

**The Bulla Regia Archaeological Project 2017:
End of Season Report
September 7th-22nd**



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Table of Contents

INTRODUCTION (MC, CF)	3
METHODOLOGY (CF, GJ, GH)	4
Photogrammetric recording (GJ).....	4
Topographic survey (GH)	7
TRAINING (CF AND GJ)	9
GEOPHYSICAL SURVEY (CF)	10
Zone 1: The western cemetery.....	10
Zone 2: The western town	12
AREA 1: THE WESTERN CHURCH AND CEMETERY (DB, GC, SC, CF, LTH)	13
The Church (DB, GC, CF)	14
Northern Annexes:.....	16
Southern annexes.....	18
Excavations in Church (SC, CF, Lth)	19
The Cemetery (CF and SC)	20
Excavations in the cemetery (Area 3000) (SC, CF).....	Error! Bookmark not defined.
Preliminary dating and phasing of the church and cemetery complex (DB and CF).....	25
AREA II: THE CHURCH OF ALEXANDER (CF)	27
ANTHROPOLOGICAL ANALYSIS (EN)	29
WORKED STONE (DB)	30
SMALL FINDS (LTH)	30
Glass	30
Metalwork and slag	31
Coins.....	35
Fresco and other materials.....	36
PLAN FOR NEXT SEASON (SPRING 2018)	36
BIBLIOGRAPHY	37

INTRODUCTION (MC, CF)

The Tunisian-British Bulla Regia Archaeological Project was established in 2014. The project directors are Dr. Moheddine Chaouali (INP) and Dr. Corisande Fenwick (UCL). Fieldwork was postponed several times in 2014 and 2015 because of the security situation in the region of Jendouba. A short campaign of geophysical prospection and topographic survey was conducted by Michel Dabas (Geocarta, geophysics and topography) and Jean-Marc Valet (Geocarta, geophysics) with Corisande Fenwick and Moheddine Chaouali between September 18th-21st 2016, laying the ground for a first season of documentation and limited excavation between September 6th-22nd. This report presents the preliminary results of this first season of sustained analysis. We are very grateful for the financial support of the Society for Libyan Studies and Loeb Foundation which enabled us to conduct this season. We are also very grateful to M. Faouzi Mahfoudh, the Director-General of the INP for his support of the project and the governor of Jendouba and XX chief of the Garde Nationale for ensuring our security throughout the season.

The team in the field were: Dr. Dirk Booms (Roman architecture specialist, British Museum), Dr. Gabriella Carpentiero (Building specialist, University of Siena), Dr. Moheddine Chaouali (Roman archaeologist, INP), Dr. Samantha Cox (Anthropologist, UPenn), Dr. Corisande Fenwick (late antique and medieval archaeologist, UCL), Guy Hopkinson (GIS specialist, UCL), Dr. Gaygysz Jorayev (Photogrammetry specialist, UCL), Dr. Efthymia Nikita (Anthropologist, University of Cyprus), Dr. Aleida Ten Harkel (Archaeologist, University of Oxford), Mahres Brinsi (Roman archaeologist, INP). A total of 8 Tunisian students (Sihem Aloui Naddari, Walid Ammouri, Amira Absidi, Mehdi Arifa, Abir Ben Moussa, Rihab Mzoughi, Manel Nasri and Sonia Wertani) participated in the project and were introduced to a variety of different archaeological methods. Our work was made possible by a team of 18 ouvriers, managed by Mounir Abidi.

The Bulla Regia Archaeological Project was established to understand the city's development in late antiquity and the early middle ages. The site of Bulla Regia (Hamman Darradji) provides an exceptional opportunity to explore the changing urban society of North Africa in late antiquity (Figure 1). An affluent city in the fertile Medjerda valley that served as the capital of a Numidian kingdom, it is famous today for its well-preserved early Roman forum, temples, baths, theatre, elaborate water-system and unusual elite houses with subterranean, mosaic-clad rooms dating from the 1st – 4th centuries AD.¹ The city, however, has a far longer history than that suggested by these scattered Roman remains. Inscriptions and ecclesiastical lists reveal that Bulla Regia was a major bishopric in 646 on the eve of the conquest and had a bishop even in the early eighth century.² The city's later history remains obscure despite visible evidence for a substantial occupation (churches, forts, kilns, ceramics) up until the site's eventual abandonment in the eleventh century. The large cemetery-church with rich mosaics and over 300 tombs discovered by Dr. Chaouali in 2010 offers a further opportunity to explore how a late antique population experienced the vicissitude of late antiquity. The project combines multiple techniques – remote sensing, photogrammetry, excavation and bioarchaeological analysis – to reconstruct the urban development of a North African town in late antiquity and the middle ages and to understand the diet, nutrition, health, lifestyle, origins and mobility of its late antique inhabitants.

¹ Chaouali 2010.

² Thébert 1983.

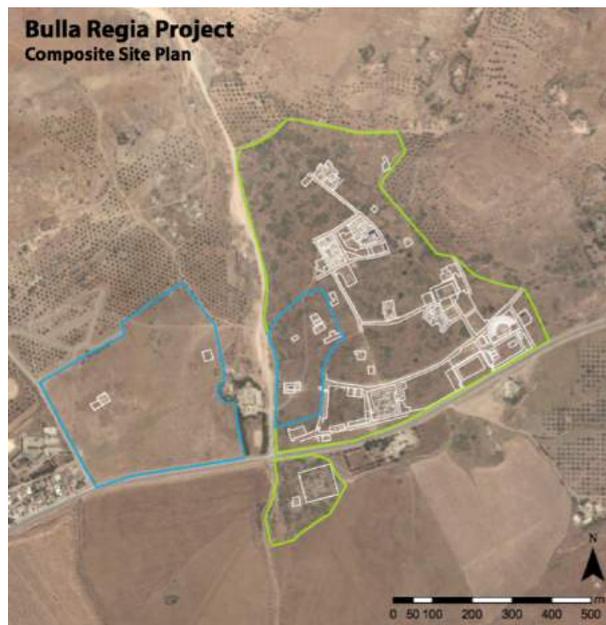


Figure 1: Plan of Bulla Regia. Zones delineated in blue were covered by geophysics in the 2016 campaign.

METHODOLOGY (CF, GJ, GH)

Our methodology prioritises non-invasive archaeological methods, re-analysis and inventory of excavated finds, supplemented by targeted small-scale excavations to gain dating information and to collect a statistically significant sample of burials for analysis. The 2017 season focused on using rapid documentation techniques to record and analyse two monuments with very different excavation histories: the church and cemetery uncovered in the rescue excavations of Dr. Chaouali in 2010 and the Church of Alexander excavated in 1914 by Dr. Carton.³ A combination of total-station survey, photogrammetry and 3-dimensional modelling software (Agisoft PhotoScan) was used to plan the church, tombs, skeletons, architecture and mosaics.⁴ Systematic cleaning of the entire church and cemetery supplemented by open-area excavation was conducted in order to a) understand the different construction phases of the church and b) the development and organisation of the cemetery.

Photogrammetric recording (GJ)

During the 2017 season, the team undertook a substantial photogrammetric recording exercise of standing monuments, archaeological features and portable objects (mosaics and worked stone). The church and cemetery and the Church of Alexander were recorded in their totality in high-resolution photographs and transformed into three-dimensional models using the photogrammetric software Agisoft Photoscan 1.3.4. In order to experiment with paperless planning, geo-referenced photogrammetric models were created for each excavated feature rather than planning by hand. Finally, models were made of the worked stone elements and mosaics in the reserves that were lifted in 2010 but had not been fully documented.

The team used a combination of different camera equipment. After initial experimentation, most of the pictures were taken with Sony $\alpha 77$ II A-mount Camera with APS-C sensor. It has fast focusing times and autofocus and an ability to take pictures in quick succession. With 79

³ Carton 1915a; 1915b.

⁴ See Dufton and Fenwick 2012 for methodology for recording complex cemeteries.

AF points and a 24.3MP CMOS sensor, it provided a good all-round option. It was used with 16-50mm F2.8 fast-autofocus lens and with 50 mm F1.7 lens. The Sony a77ii also has a very good mobile phone control functionality and that was extensively used in our works at Bulla Regia. Additionally, the light Sony NEX-5T mirrorless camera equipped with an interval meter was used with E 20mm F2.8 lens and 16-50 mm F3.5-5.6 lens to take near-vertical shots of the site from a pole. For site modelling, the Sony a77ii and NEX-5T were used attached to long poles and controlled remotely. For wide-angle shots, especially in restricted environments such as the excavation trenches, highly capable Canon EOS 70 D camera with a wide-angle Canon EF-S 10-22 F3.5-4.5 lens was used. The combination of the three helped with building the highly detailed models seen below (Figure 2). In photographing the objects, especially the column capitals with complex geometry, to compensate for any distortion, the combination of the pictures from wide-angle Canon (10mm), fixed-length Nex5 (20mm) and mid-range Sony a77ii (16 mm) were used together. Certain objects were also modelled with the lightweight and high-speed point-and-shoot camera Canon IXUS 220HS. The resulting models were exceptionally accurate, often providing sub-millimetre accuracy and minimal distortion.

All of the models were recorded using scale bar targets as well as ground control points created with the use of the total station for maximum accuracy. The team primarily used specifically designed scales with machine readable targets. These are automatically recognised by the software and they improve the accuracy of the end results. Additionally, ground control points were routinely embedded into the models in order to provide a sub-millimetre global accuracy to the final orthomosaics and digital elevation models. Working models were created during the field of key features to assist with in-field documentation. All of the models will be processed in higher quality using UCL high-power computing facilities in the post-excavation period and shared with the INP.

The recording of the church and cemetery began with the detailed photography of specific rooms. These were successfully turned into scaled models which can be used to generate orthomosaics and digital elevation models (DEM) that can be integrated into the larger Bulla Regia GIS.

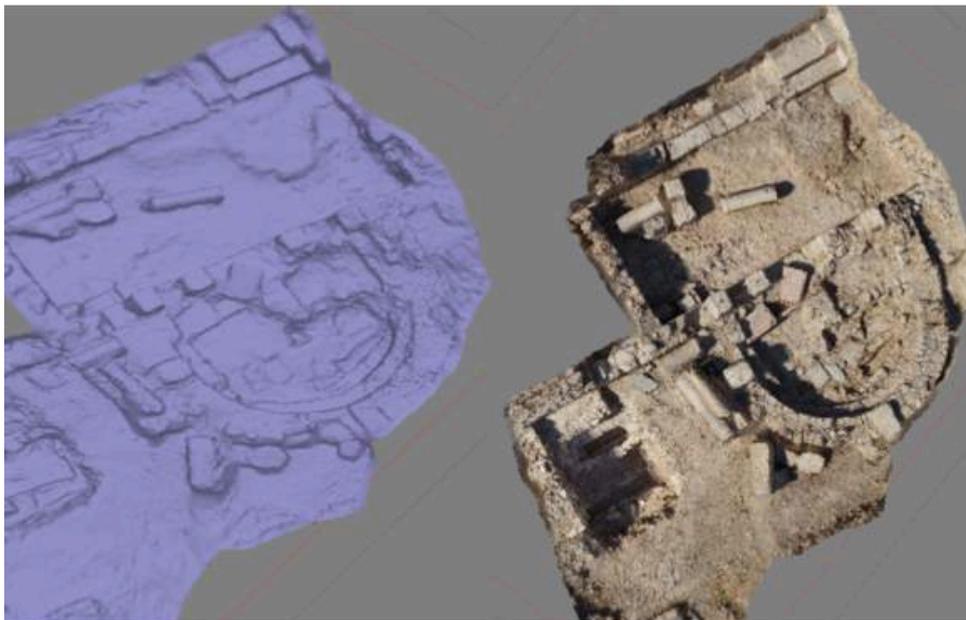


Figure 2: Left: 3-dimensional mesh of chapel; right: textured 3-d model

Excavated areas were recorded both pre- and post-excitation to provide a complete picture of the change over the period of the archaeological season (Figure 3). The team also recorded individual excavated features, such as the skeletons, in situ. It is hoped that this approach will save time in post-excitation stage by providing ortho-rectified sections for generating additional drawings or illustrations.



Figure 3. The same area of the site recorded before and after cleaning and excavation.

A second focus was the detailed recording of the architectural elements from the church and cemetery that were previously lifted and stored in the site office or reserves. These are stone objects with intricate decorations and inscriptions. Several of them are of crucial importance for understanding the architecture and function of the church and were documented in photogrammetric models with scales and appropriate sizes (Figure 4).



Figure 4. A model of a capital excavated during 2010 and moved to the site office (GJ).

Sixteen mosaics were recorded photogrammetrically during 2017 season (Figure 5). These were previously lifted from the site and placed into the storage in wooden frames, embedded into plaster. The mosaics are of different sizes and preservation level and documenting them will allow a snapshot of their condition at this stage, as well as enabling analysis of their design and composition. All of the mosaic models will be processed at millimetre-accuracy in order to allow them to be embedded into the site GIS.



Figure 5: The mosaics recorded from the reserves

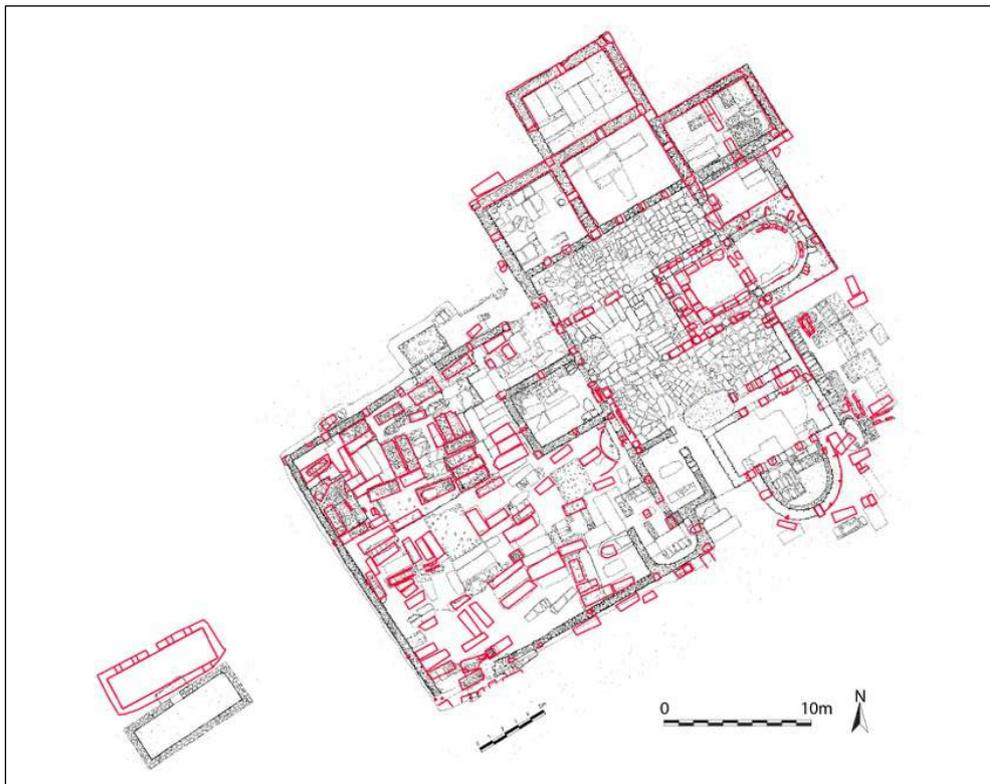


Figure 6: Spares survey compared with pre-existing hand drawn plan of site (INP and GH)

Topographic survey (GH)

The main aims of the survey component of the work at Bulla Regia were to provide accurate control points for the photogrammetry at both the main site and the church to the south of the road (Church of Alexander), check the accuracy of the existing hand drawn plan of the main

site, and to provide a preliminary drawing of the Church of Alexander for which there was no pre-existing plan.

Although no control points from previous survey work could be located on the ground on which to base a site grid, an existing CAD drawing was provided from the 2010 GPS survey undertaken by the INP showing the basic wall outlines. New control points were established at four locations within the site (all within the core of the walls) and a rapid ‘floating’ survey was undertaken to record their positions, along with a few of the main wall alignments, on a local grid. The results of this rapid survey were plotted in AutoCAD, and subsequently dropped into the earlier survey drawing. By moving and rotating the rapid survey results to achieve a best-fit with the earlier survey, it was possible to locate the four new control points in relation to the grid used in the earlier work. Spot heights on three stones in the northern wall of the cemetery area (points M001, M002 and M003 in the previous survey) were used to establish the elevation of the new control points. A comparison of the raw survey and the existing hand drawn plan of the site shows the latter to be of high quality over most of its coverage. Some minor errors are apparent within the church itself (maximum error approximately 0.25m), but on the whole it provides a very good basis for further work. The only significant error is in the position of the mausoleum to the west, which is shown offset from its actual position by approximately 3.50 meters (Figure 6).



Figure 7: Photogrammetric model integrated with results from sparse survey (GH and GJ)

The survey was undertaken using a Leica TCRA 1205, a robotic Total Station Theodolite which allows single person operation. The coordinate system of the grid is UTM84-32N (EPSG:32632). For the photogrammetry, a dedicated network of points was surveyed at locations which were easily identifiable in the models generated. These provide scale

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addition, a spread of key stones were surveyed which were used to validate the accuracy of the 3D models once full processing of the data has been achieved (Figure 7). Our intention is to use the ortho-mosaics from the photogrammetry, positioned with reference to the sparse survey data, to digitize plans of the areas between the surveyed stones, and so produce a full plan of the site that can be integrated into the project GIS.

TRAINING (CF AND GJ)

Training was an important part of the project design, and over the course of the season, 8 Masters or Doctoral students with limited or no prior field experience were introduced to different aspects of archaeological fieldwork. The emphasis was on rapid documentation and inventory in the field and reserves. At the start, students were introduced to the principles of stratigraphic recording and taught how to produce a section sketch and a Harris Matrix, as well as being introduced to different recording sheets for stratigraphic units, masonry, worked stone, skeletons and mosaics.⁵ They were taught how to use trowels to clean exposed archaeological remains in order to understand stratigraphy and to analyse standing remains. Subsequently, students were responsible for cleaning and re-bagging the finds (human remains, ceramics, glass and small finds) from the 2010 excavations and conducting the inventory of these materials. This very important task has enabled us to create a detailed inventory for the finds excavated in 2010 and 2017 which will lay the foundation for more detailed analysis in future seasons.

The next phase of the training focused on different mapping technologies for archaeological remains led by Dr. Gaygysz Jorayev. Students were introduced to recent and inexpensive developments in photogrammetry and shown how to implement it widely in rapid documentation of objects and buildings with the equipment they had ranging from mobile phones to digital SLRs (Figure 8). The group was introduced to the basics of Agisoft, the most commonly used software for photogrammetry and shown how to process the data. Throughout, the potential of low-cost tools like cheap smart-phones to create high-quality 3-d models and the adaptability of this technique for a range of different research questions by the students. Available cameras, laptops and other tools were used to provide the students with an experience in different levels of the photogrammetric documentation. They have also experimented with using simple equipment such as their mobile phone cameras and using everyday objects as a scale in the models. The students worked with different objects and learned techniques for detailed site photography. Many of the pictures taken by them were used to create the models used in this report. Discussions were also held on why such a detailed documentation is necessary for better planning further conservation and research, for more holistic management and for better valorisation of heritage resources.

⁵ During the course of the project, these were translated into French so that in future years, we can have a bilingual recording system.



Figure 8: The students collecting data to make photogrammetric models of the mosaics.

Finally, students were given the opportunity to gain more advanced training in certain techniques. Thus, one student worked closely with Dr. Dirk Booms to photograph and record the worked stone in the church, while two students assisted Dr. Samantha Cox to excavate skeletons and to develop their excavation skills in this specialisation. Dr. Aleida Ten Harkel introduced students to the principles of rapid condition assessment for monuments and sites and students assisted in conducting a basic condition survey for the Church of Alexander.

GEOPHYSICAL SURVEY (CF)

The main aim of the initial season of geophysical survey conducted in September 2016 at Bulla Regia was to test the potential of magnetometry at the site, and in particular, to identify whether there were further sub-surface archaeological remains in the zone around the newly discovered church which is under threat from development. The preliminary results of the magnetometry survey have identified: a) a large cemetery zone with numerous buried mausolea and a large funerary enclosure; b) evidence of cadastral organisation or field enclosures; c) the continuity of the orthogonal street plan in the western sector of the site inside the walls; d) evidence of large-scale hydraulics and industrial installations.

Geocarta conducted an extensive geophysical survey of 6.49 ha using their ‘Automatic Magnetic Profiling’ system which comprises a modified fluxgate magnetometer on a quadbike. This was combined with a GPS RTK (Trimble AgGPS5442) with a base on the roof of the Byzantine fort linked by radio to the quadbike which allowed each measurement to be mapped at centimeter accuracy. The measurements taken by the GPS and were linked to an aerial panchromatic photography taken by DigitalGlobe on 19th June 2013 and geo-referenced in UTM 32.

Zone 1: The western cemetery

Area 1 was targeted because it is the proposed location for a new housing development. The discovery of the church and cemetery in 2010 raised important questions about the size of the church complex and the extent of the pagan cemetery excavated by Dr. Carton in the 1890s.⁶ The results were disrupted by recent sondages dug by mechanical means, modern ferrous debris in the edges of the field and the spoil from recent excavations in, and around, the church and the road. Nonetheless, the survey produced some significant results (Figure 9):

- Circular anomalies: a group of 3 significant anomalies to the North forming the points of

⁶ Carton 1890a, 1890b.

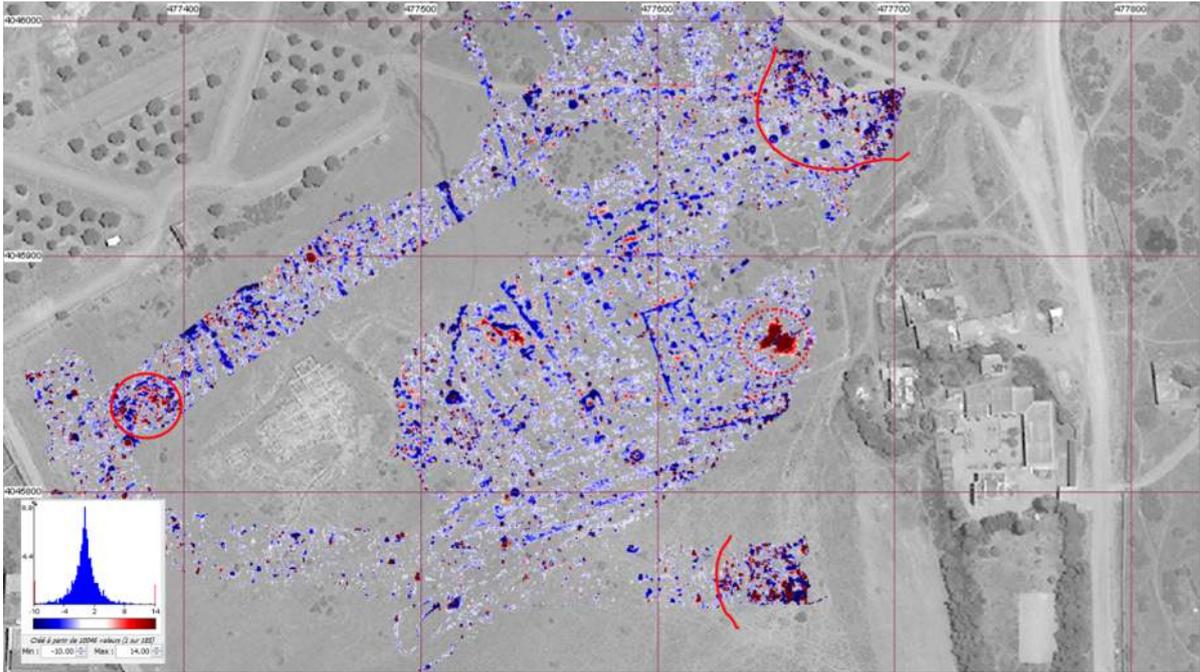


Figure 9: The geophysics results in the western cemetery showing field boundaries/ centuriation, a large funerary enclosure and multiple mausolea and graves.

a triangle; smaller and more numerous anomalies in the south, and a very strong anomaly to the South. These likely correspond to mausolea and graves, similar to those found by Carton in the 1890s.

- 3 linear, parallel anomalies in the direction N 330. They are separated by 57m. If one extrapolates to the north, there is no trace to of a fourth line, but a fifth line is visible 106m away. We tentatively identify these as a trace of cadastration, even if it does not correspond to a multiple of the *actus* (35.5m) or medieval or pre-modern field boundaries.
- The two strongest anomalies correspond to a quadrangular structure (20 x 54m) and open to the SE and we interpret this as a funerary enclosure similar to that excavated in the 2000s to its north east, and located on the same orientation (Figure 10). A second small rectangular structure of 7 x 6 m with a positive magnetic anomaly at its centre may be a cremation structure or another mausolea.

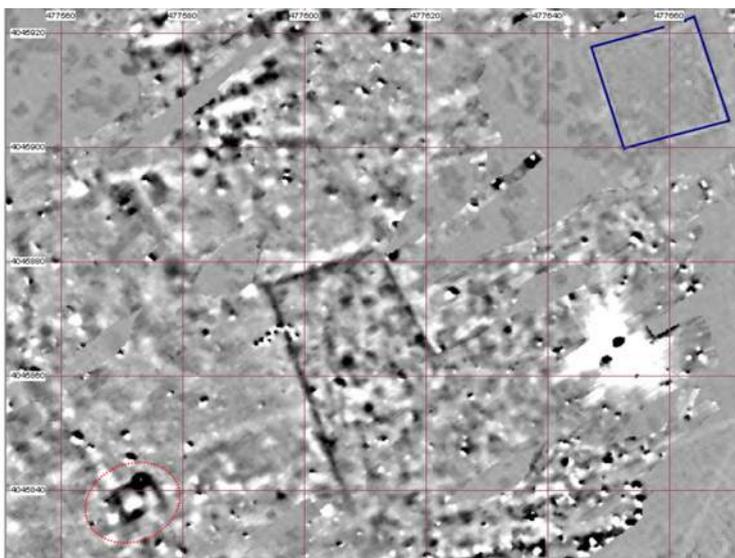


Figure 10: The funerary enclosure and possible cremation building

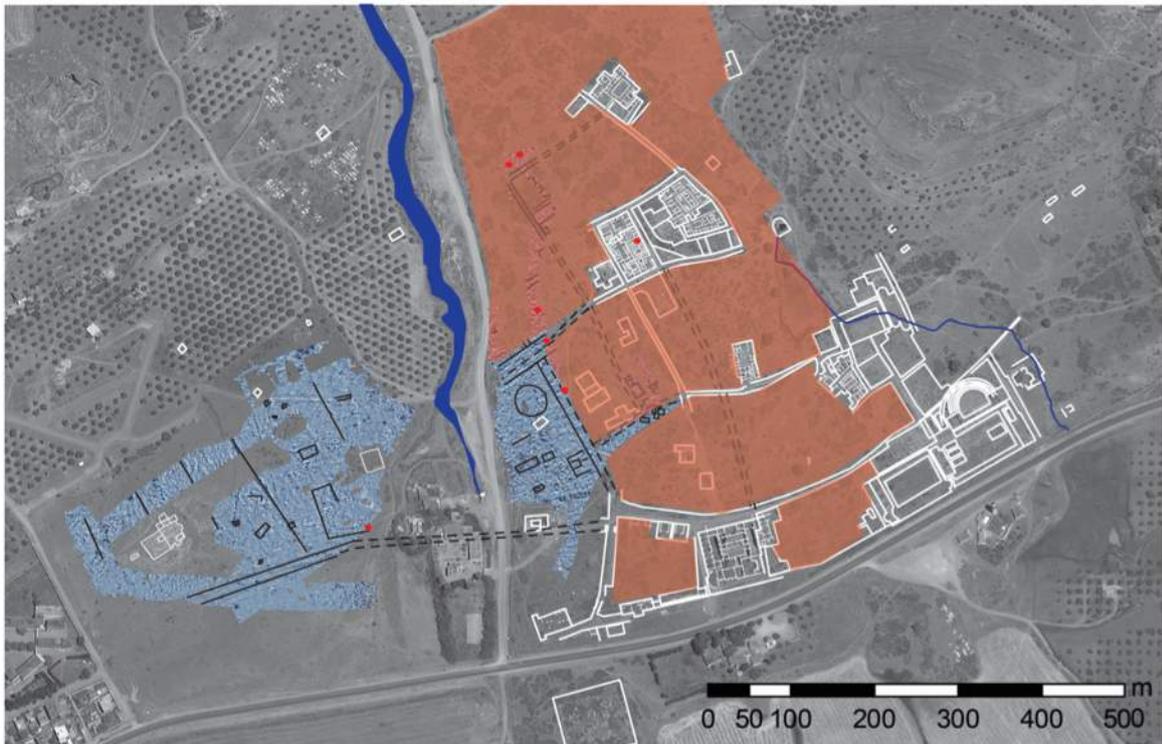


Figure 11: Plan of standing remains, excavated structure and features identified in the geophysical campaign of 2016

Zone 2: The western town

This zone of Bulla Regia is extremely poorly understood. The standing remains include a small fort (now used as the site office), a double-church, the so-called ‘Church of Alexander’. According to plans published in the Guide Bleu in the 1930s (based on a plan of Dr Carton), cisterns and a circular reservoir were visible to the north of the fortress, but are not reproduced on other plans of the site and are not visible on the ground today. The geophysics was not successful in the area around the Byzantine fort (for about 80m): a large amount of ferrous metal on the surface, spoil from earlier excavations and the various renovations of the fort into a dighouse, the construction of the modern pipe from the wadi seriously disrupted the reading.

Beyond this zone, the results were clearer:

- the area was laid out on an orthogonal and homogeneous plan on the same orientation as the rest of the town.
- to the east of the double church, a remarkable anomaly in the shape of a cross (15 metres in length) was detected with a possible apse on its east side.
- a group of circular positive magnetic anomalies (more than 50 nT/m) were found in the North which may be associated with metal-working structures or baths.
- The cisterns and section of the circular basin from Carton’s plan were identified.

The magnetometer survey has improved our understanding of the urban topography of Bulla Regia (Figure 11), linking the known standing structures in the south-west sector together, identifying new buildings and tombs in the western cemetery, and broadly confirming the general reconstruction of the street grid but adjusting its positioning and revealing further internal detail. It has demonstrated that magnetometry is an effective means of mapping the sub-surface remains in the interior of the site and that resistivity should be employed in areas

with ferrous debris on the ground.

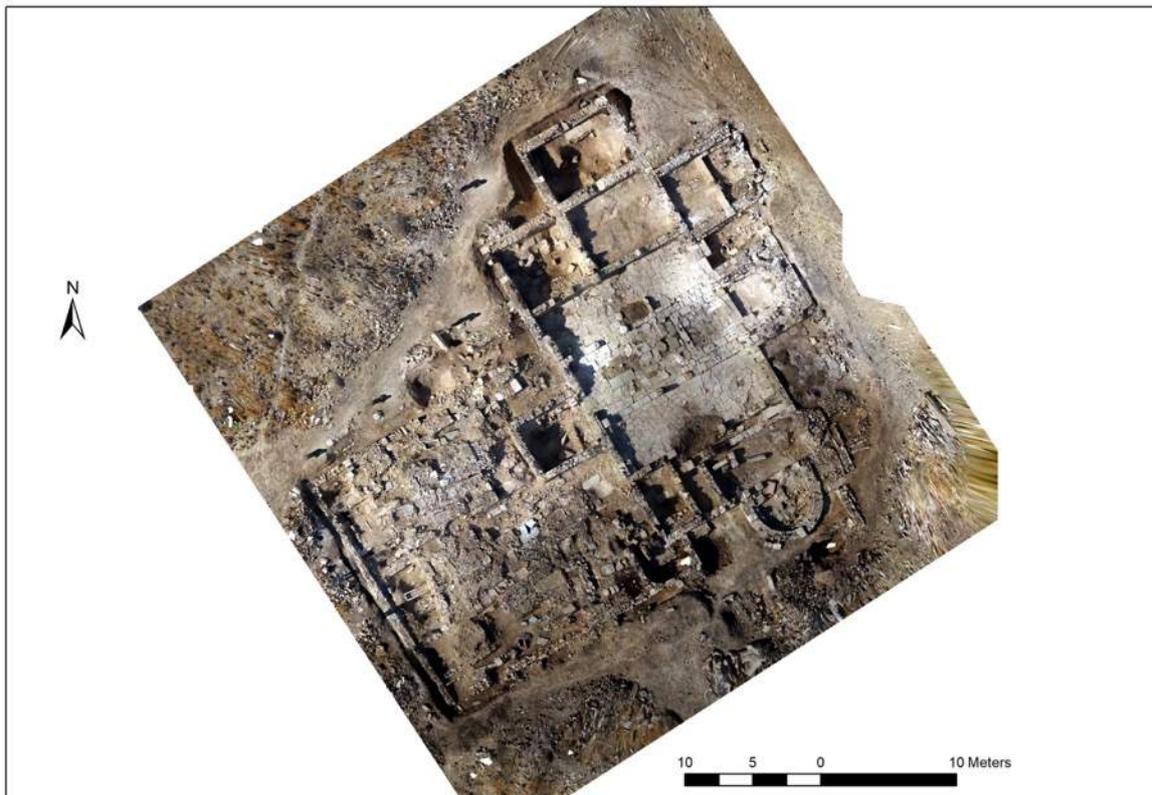


Figure 12: Orthomosaic of the church and cemetery in 2017 season.

AREA 1: THE WESTERN CHURCH AND CEMETERY (DB, GC, SC, CF, LTH)

Area 1 lies outside the protected site of Bulla Regia (Figure 1), immediately to the west of the western cemetery. It is located in a large field outside the boundary of the site which has several other funerary monuments, including several early Roman mausolea and a recently excavated 2nd century AD columbarium. The western cemetery is known primarily from the excavations by Carton in 1899, 1890 and 1892. He seems to have excavated many cupola tombs (perhaps as many as 175) which have all disappeared through some of the materials are apparently housed in the Bardo. He also identified unfinished cupola in the neighbouring quarries.⁷ A further 10 cupola tombs were excavated in 1968, 1974 and 1978 by M. Khanoussi. The burials were cremated in the tombs as is shown by the calcinated bones and the residues of burning at the bottom of the graves.⁸ These are all dated to the early 2nd century AD on the basis of the lamps (Deneauve VIIA, VIIC, VIIIA) and an imitation of Hayes 123.

In the 1970s, the French-Tunisian survey planned and mapped much of the environs of Bulla Regia including the western cemetery; they identified a small mound (C31) in the far west of the field about 15 metres wide with no visible architecture but fragments of marble slabs, a bowl of Chemtou marble and African sigillata (A and D).⁹ They suggested that these finds

⁷ Carton 1890a, p. 152 n.1

⁸ Khanoussi 1983: 92; Carton 1889: 429.

⁹ Antit et al. 1983, 150.

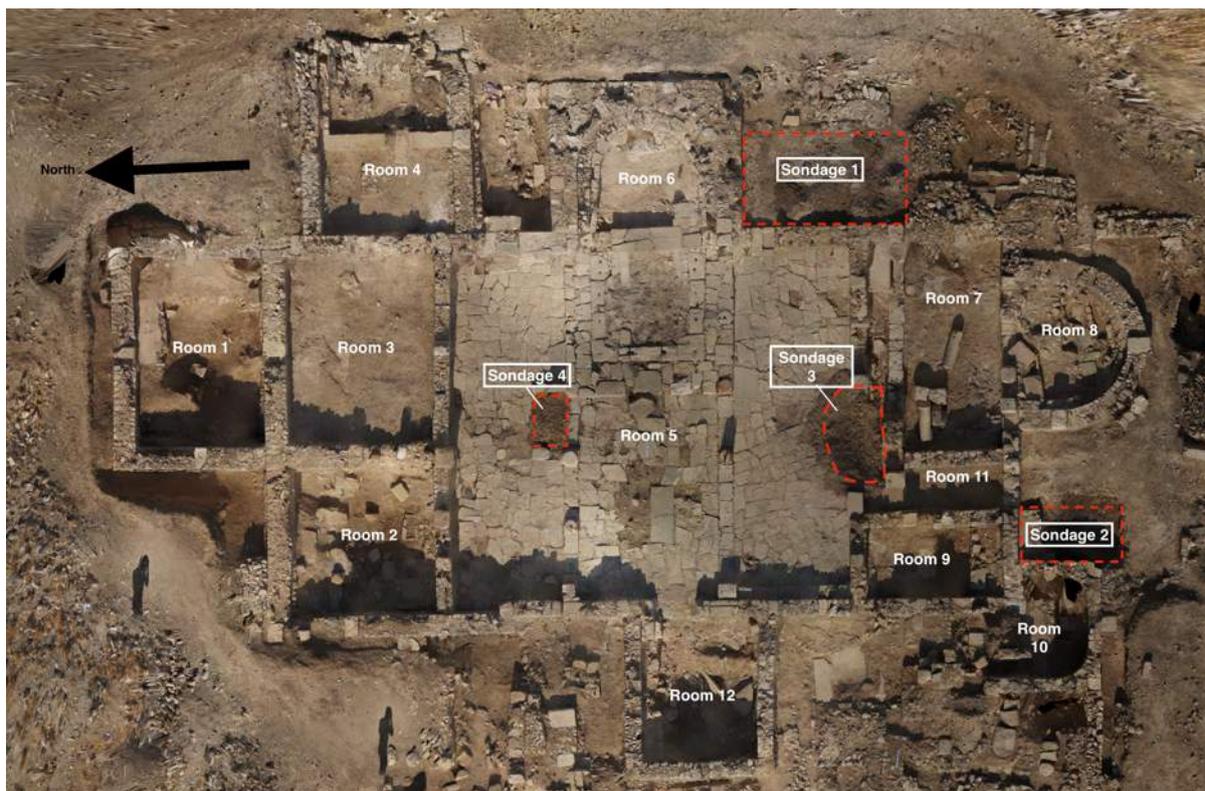


Figure 13: Plan of church showing locations of sondages opened in 2017.

indicated a small farm rather than another mausolea. However, in 2010, emergency excavations directed by Moheddine Chaouali uncovered a substantial church and cemetery complex, dating probably between the 3rd and 6th century (Figure 12). The complex contains a church, a series of funerary chapels and over 300 sealed tombs of men, women, children and even a pair of bishops otherwise unknown in the historical record.¹⁰ Our primary aim in this short season was to fully document and analyse the church, its decoration and the surrounding cemetery in order to understand its phasing.

The Church (DB, GC, CF)

The church follows the plan typical of North African basilicas: three naves with a semi-circular apse (Figure 13). It has several funerary annexes and chapels on its northern, southern and western side. The orientation of the building is North-East- South-West and is identical to that of the double-church and the alignment of the street grid in the western zone of the town.

In its current form, the *quadratum populi* (**Room 5**; length 14; width 12m) is divided into three naves. The naves are divided by *stylobates* on top of which are columns. Many of the bases are in place (5 of 10), though at least two columns were erected without a base. The surviving bases are all Attic and must certainly come from earlier constructions, perhaps Roman mausolea in the cemetery.¹¹ Its pavement **1063** consists of thin slabs of varying size and is well preserved throughout the area. In the south corner, a bench was constructed at an unknown time, but before the current pavement was laid.

¹⁰ Chaouali forthcoming

¹¹ See Carton 1890a.



Figure 14: The multiple phases of the choir..

The raised choir has several phases (Figure 14). The earliest of these consisted of the *stylobate* with columns and a central *ciborium*, of which the dowel holes for the four columns are present. We imagine that this was where the altar was located in this phase. Traces of an extremely poorly preserved mosaic floor **M14** with white tesserae are visible. To the north-east of it, marble *opus sectile* covered a step into the apse. In a second phase, the *ciborium* with its four columns was replaced by a chancel and at the same time encapsulated in a larger platform **1057**, which also included six of the ten nave columns. The traces of the chancels are visible in the dowel holes. The central part of the platform was paved in an *opus sectile* pavement re-employing marble slabs, one of which had a moulding. It is likely at this time that the apse in its current form was built or monumentalised.



Figure 15: The apse

The apse (**Room 6**) was entered from the platform by a large step in green-grey slate **1132**, flanked by two bases on which columns must have stood (Figure 15). The apse itself has a *synthronos* of two steps in ashlar blocks. Part of the pavement survives, it consists of irregularly sized large coloured slabs (green and red). One of these contains a graffito of a *kantharos*. In

the north-east of the apse, a feature consisting of large ashlar blocks mortared together. This may have been a throne or steps towards the tabernacle. A large opening in **1047** may be the base for the tabernacle.

In its current form, the main entrance is in the south, an entrance corridor (**Room 11**), with later doors cut in the northwest, south-east and north-east corners. The original entrances into the church do not seem to survive. We hypothesise that the church may originally have had one or three entrances on the west side, opposite the apse, which may have gone out of use when **Room 12**, the funerary chapel of the bishop, was constructed.

Below the flagstone pavement **1063**, the modern robber cut **1213** (cleaned up as Sondage 3) revealed a fragment of a mosaic tomb-cover (**M12**) approximately 5 cm below the slabs (Figure 20). Sondage 4 also revealed traces of mosaics (**M13**) at a similar elevation. Several layers of cist tombs are also visible in the section of Sondage 3 to a depth of 1.8 m, indicating that there are substantial numbers of tombs in the zone of the church. At this stage, we hypothesise that these either relate to an earlier phase of the church or to a pre-church cemetery phase.



Figure 16: Room 3 and northern annexes

Northern Annexes:

A group of 4 subsidiary annexes (Figure 16) were built onto the northern side of the church in successive phases. The walls are in opus africanum with regular courses of squared blocks and a rubble in-fill. The inner walls may have been covered in plaster.

An entrance with two orthostats [**1031**] and **1042** (later blocked by **1030**) leads off the church in the western end of the north nave into **Room 2**. Room 2 had internal dimensions of ca. 5 by 5 m. The walls are constructed in opus africanum, and the north wall **1006** re-uses an inscription in its foundation offset **1007**. In its original state, it served as a funerary purpose and several tombs were excavated from here in 2010. At some later point, the entrance into the church was blocked **1030** and this room was used as a depot for columns – possibly at this point, a door was cut **1028** into the northwest corner acting as an entrance to the exterior. Several columns were found here in 2010 (insert photo), of which one remains in situ. Another blocked the



Figure 17: M1 in situ, Room 1

blocking **1030**. One door in the northwest corner was also blocked at a later date with a blocking **1008** with an offset **1009**. The entrance into **Room 3** was later blocked by **1014**. Orthostats were used as door lintels for both.

Room 3 was entered from **Room 2** and had internal dimensions of ca. 6.75 x 5m (Figure 16). The walls are constructed in opus africanum and another entrance gives onto Room 4 and Room 1. The room contained several graves with funerary mosaics which were lifted in 2010 but the underlying tombs were not excavated. Several other mosaics (M3, M4, M5) are still in situ.

Room 4 was a later addition with internal dimensions of 6.5 x 4.5m. There appears to be a door cut into the south-eastern corner (possibly relating to an earlier structure **1124**) but it is still poorly understood. Inside are a range of tombs, some covered with large slabs still *situ*, others were excavated in 2010.

Room 1 was a later addition that postdates the construction of rooms 2 and 3, the latter of which it opens off. A crude entrance **1037** was cut into wall **1006** and **1035**, and subsequently blocked **1038**. A rectangular room of ca. 4.5 x 6.5m with walls of opus africanum; it abuts walls 1006 and 1035 and postdates their construction. Offsets are visible on the north, south and west walls. The room contained a number of tombs with funerary mosaics, including M1 (Figure 17) and M2 still in situ and the Jonah mosaic which was lifted in 2010.



Figure 18: Room 8 from exterior, showing outside wall of apse.

Southern annexes

To the south, a group of three or four rooms served as ancillary annexes to the church in its latest form.

An entrance with two orthostats [1083] and [1085] leads off the church in the eastern wall [1075] of the south nave into **Room 7**. From the door, one enters a narrow space of only 0.75 m which contains a mosaic (M7). This seems to run under wall 1075, but abuts a rectangular ashlar construction of unknown function in the NW corner of this space. Also visible is wall [1121] which seems to be perpendicular to wall [1082], and bonded to it. It was cut in order to construct [1077], the threshold (3.75m in length) to enter Room 7.

Room 7 is a rectangular room with internal measurements of 7.5 by 3.75 m. It has a door on its east side marked by two orthostats which is later blocked [1110]. It re-uses a fragment of earlier wall 1082 of thickly mortared stone in its north-western corner (see description of Sondage 1 below). This masonry type is not found elsewhere in the church and is very similar to that of the still standing Roman mausolea in the cemetery. The western wall [1119] is of rubble construction contrary to the eastern wall 1112 which is in *opus africanum*. Four fragments of mosaics are still in situ (M8, M9, M10, M16), of these M8 is a funerary mosaic, but it is unclear whether the other fragments were decorative or funerary in function. Several broken columns (S47, S48, S50) and a worked block (S49) were also found in situ in this room.

The apse (**Room 8**) was framed by a monumental entrance [1115], flanked by two piers with bases for two columns in between (Figure 18). The broken column fragments in Room 7 are likely to come from here. The apse itself has a *synthronos* [1114; 1128] of one step in mortared rubble. None of the original pavement survives: the apse was given over to burials in a series of stone cist graves and sarcophagi. Most of these were excavated in 2010 and some have subsequently been vandalised.

Rooms 7 and 8 appear to pre-date at least the latest phase of the church. The south-western corner of the room uses the substantial earlier wall [1082]. One mosaic runs under one of the later walls [1075] of the church. Our current interpretation is that this is a funerary chapel, potentially of earlier date than the quadratum populi and certainly incorporating walls of an even earlier structure that could be a mausoleum.

Room 11 served as the main entrance to the church, at least in its latest phase. It consists of 1.5 x 6m in dimension. Ashlar thresholds [1089], [1130] and [1126] are in situ at the ends of the corridor. [1130] and [1126] have dowel holes for the doors, and it may be that the threshold [1089] dates to a later phase when wall [1075] was built.

Room 9 was entered from this entrance corridor (**Room 11**), and subsequently blocked [1095]. A rectangular room of ca. 3.5 by 6 m with walls of *opus africanum*, it seems to have been built later than walls 1099 and 1097 to serve as a funerary chapel. Partially excavated in 2010, the funerary mosaic (M6) of Victorianus is still in situ.

Room 10 abuts the church-complex but appears to have been blocked off by the construction of 1099, the exterior western wall of the church in its latest phase. The form and function of this space is poorly understood: it contains a piece of collapsed vault in its centre, and its western wall [1123] is cut by later tombs in the cemetery enclosure. The cemetery enclosure 1140 is built against the room.



Figure 19: Funerary chapel of Procesius (Room 12) facing east

The funerary chapel of Procesius (Room 12)

Room 12 is one of the latest additions to the church (Figure 19). It is an almost square room of 6 x 5.5m with bonded walls in opus africanum, built on the west side of the church, off-centre. It abuts wall **1099** and appears to bond with **1108** which may have been remodelled at the same time as the construction of the chapel. Its construction damaged several graves in the cemetery enclosure outside. The entrance was later blocked (this was removed during 2010). It contained several burials, including that of bishop Procesius, which were excavated in 2010.¹²

Excavations in Church (SC, CF, LtH)

In order to understand the chronology and phasing of the church and cemetery, our focus in this season was on cleaning and recording the exposed archaeology. A clandestine robber trench (**S3**) cut into the stone pavement **1063** of the church was cleaned up in order to understand the chronology of the church (Figure 20).

A modern robber cut **1213** (fill = **1214**) cuts the flagstone pavement **1063** and its preparation (**1064**) of the church in its latest phase and was delineated by **1087** on the SE side. It also cuts [**1075**], the south-east wall of the quadratum populi. Below the stone pavement is an earlier mosaic surface **1091/ M12**, which seems to be that of a tomb (the wall of this tomb may be visible as **1090** in the section). It seems to have robbed out several tombs below this level, the walls of which are partially visible in the section. At the bottom of the robber cut, a tomb covered in stone slabs is visible. We did not excavate it in 2017, but it seems likely that it has been robbed.

The first archaeological layer that we reached was **1215**, a hard clay fill layer, into which was cut a tile tomb (**T28**). The tomb extended into the section wall of the trench, however this tomb

¹² See Chaouali, forthcoming.



Figure 20: Sondage 3 showing key contexts

yielded the best-preserved remains found this season. The tomb was oriented in SW-NE direction and made of large ceramic tiles [3047], [3048], [3049] supported in the middle by a standing stone and a ceramic tile cover [3049]. The skeleton was a that of an adult male 3035* in a supine position with a broken cranium from the skull rolling back and fracturing in the empty space of the tomb. The skeleton was only recovered from the shoulders up.

All of the tombs and layers excavated thus far post-date the construction of 1082 and its foundation 1087. [1082] consist of thickly mortared coursed rubble and stands to ca. 1.2 m above ground. Its foundation 1087 is constructed in the same technique with slightly larger stones and is extremely substantial. We have yet to find the bottom of this wall or define its NE-SW extent but this does seem to be one of the earliest walls uncovered so far and of a very different nature (construction technique, thickness etc.) to the walls of the church and cemetery.

The cleaning of this robber cut has demonstrated both that there are several layers of burials below the flagstone pavement of the church and the presence of a substantial earlier structure that may pre-date the church.

The Cemetery (CF and SC)

Much of the area around the church seems to have been given over to a substantial cemetery (Figure 21). The 2010 excavations exposed a below-ground mausoleum containing 4 graves (Zone 1), a large cemetery enclosure containing at least 98 tombs and a further 47 tombs outside the church-cemetery complex.¹³ A variety of tomb types are visible, including several caisson tombs with mosaic covers. In 2017, we cleaned and continued the excavation of

¹³ The mausoleum is currently being prepared for publication by MC with minor contributions from members of the team.

Sondage 1 and Sondage 2 in Area 3000, both of which had been partially excavated in 2010. Further exposed skeletons at-risk of destruction in the off-season were removed as described below.

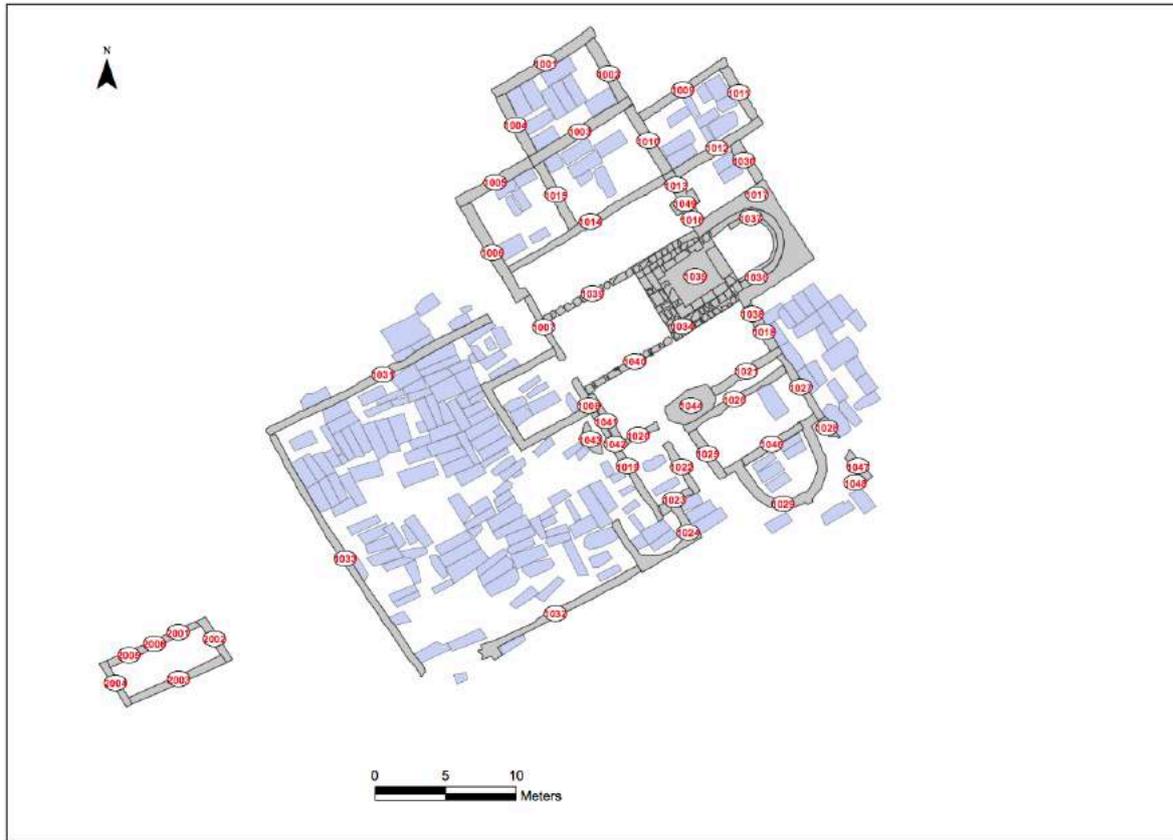


Figure 21: Plan of church and cemetery with graves marked in blue (CF)



Figure 22: Sondage 1 showing the location of tombs



Figure 23: Re-used funerary stele in T27

Sondage 1 (SC, CF)

Sondage 1 was placed outside Room 9 and Room 10 (Figure 22). It was partially excavated in 2010 revealing a number of tombs built in different styles, descending several layers. The latest of these is an unexcavated mosaic-clad tomb (**T32, M15**) built against **[1097]**. To its south was a pair of tombs: **T33**, built of coursed, roughly-worked ashlar blocks, which covered **T34**, constructed with walls of bricks and square ceramic tiles as a floor. The excavation of **T27**, partially excavated in 2010, was completed in 2017. A further tomb **T35**, with walls of upright slabs, lies to the south.

T27 is oriented SW-NE. It is constructed of a combination of quarried stone slabs, reused stelae, and ceramic tile **[3043]**, **[3044]**, **[3045]**, **[3046]**. The NW and SE walls (**[3043]**, **[3045]**) each had fragments of re-used funerary stele with inscriptions (S85-88; Figure 23). Three of the stele have the same decorative field. The bottom of the tomb was made of square ceramic tiles **[3055]** on top of which was a layer of plaster **3054** beneath the skeleton. The skeleton **3034*** was that of an adult male in a supine position and had been disturbed in previous excavation. A large stone rested in the middle of the foot wall **[3044]** of the tomb and may have served to separate the feet of the body.

Sondage 2

To the south of the church apse (**room 6**), sondage 2, a 5 by 5 m trench was opened in order to investigate the tombs already exposed there (Figure 24), find their relationship to the construction of the church, and get a scientific sample of human remains. A total of 13 tombs were exposed during the season, of which 4 were excavated. Tombs comprise of a mix of 3 styles, those with covers made of multiple stone slabs are likely the latest, while earlier tombs are constructed of rectangular piles of mortared stone that may have once been covered by mosaics. The orientation of the tombs follows that of the church and are in either NW-SE (**T1, T2, T4, T5, T7, T8, T11**) or SW-NE (**T3, T6, T9, T12, T30**) arrangements. A foundation cut **3031** for the apse wall **1046** was identified during cleaning and partly excavated. The fill contained rubble and small amounts of ceramic. It cuts the probable tomb **T12**, which would suggest that the construction of the apse disturbed a pre-existing cemetery. A second tomb **T30** immediately to its west appears not to be cut and these relationships will need to be determined in 2018.



Figure 24: Sondage 2 showing the location of tombs identified in the 2017 season (GC)



Figure 25: Infant burial in T4 as a 3-dimensional model (GJ)

The latest tomb construction in Sondage 2 appears to be the child tomb **T4** (Figure 25), which cuts **T3** for its construction and is partly mortared into **T5** to the NE. **T1**, **T2**, and **T3** also appear to be later tombs. As **T1** and **T2** abut the wall of the main church, their construction must postdate the many modifications that have been made to this wall. Exploration through the dirt floor **3033** to **T1** revealed stones and a cut mortared surface below that suggest this tomb is either covering earlier tombs or other early church construction. This will be explored

further in future seasons. These 4 later tombs are all built in a similar style with walls of standing stones and covers made of multiple stone slabs.

T3, T5, T6, T7, and T9 are all of similar construction of rectangular piles of mortared stone. These might represent a middle phase of tomb construction and while similar tombs within the cemetery enclosure on the NW side of the church were often covered with mosaics, there is no indication of that having been the case in sondage 2. **T5** and **T3** seem to be the earliest of this style tomb as they are both cut and built over by subsequent construction; **T3** is cut by **T4** while **T5** is cut by **T6**. **T7** was built abutting **T6**, as was **T8** but **T8** is of the probably later stone slab style. None of this type of tomb were opened this season, so the specifics of their relationships, construction, and burial practices will be investigated in the future.

What appears to be the earliest style of tomb is that of **T12** and **T30** which appear in the footpath leading to the church door [1067]. **T12** has a flat mortared surface with a stone edge on the SE edge, opposite the apse [1046] where the mortared surface continues down the side of the probable tomb about 10cm and then makes a right angle to form another pavement. This pavement is cut by **T8** which was partly excavated this season. **T30** lies to the SW of **T12** and is very similar in appearance, though with less mortar and the line of stones on the NW [3053]. **T30** was not cut for the construction of the apse, but the overlapping of mortar from **T12** onto **T30** suggest that this tomb is of the same phase as **T12** and pre-dated it in construction. Another surface of hydraulic mortar 3039 is adjacent to the mortared surface of **T12**, and was cut for the construction of **T3** and **T8** so that this small surface predates the construction of the tombs in this area.

A large area between **T6** to the NW, **T7** to the NE, **T9** to the SE, and **T1** to the SW has indications of some tombs below those that have already been numbered and described. These groups of stones have not yet been fully exposed so their orientations and relationships were not able to be determined this season. It is most like that they represent an earlier layer of tombs and will be explored further next season. Appearance of small patches of pavement similar to that around **T12** have been found in two other places around the sondage and suggest that this might be an early church pavement cut by the later tomb construction. This will also become clearer in future seasons.

T1 is built against the NE wall of the church [1110], [1109] and [1176]. It is a tomb covered in a stone slab cover [3012], consisting of 5-6 roughly worked slabs, of which the foot stone was rounded. The bottom of the tomb was earthen 3033, and the walls were made of unmortared standing stone [3014], [3015], [3016], [3017]. It contained the poorly preserved remains of an adult, probably male 3022*. The body was supine with the head was in the NW, and arms extended laterally along the body with extended limbs. The body was probably buried in an empty space, and possibly buried within a shroud.

T2 is built against the NE wall of the church [1076] and [1068]. The superstructure consisted of a slab cover [3002], a possible mortared stone construction with stone slab top marking the placement of the head [3025]. The walls were of re-used split column and vertical slabs [3018], [3019], [3020], [3021] and the bottom was mortared with a few stones [3023]. The tomb was badly disturbed by a modern rodent burrow and the skeleton was fragmented and not articulated. The skeleton was an adult and the location of the few undisturbed bones suggest that it was a NW-SE burial with the body in a supine position.

T4 is to the NE of **T2**. It is a small tomb oriented NW-SE constructed of upright unmortared stones [3008], [3009], [3010], [3011] with a thick ceramic tile as a cover [3005], and a large stone for the floor. It contained the poorly preserved remains of a child **3004***, approximately four years old. The body was laid out in a supine position with the arms lateral along the body and the legs extended. It was buried in an empty space, and possibly in a shroud.

T8 is to the NE of T4 along the NE border of the sondage. It is of NW-SE orientation and was covered with stone slabs [3024] with a rounded foot stone and walls of a roughly coursed unmortared stone [3028], [3029], [3030]. It contained the remains of a supine adult male laid out with legs extended and arms lateral along the body **3027***. He was buried in an empty space, with visible compression on the neck and shoulders to fit within a tomb that was too small. The tomb was not fully excavated and given the presence of unrelated human bone in the fill, it is likely that there is another individual below.

Other excavated skeletons

T29, a tomb in the cemetery enclosure with visible human remains was exposed during cleaning and was excavated. The tomb was cut into the cemetery enclosure wall [1135], and used the orthostat as its SW wall [3051], the two other walls consisted of upright slabs [3050], [3052] and the fourth wall was not present. The tomb contained the remains of 4 infants **3036***, **3037***, **3057***, **3058*** in a supine position with the arms lateral along the body and legs extended. The bones of the infants were partly commingled and partly articulated, suggesting that they were laid into empty space but in a relatively short period of time and perhaps in a shroud that kept the bodies mostly separated but in very close proximity. The oldest infant was approximately 18 months of age and fit nicely within the tomb construction so it is likely the tomb was built for this individual and the others were subsequently interred. The bottom of the tomb was just the rough stone of the wall construction; however, no bones were found in among the peaks and valleys of these stones so the tomb must either have had some kind of wood or textile lining or perhaps shrouds around the bodies prevent the bones from falling between the stones.

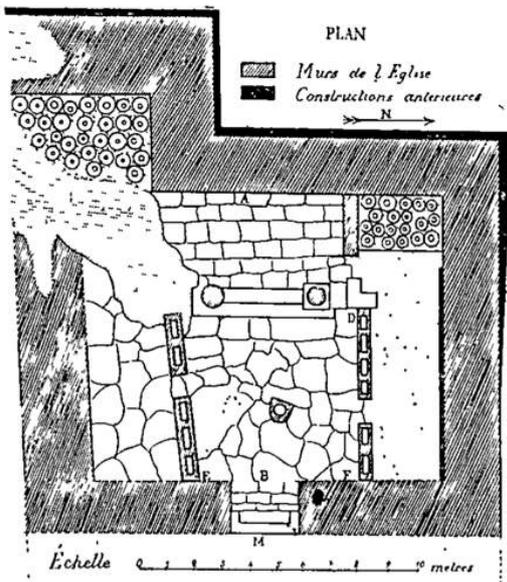
Preliminary dating and phasing of the church and cemetery complex (DB and CF)

Although the basic plan of the church and annexes is relatively clear, understanding the different phases of the church and cemetery complex is far more challenging. We hypothesise five basic phases summarised as follows:

- Phase 1: A pre-church phase consisting of several walls that are the earliest uncovered so far and are of a very different construction technique to those of the church and cemetery, but similar to those of the mausolea in the western cemetery. We interpret this as contemporary with the 1-2nd century cemetery of pagan, cremation and inhumation burials.
- Phase 2: Rooms 7, 8 and 10 which incorporate elements from Phase 1 but pre-date construction of the funerary enclosure and the *quadratum populi*. We interpret these to be chapels of a funerary nature (though the excavated burials so far may date to a later phase).
- Phase 3: the construction of the funerary enclosure, of which wall 1099 abuts and cuts Room 10 (Phase 2). It contains tombs of three different types, including mosaic tombs and continued to be used in subsequent phases.
- Phase 4: The life of the church is divided into four sub-phases:

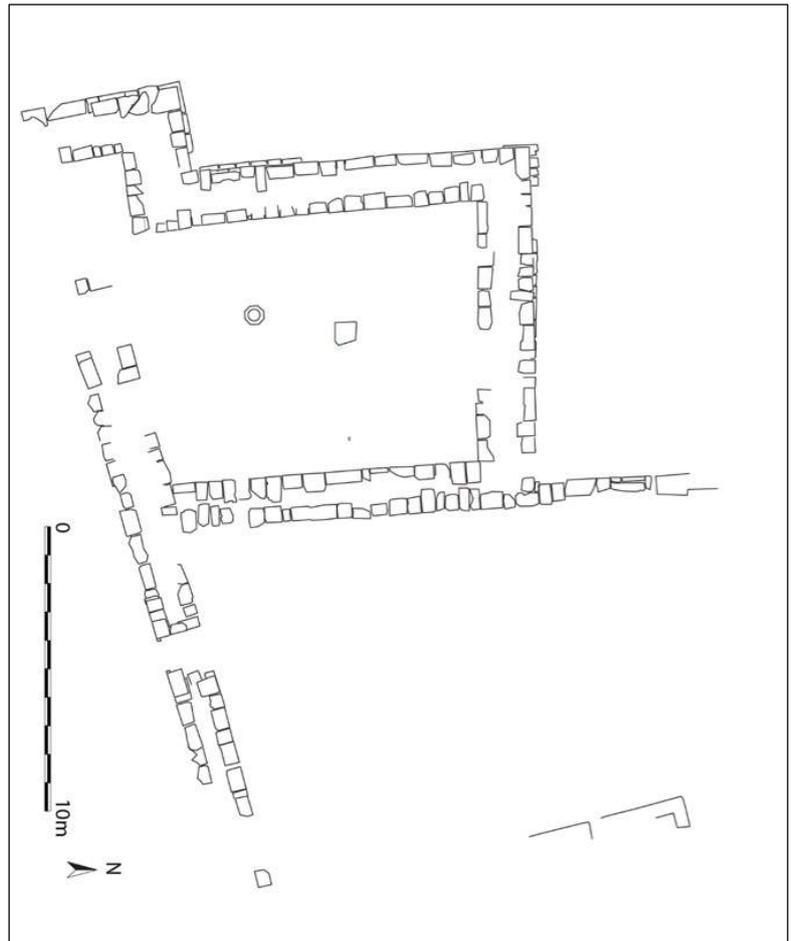
- 4a. The first phase would include a mosaic floor and the ciborium and two columned stylobates and incorporates the southern chapel (Room 7). The south-east entrance (Room 11) presumably dates to this phase. The bench seems to date to this period.
- 4b. The second phase includes the remodelling of the church, through changing the ciborium into a chancel on a platform which incorporates columns of the stylobate, and the remodelling of the apse into its current square form. The paved floor 1063 seems to be added at this moment. At this stage, we hypothesise that the space was rationalised into an almost square *quadratum populi*. In order to create symmetrical naves, wall 1075 was built screening of Rooms 7 and 8. The south-east entrance was re-modelled and it is presumably at this point that Room 9 is added as a funerary chapel. Either contemporary or later is the addition of funerary annexes (Rooms 2 and 3), later Rooms 1 and 4.
- 4c. This phase includes the addition of the funerary chapel for bishop X (and perhaps Room 4 which post-dates the addition of 1033 as a northern entrance). This phase may also include entrances are cut through the existing walls of the church at some unknown point.
- 4d. The main body of the church still seems in use, but several of the annexes are blocked off, and Room 2 is used as a depot for columns, possibly with no entrance.
- Phase 5: Destruction and abandonment of the complex. This phase is represented by a destruction layer throughout the site containing large amounts of roof-tile, column fragments and other architectural elements. A concentration of black ash was found across the area of the *quadratum populi* during the excavations of 2010 and signs of burning are still visible on the walls.

We are still in the process of evaluating the finds from the 2010 season. The ceramic finds from stratified contexts are inevitably small and there are very few finewares. A large amount of diagnostic glass has been discovered which may offer some opportunity to refine the dates. Coins were usually found in unstratified contexts and are primarily low-value coins of the 4th and 5th centuries, though nine sixth-century coins from the reign of Justin II were found in the mausolea (Zone 1) to the west of the enclosure. Finally, the funerary mosaics and inscriptions thus far uncovered are similar to fourth-sixth century mosaics found elsewhere in Tunisia.



Above: Figure 26: Plan of Church of Alexander after Carton's excavations (Carton 1915a, fig 1.)

Right: Figure 27; Preliminary plan of Church of Alexander at the same scale (GH).



AREA II: THE CHURCH OF ALEXANDER (CF)

A second priority was to plan the building known as the ‘Church of Alexander’ excavated by Dr. Carton (Figure 26), but never fully recorded.¹⁴ Dr. Carton identified and excavated a building in the south-west corner of the site in 1914 (close by to the large, unexcavated baths), which he interpreted as a church on the basis of the a large lintel with a verse from Psalms 120(8)¹⁵ and a sixth/ seventh century Byzantine cross offered by the priest Alexander.¹⁶ However, the religious function of this building has been much debated and other scholars have suggested that it resembles a ‘monument auge or a small fort instead. Although some of the stones of the building have been robbed or disturbed over the course of the last century, a detailed plan should help to resolve some of these queries.

The facing stones of the extant walls of this enigmatic building and its surrounds were surveyed to create a basic plan of the site (Figure 27). There was insufficient time to survey the rubble core of the walls or the paved areas, and these will be digitized from photogrammetry orthomosaics located with reference to the features that were surveyed.

The building itself (Figure 28), roughly rectangular, consists of a single nave, 4 by 5. 15m flanked by two small annexes of 2.6m in width, divided by two lines of ‘auges’ (worked

¹⁴ Carton 1915a; 1915b.

¹⁵ *Dominus custodiat introitum tuum et exitum tuum ex hoc nunc et usque in saeculum. Amen. Fiat, fiat.* (Felle 2006, no. 684, 325)

¹⁶ de Villafosse 1914.

stone troughs). Many of these have been displaced since Carton's excavations in the early 1900s. Two columns, of which only one is still standing, separate the central 'nave' from a raised rectangular platform which Carton interpreted as the apse. It is paved throughout with large roughly square re-used blocks of 0.6 by 0.6 m with a roughly central well/ cistern shaft. A large threshold on the SE side leads out onto a wide paved street. It is unclear whether the opening in the NW corner is original or if it has been robbed out.

The SE entrance gives onto a wide paved street (N:S) that is blocked off on its southern end by a substantial fortified wall of spoliated stone that continues to the east and seems to englobe the entire area of the baths. A narrow gateway leads to the exterior of the site. Our cleaning revealed several small structures built onto the street and abutting the building. These may be small shops encroaching onto the street (similar examples can be seen on the monumental street to the north). Enormous pieces of the mortared vaulting of the baths to the south-east were found in situ onto the street at some unknown date, presumably marking the abandonment of this zone. We hypothesise that the collapse of the baths coincides with the burning and destruction of the Church of Alexander noted by Carton during his excavations. Another street (E:W) seems lie to the north of the building and separates it from another building (represented by a large mound). The bed of an olive press is still in situ here.

Our preliminary assessment of this zone suggests that excavations here would not only shed new light on the enigmatic function of the 'Church of Alexander', but also shed important light onto the late antique and early medieval history of Bulla Regia and a key destructive episode in its history.



Figure 28: Orthophoto of Church of Alexander with key features noted.

ANTHROPOLOGICAL ANALYSIS (EN)

The bioarchaeological study focused on the skeletal remains revealed in the Christian basilica at Bulla Regia in excavations that took place in 2010. The material originated in four zones (Zones 1-4). A total of 34 human skeletons were examined. The material was originally cleaned with the help of Tunisian Master's students. Subsequently, it was rebagged and organized in 6 crates (Boxes 1-6). The macroscopic analysis included a detailed inventory of the preserved skeletal elements, information regarding the state of preservation of these elements, assessment of sex, estimation of age, palaeopathological assessment, recording of activity markers such as enthesal changes and dental wear, postcranial measurements, as well as the recording of dental morphological characters (nonmetric traits). The paleopathological and activity markers are anticipated to elucidate aspects of life quality in late antique Bulla Regia, while the dental nonmetric traits have been shown to exhibit moderate to high heritabilities; therefore, they will be used in the future to elucidate possible kinship patterns in the cemetery.

In addition to the macroscopic analysis, dental casts have been obtained in order to examine microwear patterns on the occlusal surface of all preserved teeth with the aim of exploring dietary and extramasticatory activities that involved the dentition. These analyses will take place at the Science and Technology in Archaeology Research Centre of the Cyprus Institute and they do not involve the exportation of any material since only the casts are needed. Furthermore, dental calculus (mineralized dental plaque) deposits have been sampled from selected teeth in order to be microscopically analysed for dietary and non-dietary inclusions. Dental calculus has the potential to entrap a broad range of debris that enters the mouth through mastication and inhalation (e.g. plant fibers, phytoliths, pottery dust), thus its analysis can provide information on past diet and other activities that involved the mouth. As such, it will complement the analysis of dental microwear. The dental calculus analysis will be performed in collaboration with Dr Anita Radini at the University of York, UK. Finally, samples of ribs, long bone diaphysis and teeth were also extracted in order to perform isotopic analysis with the aim of exploring palaeodietary and palaeomobility patterns. These analyses will be performed in UK.

The preservation of the material from Bulla Regia exhibited marked variation, possibly associated with the different areas that the skeletons were excavated from. The analysis so far revealed 16 males, 9 females and 9 individuals of indeterminate sex. Of the latter, 5 could not be sexed due to very partial preservation while the remaining 4 were juveniles, thus sexual dimorphism in the skeleton is not pronounced enough to allow an accurate sex assessment. Regarding the age distribution of the assemblage, additionally to the 4 juveniles mentioned above, 13 individuals were young adults, 11 middle adults, 4 old adults and 2 could not be aged beyond the general category "adult". The pathologies identified on these skeletons are the ones commonly found in bioarchaeological assemblages and included osteoarthritis on various joints of the appendicular skeleton periostitis, and dental diseases. The Excel spreadsheet on the project hard drive provides even more information on the standards used for age and sex estimation as well as the degree of expression of each pathological condition. The Excel spreadsheet also includes all the scores for the recorded enthesal changes, the postcranial measurements, the dental wear and the dental nonmetric traits. Finally, besides the study of the skeletal material, a brief seminar on osteological methods was provided to the Tunisian students on site.

At this stage, no further interpretation of the findings will be attempted as the study is at a very early stage. A few more skeletons excavated in 2010 as well as a number of skeletons excavated in 2017 have been organized in Boxes 7 and 8 and these will be examined in the next fieldwork

season. Once data collection is complete, associations between sex, age, social status and markers of pathology, diet and activity will be explored, as well as kinship patterns.

WORKED STONE (DB)

Around 120 objects of worked stone (apart from regular ashlar blocks) were recorded from the church and cemetery, ranging from small votive altars to large column fragments. The majority of these were reused, either as construction material in the mortar for the *opus africanum*, as architectural fragments for the embellishment of the church, or to construct the tombs. Unsurprisingly, columns, column bases, and funerary altars or stele were the dominating types of objects. The column fragments and bases retrieved were both from the church itself, where their find spot should make it possible to reconstruct the exact location they stood (the central nave, the central apse, or the entrance to the funerary apse), and from Room 2, which seems in its final function to have been a storage room for columns – at least 5 large fragments were discovered here. However, only four capitals have been discovered during the excavations of 2010. The funerary altars or stele (due to their fragmentary nature, it is not always possible to distinguish) on the other hand, all dating to the Roman period (1st to 3rd C AD), were mostly found as part of the construction of the Christian tombs in the cemetery rather than in the church. Interestingly, their inscriptions would not have been visible in antiquity, except perhaps in a couple of cases, and thus it is unlikely they would have been used for reasons of prestige or antiquity. Instead, fragments were incorporated in the mortar, or, in one unique case, 4 almost intact stele were used to build the walls of one grave.

The dominating material of all worked stone objects (as well as of almost every ashlar block used in the construction of the church and cemetery) is a local medium grey limestone, which has many thin brown veins and the occasional quartz inclusions. However, other objects are in a local dark beige limestone; a local dark green schist; a hard green slate, or a brownish red limestone, with thin light veins and large grey patches, neither of which the origin could be determined. Several columns consist of white, coarse-grained marble with thick grey streaks, most likely Proconnesian, but of which the origin could perhaps be discovered through sampling. One column was in cippolino marble, while small opus sectile fragments (all reused for tomb building) were in giallo antico, rosso antico, black limestone, cippolino, serpentine, and red porfido rosso.

SMALL FINDS (LTH)

During the September 2017 fieldwork season, an inventory was made of the small finds from both the 2010 and 2017 seasons. The following summary divides the small finds by material type, including glass, metalwork and slag, mixed materials (metalwork with glass or semi-precious stone), coins, fresco and other materials (bone, vitrified ceramic and shell). All objects were photographed, with photo numbers included in the inventory.

Glass

The glass was inventorised by Sonia Wertani, Amira Abidi and Walid Ammouri. By far the largest group of finds were fragments of vessel glass. These included 20 fragments of vessel bases; 2 fragments of a foot and stem; 3 fragments of stems; 3 foot fragments; 60 rim fragments of which 3 were decorated, 2 fragments of either a foot, a lid, or a rim; 25 handles and 8 handle fragments; 2 fragments of handle and rim; 4 vial fragments; 95 body sherds; and 26 unidentified fragments including at least 2 rims and 2 foot fragments. In addition, 2 glass tesserae were found during cleaning of the eastern apse (room 6). The most interesting objects were probably 5 decorative pieces of flat sub-rectangular glass, discovered in the north-east tomb in the

funerary enclosure in Z1 in 2010, as they may have formed part of jewellery or clothing with which the deceased was buried (Figure 29).



Figure 29. Five pieces of flat sub-rectangular decorative glass from the north-east tomb in the funerary enclosure, along with two other fragments from the same context, which may have formed part of jewellery or clothing. Discovered in 2010.

The glass is generally in good condition, apart from some body sherds that are flaking rather badly. It has substantial potential for further typological study, and would make a good project for an MA or MSc student.

Metalwork and slag

The metalwork and slag were inventorised by Rihab Mzoughi and Abir Ben Moussa. It included some 91 objects, including 11 of copper-alloy. These included several pieces of sheet metal and other unidentified objects as well as a possible piece of metalworking waste. The most interesting of these included a possibly Late Roman (4th or 5th century?) bracelet of copper-alloy wire with circular cross-section and twisted ends, measuring 81 x 71 mm and discovered this year in a general cleaning layer (3001) over an area of graves to the south of the apse (Figure 30). It potentially represents a disturbed grave gift.



Figure 30: Copper-alloy wire bracelet with twisted ends, discovered during the 2017 season.

Another interesting piece was discovered in Z3 in 2010, and represents a copper-alloy necklace made of sheet metal with three rows of decorative piercings. This may also be of Late Roman date (Figure 31).



Figure 31: Copper-alloy sheet-metal necklace discovered in Z3 in 2010.

Amongst the 38 lead-alloy objects were some 25 tapering strips with a lozenge-shaped centre and a central attachment hole. Their function remains unknown, but in 2010 one of these objects had been discovered that was seemingly in its original, annular shape (all of the other finds were seemingly deliberately bent open) (Figure 32). They seem to represent attachment fittings of some sort, possibly to hold together material that needed to be tightened. If this identification is correct, the fact that all but one were deliberately bent open indicates a deliberate phase of dismantling or deconstruction. Other lead-alloy objects included a bracelet with splayed terminals, and various structural bits of sheet metal, possibly from coffins or column bases.



Figure 32: Flat tapering strip of lead bent into an annular shape with lozenge-shaped centre and central attachment hole (in this case damaged, which may indicate that it became undone rather than deliberately bent open). It probably represents an attachment fitting of some sort.

Some 30 iron fragments were also recorded. These were mostly structural attachment fittings, but also included an iron adze head (Figure 33). As the iron was in fairly bad state, the 29 recorded fragments probably represent fewer complete objects. They are in urgent need of conservation and/or preparation for permanent storage (for example wrapping in acid-free paper and adding silica gel to boxes for moisture control).



Figure 33: Iron adze head.

Finally, the excavations in 2010 and 2017 yielded 13 pieces of possible metalworking slag, of at least 2 different types. Together with the occasional piece of possible metalworking waste, this indicates that metalworking took place on the site. This is not an uncommon phenomenon for early church sites.

The material is generally in good condition, but it would be beneficial to study the dress-accessories in terms of their typology, to identify the function of the lead strips by further comparative study, and to prepare the metalwork archive for permanent storage (acid-free paper for more fragile objects, as well as silica gel to control humidity).

Mixed materials

The excavations in 2010 yielded 7 objects of mixed materials, all from grave contexts. These included 6 earrings from 2 graves (2 probably matching pairs, and one non-matching pair) made of copper alloy with glass and semi-precious stone (Figure 34), and a possible iron pin with glass head. The objects are all extremely fragile and in urgent need for further study and conservation.



Figure 34: Four earrings from north-east tomb in funerary enclosure in Z1, discovered in 2010. One matching pair made of copper alloy with semi-precious stone (possibly pink quartz), and one non-matching pair of copper alloy with glass.

Coins

A total of 20 copper-alloy coins were retrieved from the 2010 and 2017 field seasons, which were studied by Sonia Wertani. Of these, 9 constituted a small coin hoard found in T3 in Z1 2010. These were probably all coins of the sixth-century Byzantine Emperor Justin II (Figure 35). All other coins were badly abraded single finds, primarily from the cemetery enclosure, probably representing low-value coins of the 4th and 5th centuries. Eventually, it may be worth investigating whether conservation and cleaning of the coins might shed further light on their denominations, although this is not a priority.



Figure 35: Coin hoard from T3 in Z1, found in 2010, probably representing coins of the Byzantine Emperor Justin II.

Fresco and other materials

The 2010 excavations yielded 33 fragments of painted fresco, which should be studied in more detail at some stage. In addition, a piece of probable vitrified ceramic, 9 oyster shells and 27 beads were found, 6 made of bone and the remaining 21 probably of glass. Of the 27 beads, 25 (5 bone and all the glass beads) came from a single necklace found in the north-east tomb in the funerary enclosure in Z1 (Figure 36). They are in good condition.



Figure 36. Beads from north-east tomb in funerary enclosure in Z1, discovered in 2010.

The small finds retrieved so far represent an interesting assemblage deserving of further study and in some cases conservation. With the exception of the jewellery (earrings) of mixed materials, which are in urgent need for conservation and study, this may be best achieved once all the planned fieldwork has been completed. As some of the most striking finds came from the north-east tomb in the funerary enclosure in Z1, it will be interesting also to study the finds from tombs in conjunction with the human bone material and cemetery layout.

PLAN FOR NEXT SEASON (SPRING 2018)

We have funding from the Loeb Foundation in Spring 2018 to complete a base map of the standing monuments and buried structures of the site in order to reconstruct the layout and development of Bulla Regia. We aim to use a range of different geophysical techniques (magnetometry and resistivity) a further 14 ha of the site to determine: the location of the street grid, public buildings, residential zones, religious buildings; urban growth and shrinkage over time; whether the layout suggests distinct phases of planned expansion or a more organic development; the prevalence and distribution of large insula houses; the organisation of water supply and storage; the nature, scale and location of industrial activities, and changing foci of activity within the urban zone. Access to the topographic plan created by the Getty will maximise the gains from this approach. Similarly, we would like to get a UCL drone

(Unmanned Aerial Vehicle =UAV) to Bulla Regia in order to achieve full coverage of the complex architecture and plans of buildings at the site.

In future seasons, funding permitting, we hope to continue the small-scale excavations at the cemetery church to gather a statistically significant sample of burials for anthropological analysis and to refine the chronology of the earlier phases of the church. It will be important to work with the INP on a re-burial plan to protect the site from damage and looting since it remains outside the site boundaries. Our second aim is to conduct open-area excavations at the Church of Alexander and investigate the late antique and early medieval developments in this zone of the site.

BIBLIOGRAPHY

- Antit, A., Broise, H. and Thébert Y. 1983 'Les environs immédiats de Bulla Regia' in *Recherches archéologiques franco-tunisiennes à Bulla regia, I. Miscellanea* Rome, p. 135-190
- Carton 1889. 'Note sur le bûcher funéraire employé par les habitants de Bulla Regia', p. 429-432
- Carton, L. 1890a. 'La nécropole de Bulla Regia', *BAC*, p. 149-226.
- Carton 1890b. 'Les nécropoles païennes de Bulla Regia', *RA*, 1, p. 16-28.
- Carton, L. 1915a. 'Découvertes faites en 1914 dans les fouilles de Bulla Regia' *BAC*, p. 184-208.
- Carton, L. 1915b. 'L'église du prêtre Alexander découverte à Bulla Regia en 1914' *CRAI* p. 116-130.
- Chaouali, M. 2010. *Bulla Regia, Bulla la royale*. Tunis.
- Chaouali forthcoming. 'La nouvelle église ouest de Bulla Regia et les évêques Armonius et Procesius', in R. Bockmann, A. Leone & P. von Rummel (eds.) *Africa-Ifriqya: Cultures of Transition in North Africa between Late Antiquity and Early Medieval*. Rome.
- Dufton, A. and Fenwick, C. 2012. 'Beyond the grave: developing new tools for complex cemetery analysis at Villa Magna, Italy', in A. Chrysanthi, P. Murrieta Flores and C. Papadopoulos (eds.) *Thinking beyond the Tool: Archaeological Computing & the Interpretive Process*. Oxford, pp. 155-67.
- Héron de Villafosse, A. 1914. 'La croix byzantine de Bulla Regia', *CRAI*, p. 697-702.
- Khanoussi, M. 1983 'Nouvelles sépultures d'époque romaine' in *Recherches archéologiques franco-tunisiennes à Bulla regia, I. Miscellanea* Rome, pp. 93-106.
- Thébert, Y. 1983. 'L'évolution urbaine dans les provinces orientales de l'Afrique romaine tardive' *Opus* II, 1, pp. 9-131.