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New research in the Roman villa and late Roman infant and child cemetery at Poggio Gramignano (Lugnano in Teverina, Umbria, Italy)

Begun in the Summer of 2016, the *Villa Romana di Poggio Gramignano Archaeological Project* – a partnership between the Soprintendenza Archeologia dell'Umbria, the University of Arizona, and the town council of Lugnano in Teverina – continues a work initially begun in the 1980s. The present report illustrates the preliminary results obtained after the years of excavation 2016-2019. The aim is to contribute to the debate concerning the causes of the end of Roman villas in the western part of Empire.
Keywords: Roman burials, Roman infant cemetery, *plasmodium falciparum*, Poggio Gramignano, Lugnano in Teverina

Iniziato nell'estate del 2016, il progetto archeologico Villa Romana di Poggio Gramignano – in partenariato tra la Soprintendenza Archeologia dell'Umbria, l'Università dell'Arizona e il Comune di Lugnano in Teverina – continua un lavoro iniziato negli anni Ottanta. Questo articolo illustra i risultati preliminari ottenuti dalle campagne di scavo 2016-2019, con la speranza di contribuire al dibattito che concerne le cause che sancirono la fine delle ville romane nella parte occidentale dell'Impero.
Parole chiave: *sepolture romane, cimitero infantile romano,* plasmodium falciparum*, Poggio Gramignano, Lugnano in Teverina*

1. Introduction

The villa at Poggio Gramignano is an Augustan-period Roman villa located on the hills overlooking the Tiber valley near the Umbrian city of Lugnano in Teverina, Italy (fig. 1). Poggio Gramignano gently slopes towards the southwest and spans an area of around one square kilometer. It provides wide visibility of the surrounding Tiber valley, including the hilltop city of Lugnano in Teverina itself and other modern cities such as Al-

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Fig. 1. Geographical positioning of Poggio Gramignano, Lugnano in Teverina – Umbria (Italy) (image by R. Montagnetti 2019).

viano, Attigliano, Bomarzo, and Giove. The whole area, mostly arable land upon alluvial plains and valleys surrounded by undulating hills of clayey-sands and limestone, is limited to north and south by the Fosso del Molinaccio and Fosso dell'Impruneta respectively, both tributaries of the Tiber. The villa rests roughly 284 m asl and is about 2.5 km east of the Tiber. This location placed the villa within convenient proximity of not just the river, but also the Roman urban center of *Ameria* (Amelia).

Begun in the Summer of 2016, the *Villa Romana di Poggio Gramignano Archaeological Project* – a partnership between the *Soprintendenza Archeologia dell'Umbria*, the University of Arizona, and the *Comune di Lugnano in Teverina* – continues work initiated by David Soren in the 1980s. These first excavations uncovered major living quarters of the villa, as well as many west-facing rooms. Soren and his team surmised that the villa's history spans nearly seven centuries[1] (fig. 2). Six phases of occupation and abandonment are attributed to this history: (I) Initially constructed sometime in the second half of the 1st century BCE,

[1] For a comprehensive account of the villa's history and the results of these first excavations, including excavation of the infant and child cemetery, see Soren, Soren 1999.

Fig. 2. Final excavation plan of Poggio Gramignano 2019, Lugnano in Teverina – Umbria (Italy) (image by R. Montagnetti 2019).

the villa then showcased decoration and architectural refinement of varying type and quality, the most notable of which being a colonnaded *oecus* featuring a unique flat-top pyramidal ceiling; (II) the shifting soil and clay of Poggio Gramignano, however, could not sustain such weight, leading to a collapse of the colonnade and other rooms along the villa's south side sometime in the late 1st or early 2nd century CE; (III) later, in

the early 3rd century, walls and support buttresses were constructed in an attempt to halt further erosion downslope; (IV) from the 3rd century to the early 5th century the villa begins to fall into ruin, with evidence for some occupancy in Room 4; (V) sometime in the mid 5th century some of the rooms were reused as a cemetery, one ostensibly reserved for infants and children. (VI) The site appears completely abandoned by the late 6th/early 7th century.

The major discovery of this early work was the cemetery found within the villa's ruin. Here the remains of at least forty-three distinct interred individuals were then discovered, found within forty undisturbed burials (IB 1-40). These individuals ranged in age from premature babies aged approximately six gestational months to young children about three years of age (fig. 3)[2]. In addition to numerous disarticulated human-remains found in isolation (likely the result of bioturbation), Soren and his team discovered an additional four "disturbed burials" (IB 41-44) and another "possible burial" (not categorized). These four "disturbed" burials were found within a robber's trench in Room 15, likely dug between the time of Monacchi's excavation and start of Soren's[3]; the "possible burial" was found in Room 11, highly disturbed and poorly preserved (Soren, Soren 1999, p. 510).

Currently this cemetery mostly appears confined to the villa's west-facing rooms, specifically Rooms 11, 12, and 17. Twelve burials were also discovered within Rooms 10 and 15. Three distinct burial types make up this cemetery: simple inhumations; inhumations within ceramic vessels, mostly Spatheion and other African-type amphorae dating to the Late Antique period and inhumations lying on and within simple tiles or "cappuccina" style. A middle 5th century CE date is ascribed to this cemetery based on the ceramic chronology (Soren, Soren 1999, p. 486).

At the end of these first excavations it was presumed that a significant portion of the cemetery had yet to be uncovered. Recent work has confirmed this notion. Since the start of renewed excavations in 2016, 15 more distinct individuals have been discovered, found within the same number of burials. This brings the current count of undisturbed interred individuals to 59. Twenty-nine were prenatal or newborn at the time of death, aged by lunar months. Another 28 individuals were younger than

[2] Soren, Soren 1999, pp. 477-530. Three "double burials" were found, containing the remains of two children each (IB 8, IB 20, and IB 40). Soren and his team also identified three other possible "double burials," but were unable to make any certain determination as to whether they were true "double burials" or simply contemporaneous burials in close proximity: IB 14 and 25; IB 11 and 16; and IB 15 and 17.

[3] Daniela Monacchi was the official of the Soprintendenza Archeologica dell'Umbria who began the preliminary investigations at Poggio Gramignano in the mid-1980s.

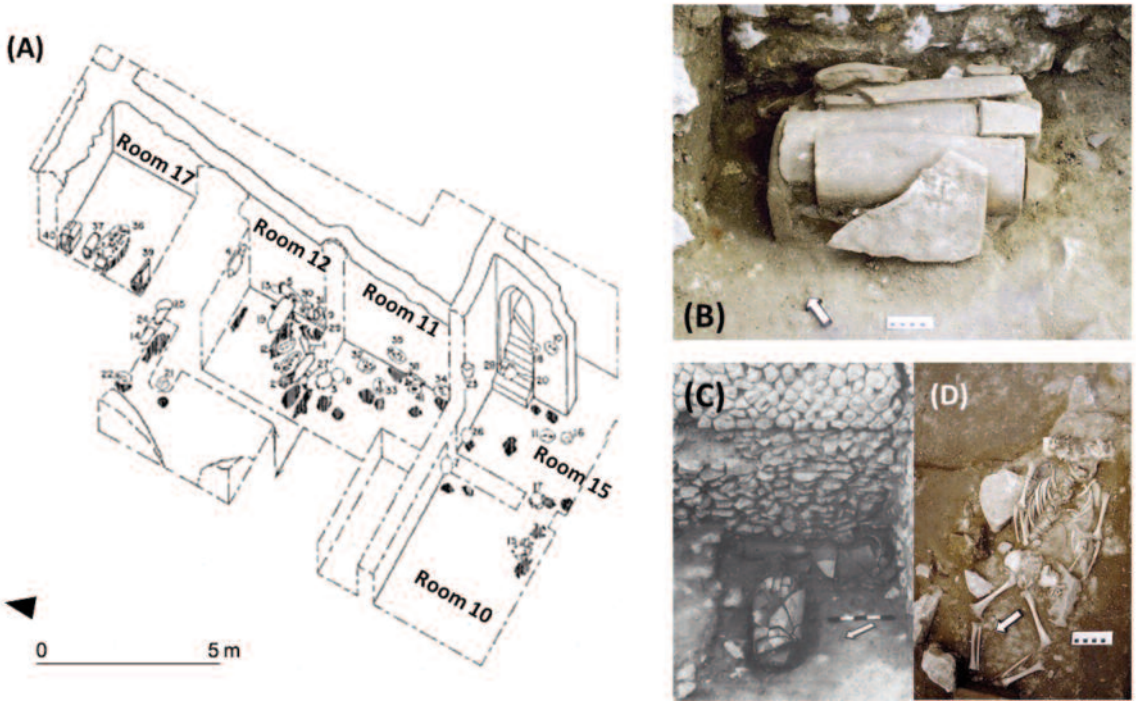

Fig. 3. (A) Axonometric view of the cemetery and its burials, ca. 1992, with depths of individual burials in perspective, after Soren, Soren 1999, fig. 77. (B) Burial 40, the "double capuchin" tomb from Room 17 partially excavated, found to have contained two individuals. (C) Cluster of burials uncovered in Room 12. (D) Individual Burial 36 from Room 17, who tested positive for an infection of *Plasmodium falciparum* malaria. All after Soren, Soren 1999, Pls. 259, 220, and 251, respectively (image by D. Pickel 2019).

one year old, the majority of which being younger than six months of age. Two older children have also been discovered, a 2-3-year-old girl (IB 36) and an 8-10-year-old child (sex unknown) (B51)[4].

While many of the characteristics of this cemetery accord well with what is considered normal for infant and child burials in Italy during the Late Roman period, certain aspects of the cemetery are peculiar[5]. For one, a number of burials provide material evidence which suggests that some ritual event had occurred during burial, possibly intended to purify

4 Soren and his team used *Individual Burial* (IB) to designate each burial uncovered, whereas we have chosen to use *Burial* (B), beginning with B45.

5 For example, the location of a cemetery within an abandoned villa, as well as the use of building material and ceramics to construct make-shift tombs and sarcophagi (Carroll 2018, pp. 157-162 and 180-198).

or contain the bodies of these infants and children or what was then considered to be their cause of death. For example, Individual IB36 was found by Soren and his team with bricks and stones weighing down her limbs (Soren, Soren 1999, p. 508; Soren 2003). Also, distinct faunal remains are commonly uncovered, for example, a raven's claw and the skeletal remains of a toad, as well as a large number of juvenile canid remains, some seemingly ritually sacrificed (MacKinnon 1999, p. 547). These faunal remains and burials are often found alongside ceramic or metal vessels containing charred botanicals. And finally, the density of burials, some deposited in direct contact with numerous others, is also noteworthy.

Taking into account much material and textual evidence, Soren and his team suggested that this cemetery was the result of an acute malaria epidemic[6]. Subsequent paleo-biomolecular analysis of the skeletal remains of from IB36, based on ancient DNA (aDNA) analysis (Sallares, Gomzi 2001) and hemozoin isolation analysis (Inwood 2017), support this interpretation – both analyses attribute IB36's death to an infection of *Plasmodium falciparum* malaria, the most malignant causal agent of malaria.

The advent of new technologies, refined excavation methodologies, and novel paleopathological approaches for studying ancient diseases like malaria allow for the possibility to better excavate and study the villa and its cemetery. Thus, the focus of the *Villa Romana di Poggio Gramignano Archaeological Project* (2016-2019) has been to fully excavate the presumed extent of the cemetery in order to better understand its development and presumed connection to malaria, as well as to better situate the villa and cemetery within the surrounding region.

D.P., R.M.

[6] Soren, Soren 1999, p. 520; Soren 2003. The malaria hypothesis proposed by Soren and his team took into consideration not only the skeletal evidence, but also the cemetery's stratigraphy, artifact assemblages excavated near and within some burials, and contemporary Roman texts. A number of the oldest individuals showed signs of anemic skeletal lesions, at the time widely considered to be an indirect indication of malaria infection (today this indirect association is debated, discussed further below). The cemetery's stratigraphy and ceramic chronology, as well as the presence of burial clusters, all suggested to Soren and his team that the burials had been deposited relatively quickly over a short period of time, fitting the scenario of an acute epidemic event. The presence of charred honeysuckle remains (*lonicera caprifolium*), which flowers in late Summer/early Fall, suggested that this rapid deposition would have likely occurred during peak malaria season (i.e., late Summer/early Fall). Also, Pliny the Elder notes that honeysuckle (*periclymenon*) was considered a remedy for conditions of the spleen (*Natural History* XXVII.94.120), an organ susceptible to severe malaria infection (i.e., splenomegaly). Some of the distinct artifacts found associated with a number of burials (e.g., puppy and toad skeletal remains) were interpreted by Soren and his team as having magico-medicinal purpose aimed at propitiating illness and disease incidence, as described by Pliny the Elder (e.g., *Natural History*, XXX.64 and XXII.49). And finally, Sidonius Apollinaris first-hand description of southern Umbria as pestilential in 452 CE corresponds with the location and dating of the infant and child cemetery at Poggio Gramignano (*Epistulae*, 1.5.6-9).

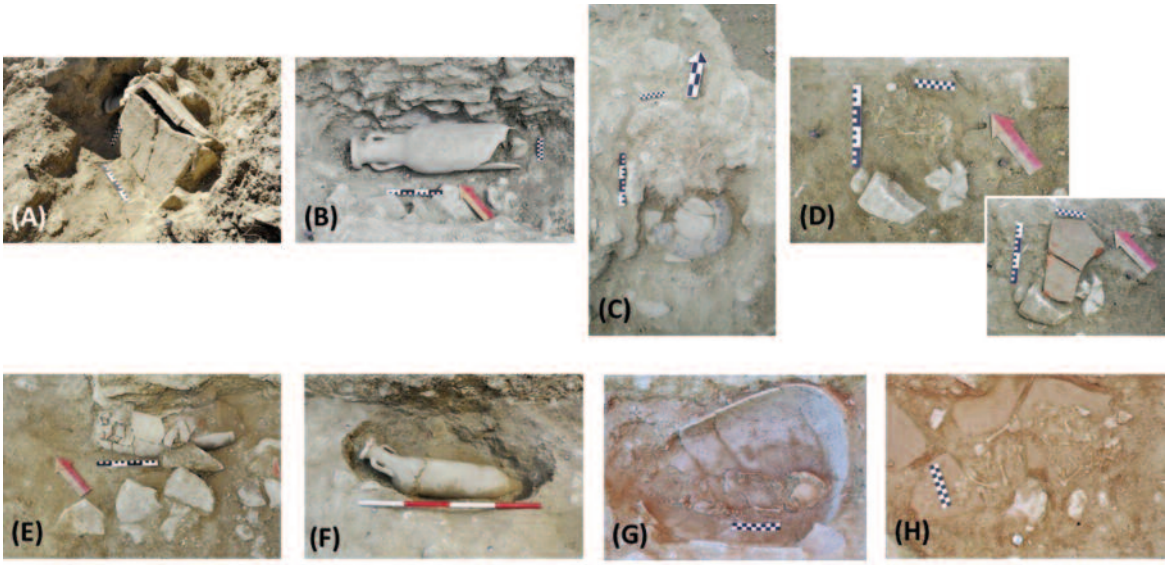

Fig. 4. Some examples of recently discovered burials: (A) Burial 46. (B) Burial 47. (C) Burial 48; Under the upturned coarse ware vessel was found a copper-alloy ring, unidentified coin, and much burned organic material. (D) Burial 49, found directly below a brick fragment. (E) Burial 50. (F) Burial 52. (G) Burial 56. (H) Burial 60 (image by D. Pickel 2019).

2. Recent excavations of the infant and child cemetery

The principal area of recent excavation (2016-2019) has been the villa's west-facing rooms: Rooms 11, 12, 17, 16 and 18. Fourteen of the 15 newly discovered burials have been found within Room 17 (table 1) (fig. 4)[7]. Soren and his team had previously excavated a significant amount of material from within the easternmost section of this room, between Walls X and Z (fig. 2). Five burials were then discovered here, two of which had been deposited within an intricately constructed "cappuccina" style tomb, the so-called "House of the Tiles" burial (Soren, Soren 1999, pp. 144-146, 509). Compared to those burials discovered within the other rooms, these burials were more elaborate in construction and unique with regard to the grave goods associated with each burial (Soren, Soren 1999, p. 487).

[7] A single burial (Burial 45) was newly discovered within Room 11 during the 2017 field season. Burial 45 designates a simple inhumation of a poorly preserved and disarticulated skeleton of a newborn infant, aged no older than three months (approximately 13 weeks). The high degree of disarticulation was likely due to bioturbation, as this burial was found in the western extent of Room 11 where excavation revealed thick and heterogenous deposits of collapse and refuse intermixed with much root-growth and insect activity.

Burial No.	Room	Burial Type	Preservation	Condition	Age	Aging Method
45	11	Simple inhumation	Fragmentary	Poor	Newborn (0-3 Months)	Dental development, limb length
46	17	Cappuccina style	Complete	Good	Fetus (8-9 Gestational months)	Limb length
47	17	Amphora (prelim. ID: Keay XXV/Africana 3)	Complete	Good	Newborn (2-5 Months)	Dental development, limb length
48	17	Simple inhumation	Fragmentary	Fair	Fetus (5-9 Gestational Months)	Dental development, limb length
49	17	Simple inhumation	Fragmentary	Fair	Fetus (8-9 Gestational Months)	Limb length
50	17	Amphora (prelim. ID: Almagro 54 "Gaza")	Complete	Good	Newborn (0-2 Months)	Dental development, limb length
51	17	Partial-cappuccina style	Complete	Good	Child (8-10 Years)	Dental development
52	17	Amphora (prelim. ID: Keay XXV/Africana 3)	Complete	Good	Infant (0-6 Months)	Dental development, limb length
53	17	Simple inhumation	Complete	Good	Fetus (6-7 Gestational Months)	Limb length
54	17	Simple inhumation	Fragmentary	Poor	Fetus (Unknown)	Cranial fragments only
55	17	Simple inhumation	Complete	Good	Newborn (0-2 Months)	Dental development, limb length
56	17	Amphora (prelim. ID: Spello-type)	Complete	Good	Fetus (5-9 Gestational Months)	Dental development, limb length
57	17	Simple inhumation	Complete	Good	Newborn (0-2 Months)	Dental development, limb length
58	17	Amphora (Prelim. ID: African-type)	Complete	Good	Newborn (0-2 Months)	Dental development, limb length
59	17	Amphora (Prelim. ID: African-type), covered by cappuccina style construction	Complete	Fair	Infant (9-12 Months)	Dental development, limb length
60	17	Simple inhumation	Complete	Good	Newborn (0-2 Months)	Dental development, limb length

Table 1. New Discovered Burials, excavation seasons 2016-2019[8].

[8] For a complete list of all burials previously discovered by Soren and his team, including age estimates, measurements, pathologies and artifact assemblages, see Soren, Soren 1999, pp. 477-530.

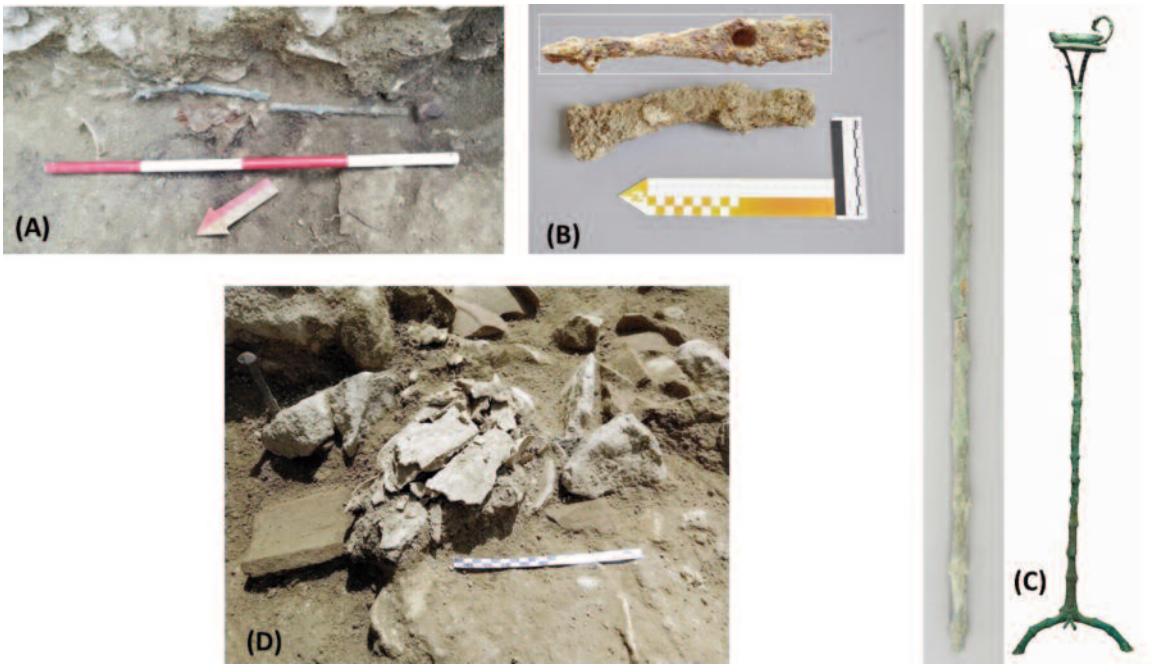

Fig. 5. (A) Photo of the *portalucerna* and pick-axe head during excavation. (B) Pick-axe head, possibly a *dolabrum.* (C) Portalucerna after cleaning (left), with comparative example from the villa at Cremona (right). (D) Photo of cow cranium during excavation (image by D. Pickel 2019).

In addition to these newly discovered burials, noteworthy artifactual material have also been revealed, including a carefully deposited adult cow cranium, as well as a fragmented copper-alloy portalucerna (*candelabrum*), itself found resting upon a heavily corroded but complete iron pickaxe head (possible a Roman *dolabrum*) (fig. 5). The cow cranium was deposited among a large assemblage of cooking ware ceramic sherds. The portalucerna and pick-axe head were found within a deposit that showed signs of heavy burning. Although fragmented and missing its base, the portalucerna is recognizable (Testa 1989, p. 140, tipo IV). A comparative example was found in a villa near Cremona, dating to the middle 1st century CE (Castoldi 2010, p. 151, fig. 2). While discovered within distinct stratigraphic layers, the cow cranium, portalucerna, and pickaxe head were all deposited near the eastern corner of Room 17, in close proximity to Burials 51 and 59, two of the most elaborate burials recently discovered. It is likely that these artifacts were involved in some kind of ritual event that occurred at the time of these burials' deposition.

Analysis of the human remains was conducted following the methods stipulated in *Standards for Data Collection from Human Skeletal Remains* (Buikstra, Ubelaker 1994), with fetal age determined using the methods outlined by Fazekas and Kosa (1978), and Ubelaker (1989)[9]. Each individual appears to have been initially interred within the rooms, with several burials becoming slightly displaced and disarticulated over time as the surrounding structure collapsed. While the exact location of the living community from which these infants and children came is unknown, the positioning of the individuals within their graves suggests that burial took place, at minimum, after rigor had subsided. While the process of *rigor mortis* does not take place in preterm infants less than seven gestational months, it is known to occur rapidly in newborn infants and can last for several hours (Kori 2018), a much shorter span of time than for adult remains. Due to their weak musculature, however, the process of rigor mortis can be undetectable to those handling the infant (Kori 2018).

When excavations recommenced in 2016, no intact burials were uncovered initially. However, a number of isolated remains indicated that additional burials had taken place within the rooms and undisturbed contexts were likely to be discovered. Subsequently, during the 2017 field season, three burials were found. These consisted of a largely disarticulated inhumation (Burial 45, discovered within Room 11) that appears to have been displaced from its original position; a "cappuccina" style burial (Burial 46); and an amphora burial (Burial 47). The infants from these burials range in age from eight-to-nine gestational months to six months old. No pathology or trauma is evident on the two perinatal infants save for undiagnosed bony deposits on the endocranial surface of the vault of the individual in Burial 45 (at most three months old). However, the older and remarkably well-preserved individual from Burial 47 (aged around six months) seems to have been considerably ill at the time of death. Pathologies include lesions on the endocranial surface of the vault, mild porotic hyperostosis and *cribra orbitalia*, and a mild periosteal reaction on the long bones and *pars basilaris* of the skull, suggesting a potential infection.

Five additional burials were uncovered during the 2018 field season. These were comprised of two single, primary inhumations (Burials 48 and 49) containing fetuses prematurely born at six to seven months into the pregnancy (approximately 23 weeks to 31 weeks), and two amphora burials (Burials 50 and 52), each containing infants between zero (i.e.,

[9] When possible, age was determined using both dental development as well as limb length to ensure accuracy. Limb length was carefully measured using digital calipers.

newborn) and six months. Surprisingly, the final burial, a partial "cappuccina" style internment (Burial 51), contained the remains of an eight to ten-year-old child of indeterminate sex.

During the 2019 field season, eight additional burials were uncovered. These consist of four simple inhumations (Burials 53, 54, 55, and 57); and four burials within amphorae (Burials 56, 58, 59, and 60). The fetuses and infants contained within these burials range in age from six-to-seven gestational months to one year old. All burials are primary inhumations, as indicated by the high degree of skeletal articulation and the relative completeness of the remains. Each individual was uncovered lying supine, arranged to suggest that burial took place after rigor had subsided. Only the individual in Burial 53, a fetus aged six-to-seven gestational months, may have been placed in the ground in the fetal position in which he or she had died. The position of the body suggests they had been buried before rigor had subsided, or that they had possibly been swaddled or tightly shrouded at the time of burial. Similarly, the verticalization of the clavicles the individual in Burial 55 (a newborn, at most two months old) suggests they had also been tightly swaddled or shrouded some time before deposition.

2.1. Mortuary context and "deviant" burials

The size of the infant and child cemetery, along with its association with malaria, renders it unusual even in the absence of the chthonic funerary objects discovered within and alongside the burials. In addition to these, the atypical postmortem treatment of several newly discovered individuals, most notably the oldest child yet discovered (B51) and two newborn infants (Burials 55 and 57, discussed below), strongly resemble so-called "deviant" burials uncovered in a variety of archaeological contexts[10]. In Europe, the earliest examples of intentional burial with unusual funerary ritual aspects date as far back as the Paleolithic period and provide the first connection between pathology and atypical mortuary treatment (Formicola 2007; Pettitt 2010). Broadly speaking, it is presumed that such atypical mortuary treatment is generally reserved for social transgressors, the physically or ritually impure (including so-called "witches" or those associated with witchcraft), and those who died in violent or otherwise unusual ways, including dying away from one's community (Murphy 2008; Taylor 2004). These rituals may have been intended to keep these individuals separate from their living communities

[10] See Murphy's 2008 volume for numerous examples of such burials.

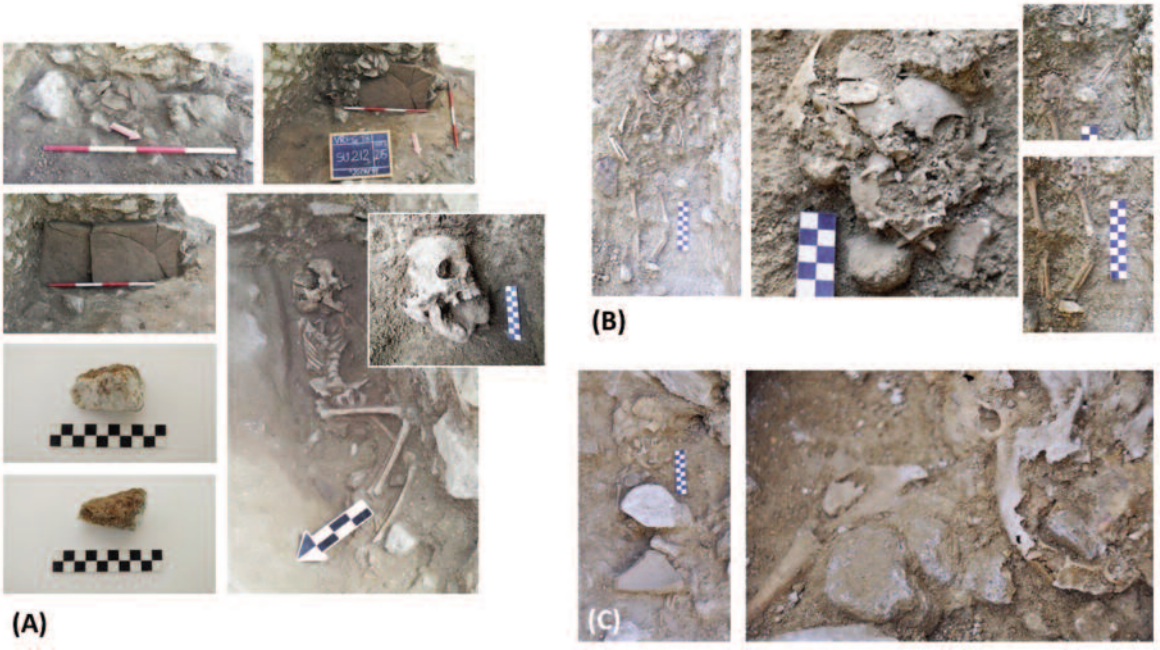

Fig. 6. (A) Burial 51, (B) Burial 55, (C) Burial 57 (image by D. Pickel 2019).

even in death (Taylor 2004). The Romans certainly believed in spirits and the afterlife, as well as the potential for some spirits to haunt and harm the living. Numerous ancient texts describe these superstitions and the ritual practices and magic-religious paraphernalia that arose from these beliefs (Felton 1999; Hope 2009, especially pp. 97-119). During Late Antiquity and the early Christian period, these pagan beliefs and superstitions seem to have largely persisted, especially in more rural areas, despite efforts by Church authorities to extinguish them (Bailey 2007). The untimely deaths of so many infants and children discovered at Poggio Gramignano, very possibly from what was then most probably understood as a supernatural disease with distinct and severe physical symptoms, would likely distinguish them in the eyes of those who buried them, thus affecting the mortuary treatment that they had received.

Burial 51 is a partial "cappuccina" style burial containing a single inhumation of a juvenile child, aged 8-10 years (fig. 6). This burial was constructed by leaning two large roof tiles (*tegulae*, ~20x30 cm) against an existing wall of the room (Wall X). These roof tiles, themselves capped by numerous *amphorae* sherds which served to further protect Burial 51 from the percolation of sediment above, covered a loose sandy-clay fill

containing small pebbles and small fragments of ceramic building material, as well as the skeletal remains of Individual B51. Individual B51 appears to have initially been placed on his or her left side, loosely flexed, but came to rest in a supine position shortly after placement or as decomposition occurred, with the face and limbs still generally oriented towards Wall X. Postmortem skeletal articulation indicates this is a primary inhumation. However, the body was subject to some degree of taphonomic disturbance after the ligamentous attachments of the joints had decomposed, with the left arm and hand being displaced over time. There is no evidence of the use of a shroud or other type of organic covering. Two beads carved from an unidentified material were found while sieving the soil associated with this burial. Significantly, a small limestone cut in the shape of a wall *cubilium* was found within Individual B51's mouth, with lime mortar spackled on two of its broader sides. At present we presume that this placement was intentional. While a number of other small to medium-sized stones were found just below the skeleton, most were isolated near his or her waist and legs. Also, this stone was distinct in character, being much smaller and with a more crystalline sheen compared to those used in the surrounding masonry. Given this evidence, combined with Individual B51's good preservation and condition, the overall protection afforded to it by the burial's construction, and the position of his or her head and likely process of decomposition[11], it is unlikely that this stone had naturally positioned itself into the child's mouth from above, below, or laterally from the nearby wall or from within the fill.

Individual B51 is approximately 8-10 years old. Age assessment is based on dental eruption. Sex remains indeterminate. The skeleton is in good condition, though the left arm and hand appear to be partially discolored. Much of the skeleton is coated in a mineral deposit of some sort. This, combined with moderate taphonomic damage to certain elements, is difficult to distinguish from lytic and periosteal reactions to the surface of the bone. No pathology or trauma is evident, save a single tooth (PM1) that appears to have been lost *antemortem* due to a periodontal abscess and some pitting visible in the orbits.

Unusual mortuary ritual similar in nature to Burial 51 and the earlier Individual Burial 36 (the two-three-year-old girl found by Soren and his team with bricks and stones weighing down her limbs) is evident in several other burials recently discovered. The individual in Burial 55 appears to have had stones intentionally placed over his or her wrists and ankles, with a larger stone placed above these over the feet and ankles. Further-

[11] The position of the child's skull resting on the left side and not supine suggests that it is not likely that his or her jaw would have fallen open as the masseter muscles decomposed.

more, a piece of concrete appears to have been intentionally placed over the throat, wedged under their chin. Similarly, the individual in Burial 57 appears as though it may have been weighed down with stones placed over the abdomen, and small lumps of concrete set over the right collar bone. A single stone appears to have been intentionally placed within the mouth of this individual as well.

These intentionally placed stones are, if nothing else, unusual funerary inclusions. It is possible that because of the unusual circumstances surrounding these deaths, this atypical mortuary treatment may have been conducted with the intent of preventing the children from rising from the grave in spiritual or corporeal form (fig. 6), especially if the living were fearful that their deaths were associated with the supernatural. The stones may have rendered them unable to move or, in instances where stones were placed in the mouth, speak or emit pestilential vapors (*miasma*). This is especially relevant in an area and time when witches were not only believed to prey on infants and children but to raise the souls of the dead to vex the living (Soren, Soren 1999, pp. 619-652). Additional research is required to fully understand the intent of this atypical mortuary treatment.

2.2. Pathology and trauma

Skeletal lesions, specifically *cribra orbitalia* and porotic hyperostosis, are present on a number of the newly discovered individuals (n. 3) (fig. 7). Such pathologies are commonly presumed to result from anemia-inducing conditions, one of which being severe malaria infection. It is important to note, however, that clinical research has so far found no direct link between malaria and these skeletal pathologies[12]. In the face of these uncertainties, bioarchaeologists today generally see such pathologies simply as non-specific indicators of general health stress (Killgrove 2018). It is important to note that the absence of skeletal pathologies in other individuals does not preclude their infection with malaria or other pathogens. It is possible that death occurred before the skeletal tissue could be affected, or that death itself resulted from an infection not known to leave evidence in bone.

Endocranial lesions are present in Burial 55, as is mild porotic hyperostosis. The long bones of this individual also display mild lytic reactions.

[12] Clinical research has in fact identified many possible contributing factors to skeltal porosity and subsequent lesions, some of which have no association to anemia, such as Vitamin D and C deficiency and simple inflammation (Ortner 2003; Wapler *et al.* 2004, p. 336; Lewis 2007). See Gowland, Western 2012 and Smith-Guzmán 2015a; 2015b for a summary of this and other research, including the controversial association between malaria induced hemolytic anemia and skeletal porosity (Walker *et al.*, 2009; Oxenham, Cavill 2010; McIlvain 2015; Cole, Waldron 2019).

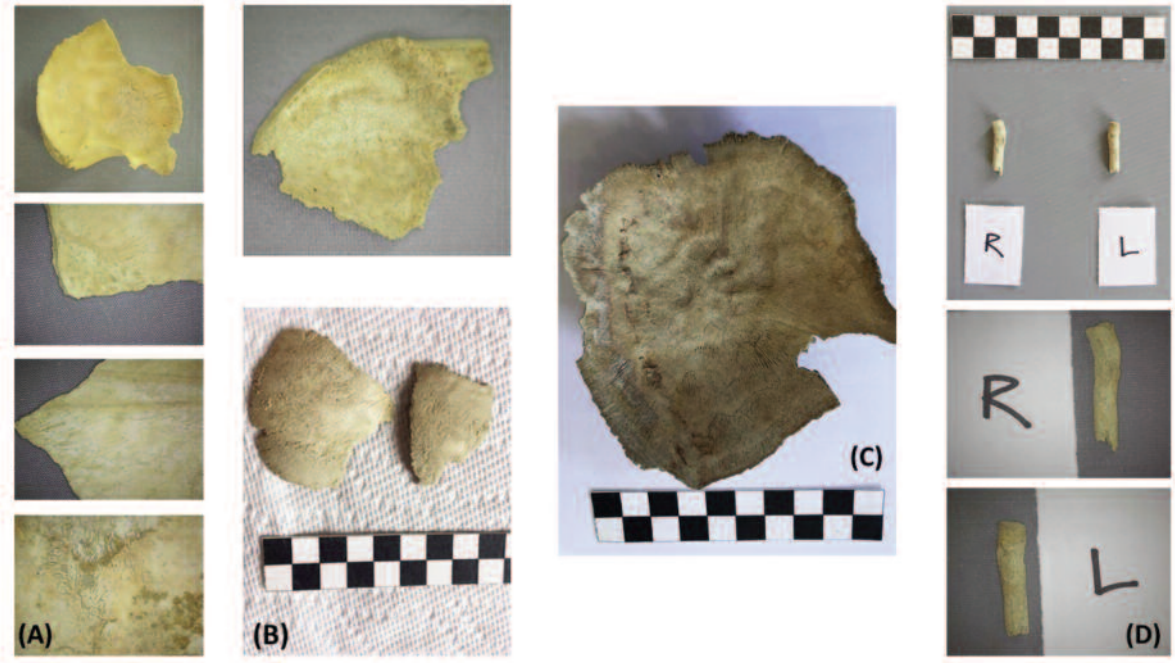

Fig. 7. (A) Burial 55, showing endocranial lesions. (B) Burial 57, showing periosteal reaction in the form of cribra orbitalia (top) and porotic hyperostosis (bottom). (C) Burial 58, showing signs of a possible inflammatory reaction on the endocranial surface. (D) Burial 59, showing signs of possible trauma on the left and right radial tuberosity where the biceps brachii tendon inserts (image by D. Pickel 2019).

Similarly, an inflammatory reaction is present on the endocranial surface of Burial 58 (aged newborn to two months). Additional pathology is evident throughout the skeleton of Burial 57 (aged newborn to two months old) in the form of mild to moderate periostitis. Mild to moderate *cribra orbitalia* is visible on the left orbit of this individual, as is mild to moderate porotic hyperostosis present on the ectocranial surface of the vault. Throughout the skeleton, the bone is highly porous and readily disintegrates. The cause of this may be pathological or taphonomic in nature. While not pathological, the incisors of this individual are much larger than is typical in this sample, suggesting a possible case of macrodontia. A similar, moderate inflammatory reaction is present on the endocranial surface of the right parietal and frontal bones. Trauma is present only in Burial 59 (an infant aged nine months to one year) and is limited to what appears to be inflammation of the right and left radial tuberosity where the biceps brachii tendon inserts. As this is the approximate age at which infants begin to stand and walk on their own, this undiagnosed bi-

lateral elbow injury may have resulted from falling, or simply rough play with other children or adults as they pulled the child into a standing position form above.

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2.3. The cemetery's development and relationship with the villa structure

These new investigations have revealed much new information regarding the cemetery and its relationship with the villa structure. For one, we are certain that this cemetery did not extend northwards into those rooms beyond Room 17. It is still possible, however, that numerous burials remain to be discovered within those areas of the villa's living quarters left unexcavated by Soren and his team, in particular Rooms 10 and 9. Also, careful excavation of the cemetery's stratigraphy and surrounding structure has provided new insight as to the cemetery's overall development and the construction and phasing of these rooms prior to the cemetery's creation. It is likely that the area of Rooms 11, 12, and 17 was originally planned as a simple terrace along the western slope of Poggio Gramignano, with Wall L designed to buttress the villa structure constructed above. Partition walls perpendicular to this terrace wall (Wall L) within this area were later added to create separate rooms, all topped by barrel-vaulted ceilings (fig. 2). Given the lack of any decorative element or robust paving it is likely that these rooms were used simply for storage. It is important to note, however, that this interpretation presumes that the western face of these rooms were originally sealed in some way, so as to block the interior space from the high winds that rush up the hill from the Tiber valley. No remains of any masonry structure, large door, or door-jam that might have sealed these rooms has yet been discovered in this area. It is possible that some structure can be found further down the western slope.

Moreover, renewed excavation has provided further evidence that a major collapse event had occurred sometime in the late 1st century CE, originally identified by Soren and his team as initiating Phase II. This is most clearly seen in the structural damage to the walls, thresholds, and pavement of Rooms 11 and 12, as well as the layer of collapse immediately covering floor-level of all rooms (fig. 8). Following this initial collapse event, it appears that sometime later parts of these rooms were used to deposit refuse, much of which likely came from villa's living quarters, which appear at this time to have been less frequented and spoiled for building material. Excavation of Room 17 suggests that this collapse material and refuse fill did not extend far into the interior of these rooms where most burials have been found, some at nearly floor level (Soren

Fig. 8. Fracture and collapse events identified during the excavation seasons 2016-2019 (image by D. Pickel 2019).

and his team also found burials near floor level within Rooms 11 and 12)[13]. It is likely that the interior space of these rooms was chosen as the best place for these burials due to both the protection afforded by the walls and sections of barrel-vaulted ceiling at the time still intact, as well as the apparent absence of thick deposits of collapse and refuse. Given the careful placement of stones and ceramics cradling most burials, it is presumed that each burial or burial cluster was simply deposited upon the ground, often within a shallow cut. Following this initial deposition, the burials were then covered by carefully selected stones and ceramics, likely gathered nearby or the remains of mortuary ritual paraphernalia (fig. 9). Over time, these piles of burials would reach a height of more than 2 meters.

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[13] For example, IB 38 (Soren, Soren 1999, pp. 499 and Pl. 243).

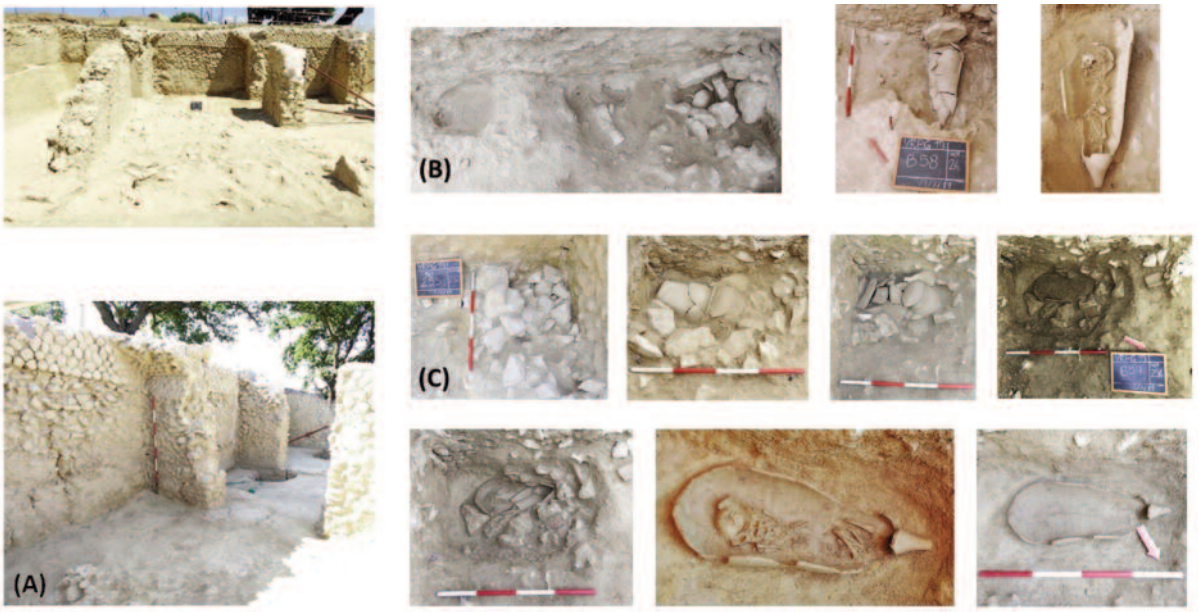

Fig. 9. (A) Room 17 near the end of excavations in 2019; (Top) Interior of Room 17, facing East; Note the difference in deposits between the interior and exterior space. (B) Burial 58; Note the sequence of the burial's construction (C) Burial 59; Note the sequence of the burial's construction (image by D. Pickel 2019).

3. Discussion

What has emerged so far from the infant and child cemetery at Poggio Gramignano accords well with the transformations found in the historical evolution of many Roman villas previously studied not only in Italy, but across all the *pars occidentalis* of the Empire[14]. The re-use of some rooms of the villa for funerary purposes is a well-documented phenomenon in many other villas of the same type between the Late Roman and the Early Medieval periods[15], including in the villas of Pupigliano and Penna Vecchia, located in the neighboring municipalities of Alviano and Penna in Teverina (TR, Umbria), respectively (Tomei 1983).

The reasons for these transformations are perhaps related to that phenomenon of property centralization widely attested in the Late Roman period, a time when wealthy landowners began to favor more centralized and manageable estates over the ownership of numerous smaller

[14] For a more in-depth study of the topic see Chavarría Arnau 2004, pp. 7-19.

[15] For a recent analysis of this phenomenon see Di Gennaro, Greisbach 2003.

and fragmented properties more typical in earlier history[16]. These occupied estates would become their official residence where they could project their wealth and power in a manner better suited to the political scene of the period; the management of those smaller rural properties which they chose not to occupy would be left to trusted familiars, local inhabitants, or abandoned entirely.

Fig. 10. Doliar stamp *CIL XV*, 1699[a] (photo by R. Montagnetti 2019).

Excavation of the villa at Poggio Gramignano has provided much evidence that accords with this general picture. For example, the partial abandonment, reuse, and spoliation of many rooms suggests that this villa was not personally occupied by any wealthy owner after the initial collapse event that damaged much of the structure in the late 1st century CE. Were it the case that a malaria epidemic had indeed struck the region around the middle of the 5th century, this would only further exacerbate the instability and unrest caused by repeated military incursions into Italy and the Tiber valley during the 5th century CE Germanic invasions and later Gothic war[17]. This insecurity could have at some point induced the nearby inhabitants of Poggio Gramignano to move their place of habitation to a more secure and healthy space, perhaps right where today stands the current center of Lugnano in Teverina. This prominent hill (458 m asl) would have provided the most defensible position, facilitated control of the territory, and potentially been a more salubrious environment, where high winds and cooler air would have offered more protection from mosquitoes and other pests.

In this regard, the recent discovery of a doliar stamp is of particular interest, found upon the crest of Poggio Gramignano during recent test soundings made just above the west-facing rooms (fig. 10) (CIL XV, 1699a)[18]. The stamp in question bears the inscription *Leonti*(us), previ-

[16] Volpe 1996, p. 210; Di Giuseppe 1996, pp. 240-241;169-214; Ortalli 1994, p. 14; Brogiolo 1997, p. 268.

[17] For a comprehensive discussion of this history, see: Remondon 1975; Cardini, Montesano 2006; Halsall 2007; Delogu, Gasparri 2010.

[18] Dr Francesca Rizzo provided the deciphering and the prosopographic analysis of this stamp.

ously attested only in Rome. Steinby suggests a possible identification of *Flavius Leontius*, *vir perfettissimus, praefectus urbi* (CIL VI, 1160, 31397) and *vice sacra(rum) iudic(ans)* between 335 and 357 CE (Steinby 1986, pp. 128-129; Martidale 1971, p. 503, n. 22). This individual is known to have made some dedications to the Emperor Constantius, one being a statue found near the ruins of the Deciane Terme in Rome (CIL VI, 160; Lanciani 1901, p. 143).

Another possible identification of this man *Leontius* includes *Flavius Domitius Leontius*, who was consul in 344 CE together with *Flavius Bonoso*. This identification is supported by Poggio Gramignano's close proximity to the area of ceramic production owned by the *Gens Domitia*, located on the opposite bank of the Tiber in the territory of Bomarzo. There is also a possible correspondence between the name *Leontius* and the praedial toponym *Leonius* of the nearby village of Lugnano (*fundus Leonianus*), already traced to the gentilizi toponyms of Lunius and *Lupinius*[19].

Based on this evidence, it could be thought that the villa of Poggio Gramignano and the immediate surrounding territory had in Late Roman period belonged to members of the *Gens Leioniana*, who, at a certain point and possibly for reasons discussed above, decided to move away from the territory of Lugnano in Teverina entirely or merely occupied the settlement on the highest site, namely, the hill of Lugnano in Teverina, where the town's medieval castle would later be constructed. Choosing to personally occupy the most prominent hill, the *Gens Leioniana* may have left the management of other properties in the area, including the villa at Poggio Gramignano, to the local inhabitants. This management and their occupation of these properties would likely only be seasonal, occupied during periods of cultivation or sporadically by shepherds and travelers who would be less concerned with the preservation of the villa's elegant spaces.

Despite this new evidence, important questions still remain as to why Poggio Gramignano in particular was chosen as a cemetery space, why only infants and young children were deposited here, the possible existence and location an associated adult cemetery[20], the intended purpose

[19] Pellegrini 1970, p. 211; Del Lungo 2001, p. 201. Another interesting hypothesis is the possible transposition of the figure of *Leontius* into *San Leontius* (or *Eleozimus*), venerated on November 7th in Otricoli and mentioned in a *Passio* of *San Leopardo o Medicus* (Lanzoni 1927, p. 26). It ought to be noted that in Umbria one *Leontius*, bishop of *Iguvium*, antecedent to *Decentius*, participated in the Synod of 324 CE. A *Leontius*, bishop of chamber appears also in the *Passio* of *S. Venantius*, reported in the year 250 CE. Finally, in the middle of the 6th century CE a bishop *Leontius* was certified in Urbino (Lanzoni 1927, pp. 488, 503, 552).

[20] In addition to high maternal mortality rates in the ancient world, malaria disproportionately affects pregnant women due to their suppressed immunity (Doolan *et al.* 2009; WHO 2019). It is possible that many of the mothers of these infants and children had themselves succumbed to the disease.

of some artifacts and deposits with seemingly ritual significance, and if malaria was in fact the major cause of death at the time of the cemetery's creation. Furthermore, it is still unclear as to whether this cemetery was built up over months, years, or decades. The propinquity of the burials to one another (some clearly clustered), the ceramic chronology, and the overall stratigraphy all suggest fairly rapid deposition, but it remains possible that a significant amount of time had elapsed between the deposition of some burials. And finally, we still know little as to who these children were, where they and their families lived, and whether they comprised a single community or multiple communities. It is likely that settlements existed nearby, but so far no evidence of contemporary habitation has been uncovered which provides any clear connection to the infant and child cemetery at Poggio Gramignano.

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4. Future work

Further analysis of the artifactual material, including the skeletal remains, will likely provide answers to these questions. These analyses are ongoing. And while little remains to be excavated within the Rooms 11, 12 and 17, excavation beyond these rooms, whether within the living quarters to the southwest or upon the hill's crest, would certainly provide new insight as to the villa and cemetery's development. Continued excavation is planned for future field seasons. In addition to this research, the *Villa Romana di Poggio Gramignano Archaeological Project* is currently assisting in the villa's conservation and the construction of a permanent covering that will better preserve the site and make it easily accessible to visitors. This work is being done in collaboration with the *Comune di Lugnano in Teverina* and the *Soprintendenza Archeologia Belle Arti e Paesaggio dell'Umbria*.

Finally, new ancient pathogen DNA and paleo-nutritional isotopic analyses are currently in progress, conducted in collaboration with Italian, American, and Canadian laboratories. The results of this work have the potential to be highly informative in and of themselves, providing new information as to the pathogen infections possibly experienced by these infants and children, as well as their diet and its source. Contextualization of these results with the archaeological, bio-archaeological, and paleo-environmental record can provide extraordinary insight into the ancient history of malaria and other diseases in Umbria and Roman Italy at large. Much work has been published that discusses malaria's likely significance in Roman history. For example, Kyle Harper has recently proposed that

malaria contributed to the persistent breakdown of the empire's resilience beginning in the middle 2nd century CE, culminating in Rome's fall in 476 CE (Harper, 2017). Also, Frank Romer has suggested that pestilence, possibly malaria, and the risk it posed to his army was what had deterred Attila the Hun from besieging the imperial capital city in 452 CE[21]. Unfortunately, little of this work is rooted in material evidence. The Roman villa and Late Roman infant and child cemetery at Poggio Gramignano have the unique potential to provide the necessary foundation upon which we can begin to construct a truly comprehensive history of ancient disease.

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[21] Romer 1999, pp. 471-475. Galassi *et al.* have recently proposed that Alaric's sudden death in 410 CE was due to a malaria infection contracted during his campaigns in Italy (Galassi *et al.* 2016). For more on the history of malaria in Roman Italy, see: Sallares 2002; Marciniak *et al.* 2018).

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