteenth century AD. Scale in cm (photographs and illustrations by Sovrintendenza Capitolina – The Caesar’s Forum Project).

complete but fragmented vessels recovered from both dumps indicate that most of these objects were discarded while still, in principle, usable for their intended functions and that it was their contact with hospital patients that determined their disposal. If viewed as an isolated context, the material from the 2021 dump suggests a notable degree of diversity for a small assemblage, for instance in the typological variation of the plates and jugs. When compared with the material from the much larger Ospedale dei Fornari dump, however, a picture emerges in which almost all the vessels from the 2021 dump find direct parallels to well-defined groups. These similarities, together with the proximity of the two dumps, strongly suggest that all the material originated from the same hospital complex. Moreover, the

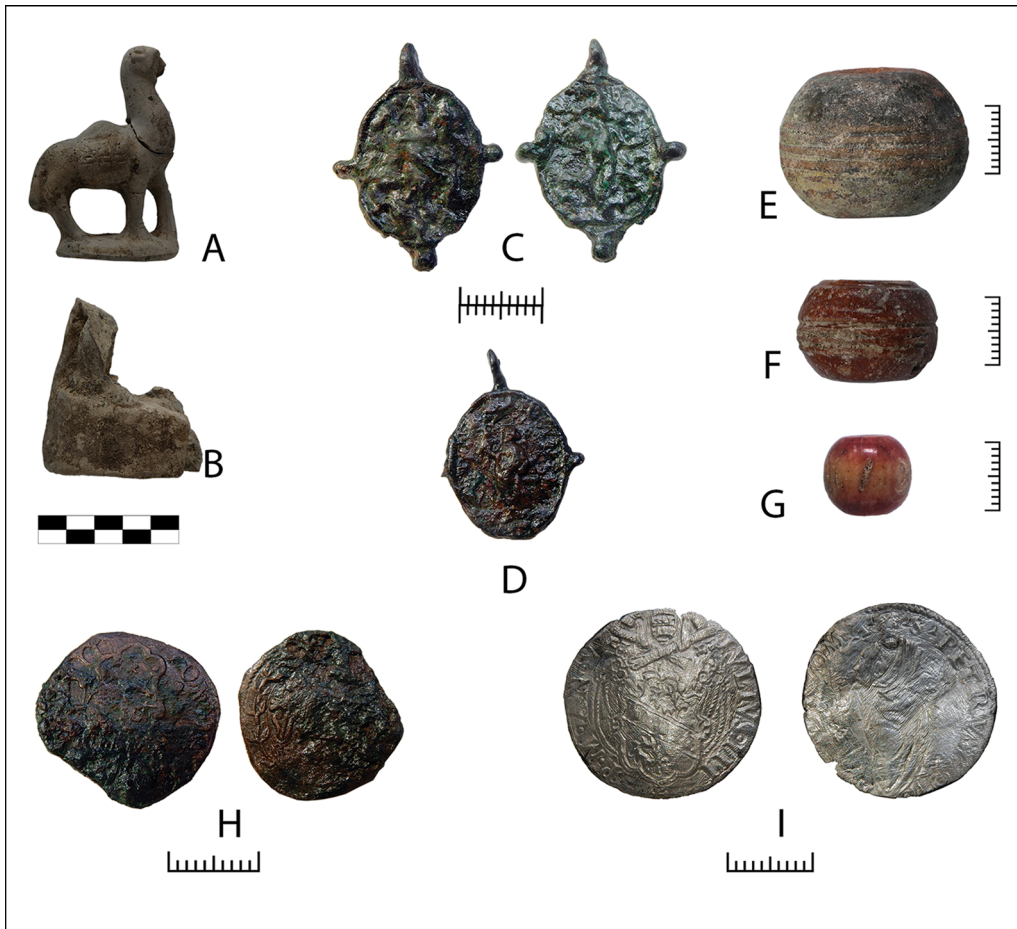


Figure 8. Minor personal objects from the 2021 dump, comprising terracotta figurines, devotional medals, rosary bead and spindle whorls. Coin: Leo X, minted between AD 1513 and 1521 (bronze); Julius III, minted between AD 1550 and 1555 (silver). Scales in cm (photographs by Sovrintendenza Capitolina – The Caesar’s Forum Project).

consistency of the material from these two contexts is not mirrored in any other published contexts from Rome, strengthening the proposed combined reading of the two dumps. This implies that a *terminus post quem* of 1564—the year in which the Ospedale dei Fornari was built—should be applied to the 2021 dump. If accepted, this would make the dump the earliest known closed context so far excavated in the Alessandrino district.

The presence of a large quantity of medical glass vessels, including urine flasks, is a further common trait of the two dumps. While the new excavations at Caesar’s Forum have identified many contexts yielding Renaissance material, none of these have yielded fragments of glass urine flasks. In earlier excavations in the forum, conducted between 1998 and 2000, however, urine flasks were found in two minor contexts (2450 & 4261), in association with small, intact medicine glass containers (Jacobsen *et al.* [in press](#)), emphasising the medical function of this particular glass flask shape. The only other Renaissance Roman contexts from which a



Figure 9. Selection of lead clamps used in joints on furniture or wooden objects. Scale in cm (photographs by Sovrintendenza Capitolina – The Caesar's Forum Project).



Figure 10. Engraving showing furniture and objects being burnt in the streets of Rome during the 1657 plague (engraving by Giovanni Giacomo de Rossi. Wellcome Collection – Wellcome Library no. 19951).

comparable quantity of urine flasks have been recovered are the dumps of the Conservatorio di S. Caterina (Cipriano 1984) and the Palazzo della Cancelleria at Piazza Navona (Del Vecchio 2009: 475, fig. 1). At the latter site, a large assemblage of ceramics and glass, datable to the second half of the sixteenth century, was recovered from a ditch ('fossa 204') on the southern side of the courtyard. The investigators of the ditch argued that, because its volume (2.20m wide × 6m long × 3.50m deep) greatly

exceeds the amount of discarded material, the ditch was not originally dug with the intention to dispose of the materials recovered during the archaeological excavation; in passing, their report suggests that the reason for the dumping of the ceramics was because they had gone out of use or fashion (Termini 2009: 231–32). This conclusion seems to be contradicted by the fact that most of the hundreds of partly reconstructable vessels were of high-quality maiolica wares. This type of ceramic was a highly prized Renaissance status symbol that was often put on prominent display in aristocratic houses. It is therefore unlikely that they would have been discarded due to changing functions or fashions (Bandini 2011).

Other finds strongly suggest these ceramics relate to a medical dump. Out of the 1150 glass fragments from the ditch, urine flasks/lamps comprise approximately 60 per cent, while other ceramics include miniature medicine containers, together with so-called *albarello* vessels, which were used for medicine storage in pharmacies. The combination

of reconstructable maiolica vessels, urine flasks and other vessels associated with medicines supports our reinterpretation of this context as a medical dump. The apparently intentional sealing of the deposit by a layer of compact clay adds further weight to this argument, as this layer illustrates an urge to contain the content in the ditch for hygienic reasons.

Returning to the Caesar's Forum, the connection between the 2021 dump and the Ospedale dei Fornari dump poses the question of why material would have been discarded in two different, and widely spaced, locations. The excavators of the Ospedale dei Fornari dump suggest that when the pit was eventually filled, alternative disposal sites would have been needed (De Luca & Ricci 2013). At that point, the hospital appears to have diverted waste to a more distant location at Caesar's Forum. A later parallel for this kind of secondary waste disposal in Caesar's Forum was identified during excavations in 1999. Investigation of a well (context 2127) yielded a large quantity of eighteenth-century material originating from the Aracoeli monastery on the Capitoline Hill, 150m to the west (Tognocchi 2006). Ceramics with the painted letters 'AR' (Aracoeli) were specifically produced for the monastery and similar ceramics have been found on the Capitoline site (Distante 2014: 22–23, fig. 7). Although some two centuries later in date, this use of Caesar's Forum for the disposal of rubbish at some distance from the material's point of use reflects that the dumping of medical waste in the sixteenth century could have been a forerunner for the eighteenth-century practice of transporting rubbish over limited distances in the forum area.

Conclusion

Defining medical dumps in archaeological contexts can be challenging because it requires an integrated approach that combines excavation data with material studies and detailed functional contextual analysis. Here, we have presented one such medical dump, excavated in the area of the Forum of Caesar in 2021. We argue that the ceramics, glass and other finds originated from the Ospedale dei Fornari, where a similar but more extensive dump was previously identified. Our interpretation of this context is based on a functional, typological and stylistic comparison of the material recovered from the two dumps. The comparison shows a great consistency between the two assemblages, which, in turn, do not find detailed similarities with other Renaissance Roman contexts. Prior to the present study, the early modern disposal of waste from hospital and medical contexts in order to prevent the spread of disease had received only sporadic archaeological attention, with limited cross-contextual investigation. In consequence, the evidence put forward here adds significantly to our understanding of waste disposal practices in the Renaissance, while highlighting the need for a more complete overview of the hygiene and disease control regimes of early modern Europe.

Funding statement

The *Caesar's Forum Excavation Project* is conducted as a collaboration between the Sovrintendenza Capitolina ai Beni Culturali in Rome, the Danish National Research Foundation's

Centre of Excellence, the Centre for Urban Network Evolutions (UrbNet) at Aarhus University and the Danish Institute in Rome. The project is, since 2017, funded by the Carlsberg Foundation and since 2019 by Aarhus University Research Foundation through a flagship grant. Further support comes from the Centre for Urban Network Evolutions, under grant DNRF119. The project is jointly directed by Jan Kindberg Jacobsen, Claudio Parisi Presicce and Rubina Raja.

References

- ALTAMURA, F. & A. PANCOTTI. 2014. Medaglie devozionali in contesti di butto dai Colli Albani: Roma, Italia (XVII–XIX sec.), in J. Dobrinić (ed.) *INCC 2013, Proceedings of the 7th International Numismatic Congress of Croatia, Opatija, Croatia, September 27–28, 2013*: 10–24. Rijeka: Hrvatsko numizmatičko društvo.
- ANGELERIO, Q.T. 1588. *Ectypa Pestilentis Status Algeriae Sardiniae*. Cagliari: typ. Nic. Canelles per Franc. Guarnerium.
- BALDASSARRI, M. 2021. Reperti devozionali: Medagliette e corone da rosario, in S. Gelichi, C. Negrelli & E. Grandi (ed.) *Un emporio e la sua cattedrale: gli scavi di piazza XX Settembre e Villaggio San Francesco a Comacchio*: 383–401. Sesto Fiorentino: All’Insegna del Giglio.
- BANDINI, G. 2011. Rinvenimenti rinascimentali dagli scavi di Palazzo Riario (o della Cancelleria) in Roma: la ceramica come indicatore cronologico e sociale, in Centro Ligure per la Storia della Ceramica (ed.) *La ceramica post-medievale nel Mediterraneo. Gli indicatori cronologici: secoli XVI–XVIII*: 201–38. Sesto Fiorentino: All’Insegna del Giglio.
- BERNACCHIO, N. 2017. I Fori Imperiali nel Rinascimento e nell’età Moderna, in N. Bernacchio & R. Meneghini (ed.) *I Fori dopo i Fori: la vita quotidiana nell’area dei Fori Imperiali dopo l’Antichità*: 31–48. Roma: Gangemi.
- 2021. Otto medagliette devozionali e due frammenti di rosario (XVII–XVIII secolo), in C. Parisi Presicce, N. Bernacchio, M. Munzi & S. Pastor (ed.) *Napoleone e il mito di Roma*: 140–41. Rome: Gangemi.
- BIANUCCI, R., O.J. BENEDICTOW, G. FORNACIARI & V. GIUFFRÀ. 2013. Quinto Tiberio Angelerio and new rules for controlling plague in 16th-century Alghero, Sardinia. *Emerging Infectious Diseases* 19: 1478–83. <http://doi.org/10.3201/eid1909.120311>
- BOLDRINI, E. & M. MENDERA. 1994. Consumo del vetro d’uso comune a San Giovanni Valdarno (AR) nel ’500. *Archeologia Medievale* 21: 499–516.
- BYNUM, B. & H. BYNUM. 2016. The matula. *The Lancet* 387: 638. [https://doi.org/10.1016/S0140-6736\(16\)00289-0](https://doi.org/10.1016/S0140-6736(16)00289-0)
- CIAMPOLTRINI, G. & C. SPATARO. 2014. La discarica del malato, in G. Ciampoltrini (ed.) *Anamorfosi di un paesaggio: gli scavi nell’area dell’Ospedale San Luca e la storia della Piana di Lucca dagli Etruschi al Novecento*: 79–82. Pisa: I Segni dell’Auser.
- CIAPPI, S., A. LAGHI, M. MENDERA & D. STIAFFINI. 1995. *Il vetro in Toscana: strutture, prodotti, immagini (sec. XIII–XX)*. Poggibonsi: Lalli.
- CIARROCCHI, B. 2009. I vetri Medievali e Rinascimentali da Palazzo Altemps, in G. Volpe & F. Pasquale (ed.) *V Congresso nazionale di archeologia Medievale*: 680–87. Firenze: All’Insegna del Giglio.
- Collegio degli Eximii Doctori della Arte et Medicina. 1968 [1498]. *Ricettario fiorentino*, facsimile dell’esemplare palatino E. 6.1.27 della Biblioteca Nazionale Centrale di Firenze. Firenze: Biblioteca Nazionale Centrale.
- CIPRIANO, E. 1984. I vetri, in D. Manacorda (ed.) *Archeologia urbana a Roma: il progetto della Crypta Balbi. Volume 2: un “mondezzerano” del XVIII secolo*: 125–39. Firenze: All’Insegna del Giglio.
- CORSETTI, F.L. et al. 2022. The archaeology of twentieth-century Rome: excavating the last days of the Alessandrino district. *Journal of Contemporary Archaeology*. <https://doi.org/10.1558/jca.22264>
- In press. The Danish-Italian excavations on Caesar’s Forum 2021. Report. *Analecta Romana Instituti Danici* 45.
- DE LUCA, I. & M. RICCI. 2013. Le ceramiche dell’Ospedale dei Fornari. *Bollettino di Archeologia On Line* 2013/2-3-4: 163–91.
- DE LUCA, I., M. RICCI & M. SERLORENZI. 2012. Scavi Metro C Roma Madonna di Loreto: ceramiche

- daò “butto” di un ospedale tra '500 e '600, in Centro Ligure per la Storia della Ceramica (ed.) *La ceramica post-medievale nel Mediterraneo. Gli indicatori cronologici: secoli XVI–XVIII*: 239–48. Sesto Fiorentino: All'Insegna del Giglio.
- DEL VECCHIO, F. 2009. Capitolo 8.11. Vetri, in C.L. Frommel & M. Pentiricci (ed.) *L'antica Basilica di San Lorenzo in Damaso. Volume 2: I Materiali*: 475–80. Roma: De Luca.
- DELFINO, A. & R. MENEGHINI. 2017. I vasi del Rinascimento, in N. Bernacchio & R. Meneghini (ed.) *La vita quotidiana nell'area dei Fori Imperiali dopo l'antichità*: 54–64. Roma: Gangemi.
- DISTANTE, A. 2014. Maiolica arcaica, maiolica rinascimentale, ceramica conventuale alla luce delle recenti indagini sul Campidoglio. *Bollettino dei Musei Comunali di Roma* 27: 15–28.
- EKNOYAN, G. 2007. Looking at the urine: the renaissance of an unbroken tradition. *American Journal of Kidney Diseases* 49: 865–72. <https://doi.org/10.1053/j.ajkd.2007.04.003>
- FOGAGNOLO, S. 2012. Contesti ceramici del XVII e del XVIII secolo nell'area dell'aula di culto del Foro della Pace, in M. Ceci (ed.) *Contesti ceramici dai Fori Imperiali* (British Archaeological Reports International Series 2455): 137–49. Oxford: Archaeopress.
- HENDERSON, J. 2010. Public health, pollution and the problem of waste disposal in early modern Tuscany, in S. Cavaciocchi (ed.) *Le interazioni fra economia e ambiente biologico nell'Europa preindustriale, secc. XIII–XVIII. Atti della Quarantunesima Settimana di studi, 26–30 aprile 2009*: 373–81. Prato: Firenze University Press.
- 2016. *L'ospedale rinascimentale. La cura del corpo e dell'anima*. Bologna: Odoja.
- HIRST, L.F. 1953. *The conquest of plague: a study of the evolution of epidemiology*. Oxford: Oxford University Press.
- JACOBSEN, J.K., C. PARISI PRESICCE, R. RAJA & M. VITTI. 2019/2020: Excavating Caesar's Forum: present results of the *Caesar's Forum Project*. *Analecta Romana Instituti Danici* 44: 239–45.
- JACOBSEN, J.K. *et al.* 2020. Practicing urban archaeology in a modern city: the Alessandrino Quarter of Rome. *Journal of Field Archaeology* 46: 36–51. <https://doi.org/10.1080/00934690.2020.1834255>
- 2021. High-definition urban narratives from central Rome: virtual reconstructions of the past and the new Caesar's Forum excavations. *Journal of Urban Archaeology* 3: 65–86. <https://doi.org/10.1484/J.JUA.5.123676>
- 2022. The Danish-Italian Caesar's Forum excavations: preliminary results from the 2021 campaign – the Alessandrino phase. *Archäologischer Anzeiger*. <https://doi.org/10.34780/yt36-nec2>
- JACOBSEN, J.K. *et al.* (ed.). In press. *Foro Di Cesare: materiali ceramici dallo scavo del 1998–2000*. Turnhout: Brepols.
- LAZRUS, P.K. 1985. Le suppellettili, in D. Manacorda (ed.) *Archeologia urbana a Roma: il progetto della Crypta Balbi. Volume 3/1-2: Il Giardino del Conservatorio di S. Caterina della Rose*: 561–68. Firenze: All'Insegna del Giglio.
- Lugo ai tempi del colera. n.d. Available at: http://www.archeobologna.beniculturali.it/mostre/lugo_colera_2014.htm (accessed 19 March 2022).
- MANACORDA, D. (ed.). 1984. *Archeologia urbana a Roma: il progetto della Crypta Balbi. Volume 2: un "mondezzaro" del XVIII secolo*. Firenze: All'insegna del Giglio.
- MANCINI, D. 2006: Contesti ceramici della seconda metà del XVI secolo dall'area del monastero di S. Urbano al Foro di Traiano, in R. Meneghini & R. Santangeli Valenzani (ed.) *Lo scavo dei fori imperiali 1995–2000* (Collection de l'École française de Rome 365): 169–83. Rome: École française de Rome.
- MAZZUCATO, O. 1971. *Le ceramiche ospedaliere* (Consiglio Nazionale delle Ricerche. Quaderni de “La ricerca scientifica” 72). Roma: Tipo-Litografia MARVES.
- 1990. *Le Ceramiche da Farmacia a Roma tra '400 e '600*. Viterbo: Artistiche.
- MENEGHINI, R. & R. SANTANGELI VALENZANI. 2010. *Scavi dei Fori Imperiali: Foro di Augusto (L'Area Centrale)* (Bollettino Della Commissione Archeologica Comunale di Roma. Supplementi 20). Roma: L'Erma di Bretschneider.
- PANNUZI, S. 2002. Produzioni di ceramica invetriata postmedievale dal pozzo di scarico della fornace della Consolazione e dal fornace LLXVIII del Colosseo, in E. De Minicis & G. Maetke (ed.) *Le ceramiche di Roma e del Lazio in età medievale e moderna IV: atti del IV Convegno di studi di Viterbo*: 165–84. Roma: Kappa.

- RICCI, M. 2013. *Museo Nazionale Romano. Crypta Balbi. Ceramiche medievali e moderne. Volume 2: Il Cinquecento (1530–1610)*. Milano: Mondadori Electa.
- SERLORENZI, M. 2010. Le testimonianze medievali nei cantieri di piazza Venezia, in R. Egidi, F. Filippi & S. Martone (ed.) *Archeologia e infrastrutture* (Bollettino d'Arte, Volume speciale): 131–65. Rome: Ministero per i Beni culturali e ambientali.
- TERMINI, C. 2009. Capitolo 8.1. Introduzioni, in C.L. Frommel & M. Pentiricci (ed.) *L'antica basilica di San Lorenzo in Damaso. Volume 2: I materiali*: 231–332. Roma: De Luca.
- TOGNOCCHI, L. 2006. Uno scarico di ceramica del XVIII secolo dal Foro di Cesare, in R. Meneghini & R. Santangeli Valenzani (ed.) *Lo scavo dei fori imperiali 1995–2000* (Collection de l'École française de Rome 365): 185–220. Rome: École française de Rome.
- VANNINI, G. (ed.). 1981. La spezieria: formazione e dotazione, in *Una farmacia preindustriale in Valdelsa: la Spezieria di Santa Fina nella città di San Gimignano Sec. XIV–XVIII*: 45–46, 48–52. Certaldo: Arti Grafiche Federighi.