Geoarchaeological Observations on the Roman Town of Ammaia

Frank Vermeulen, Morgan De Dapper, Cristina Corsi and Sarah Deprez

Table of Contents

Last updated: Mon Nov 21 2005

1 Introduction

This report presents, for the first time, on-going multidisciplinary geoarchaeological work by a joint Belgo-Italian team from the universities of Ghent and Cassino in and around the Roman urban site of *Ammaia* in the northern Alentejo region of Portugal. The participation of the authors in the long-term scientific investigations of this site is the direct result of activities within the international COST G2-action of the European Commission. In this six-year action (1996–2001), which was titled *Paysages Antiques et Structures Agraires*, teams from over 12 countries joined efforts to study ancient landscape forms all over Europe. Delegates from two countries in this action, Portugal (Universities of Evora and Coimbra) and Belgium (Ghent University), decided to collaborate on the site of Ammaia and to develop this venture into a geoarchaeological case study to investigate the conditioning effects of landscape and landscape evolution on a Roman urban site (and vice versa) in the Iberian peninsula (Note 1).

In this contribution we wish to characterise and visualise the site and surrounding study area, briefly discuss the aims and approaches of the chosen geoarchaeological strategy and report on some major preliminary observations and results, obtained during three field campaigns in the summers of 2001, 2002 and 2004 (Note 2). These results relate primarily to three fields of archaeological concern with specific relevance to the landscape background: the tracing of the circuit wall of the Roman city, the intra-urban cartography and the supply of water to the urban area during Roman imperial times. We believe these investigations to be examples of good practice in the field of geoarchaeology of the classical Mediterranean landscape (Vermeulen and De Dapper 2000).

Last updated: Mon Nov 21 2005

2 The Study Area

The ruins of the Roman town of Ammaia are located in the heart of the Natural Park of the Serra de São Mamede, a mountainous area of east central Portugal extending into Spanish territory. The site is part of the fertile valley of São Salvador da Aramenha in the municipality of Marvão, district of Portalegre, within the region of Alto Alentejo.

Figure 1: Elevation of Marvão, showing the location of the study area

The Alentejo is a very rural region. The population number is low, there are several small towns but very few big cities, and farms with large estates are dispersed throughout the landscape. A great part of the sparse population still makes a living from agriculture, which is dominated by cork and olive plantations and pastureland. The majority of the Alentejo consists of outcropping hard rocks, which means that the resultant soils are very shallow, evidently making them very poor. This is exacerbated by the extreme summer dryness, especially in the south, due to Mediterranean influence. The only ways of using the land are consequently grazing for meat production (mainly cows) and cork/olive production (trees which make few demands on the environment).

Portalegre is the northernmost district of the Alentejo region and it is also the name of the district's capital town. Another name for the district is *Norte Alentejano* (the north of the Alentejo). It is the hilliest part of Alentejo and hence forms a transition between the lower parts of Alentejo in the south and the mountainous Beira in the north. It is characterised by a desolate landscape of rolling planes in schists and granites, alternating with quartzite hills. The Serra de São Mamede is the main mountain range; it has a NW-SE orientation and extends for some 40km, distributed more or less equally between Portugal and Spain. The highest point is the Pico de São Mamede at 1027m above mean sea level. This elevated area forms a real barrier for clouds, which cause abundant orogenetic rains, resulting in numerous rivers and streams. The whole mountain range is encompassed in a protected natural area: the Serra de São Mamede Natural Park. The main rivers of the area are Ribeira de Nisa and Rio Sever, roughly running SE-NW along the same orientation as the main mountain ridges, and of course the River Tejo, to which the aforementioned streams are tributary. Throughout history several rather small dams have been built on these rivers, mainly for water storage.

The Portalegre district has an extensive cultural patrimony. Remains of many time periods can be found throughout the area. More than 500 dolmens and menhirs dispersed throughout the area witness prehistoric human occupation, as do the numerous artefacts of lithic industries that have already been found on the Tejo's river terraces. Roman remains are very abundant, as are medieval remains. Several hilltop villages with castles (e.g. Portalegre, Castelo de Vide, Marvão) testify to the area's potential for the construction of defence sites (N.N. 2001).

The archaeological and historical identification of the site as the Roman town of Ammaia dates from the mid-1930s (Vasconcelos 1935, 5). Systematic archaeological digs started here only in 1994, and from 1997 this work of excavation, study and conservation has been organised by the *Fundação Cidade de Ammaia*. These excavations were all centred on places where still visible ruins indicated

the underground presence of Roman and Late Antique building structures. They mainly consist of parts of the Roman city wall with towers and a gate ('porta sul') on the southern side, remains of housing and a monumental paved square and road in the same sector, remains of a house in the location Quinta do Deão, parts of a public bath building and the remains of the centrally located forum with the well-preserved podium of a temple and walls of a surrounding *porticus* or *cryptoporticus* (Fig. 8). So far only very preliminary excavaton reports have been published (see Oliveira *et al*. 1996; Pereira *et al*. 2000; Borges 2003.

Apart from providing the first good indications about the extent and organisation of the former urban area, these digs, in combination with the first topographic mapping effort and a synthesis of earlier historical, epigraphic and numismatic evidence, inform us about the location of the town and the major elements of its chronological development (for syntheses of earlier historical and archaeological work about Ammaia, see Guerra 1996 and especially Mantas 2000).

Founded probably in the 1st century AD, at the latest under the reign of Claudius (Note 3), the flourishing Roman town, lying in the Roman province of *Lusitania*, soon received municipal status (under Vespasian?) and developed its urban structures in part as a result of the efficient exploitation of the area's natural resources: metals and minerals (e.g. lead, silver, rock crystal), fertile agricultural land, horses etc. (Alarcão 1988a; Alarcão 1988b; Guerra 1995; Mantas 2000; Carvalho 2003). A further major asset was its location on the junction of several main roads, one of which connected Ammaia with the provincial capital of *Emerita Augusta* (Merida) (Mantas 2004; Carvalho 2003).

After the 5th century the city seems to have fallen into ruin and the recent excavations (Pereira *et al*. 2000) showed that some parts were covered by floods and slope deposits. Under Arab rule the Roman site was finally abandoned, to be replaced in the late 9th century by the nearby and strategically well-situated town of Marvão (Note 4). During and after the later medieval period, the above-surface ruins were further dismantled. With the exception of a few separate wall structures mentioned above, not much of this classical town remains visible today.

The archaeological site of Ammaia is located on a hillside immediately south of the small 'street-village' of São Salvador da Aramenha, near the Rio Sever.

Figure 2: Topography of Ammaia and surroundings. The main archaeological features discussed in this article are present. [View static image]

Figure 3: Topography of Ammaia and surroundings (detail). [View static image]

Nowadays this terrain is almost completely used for agricultural purposes, mainly olive and some crop cultivation. The upper parts of the hillside are covered by light woodland and abandoned cultivation terraces. Except for a handful of houses and farms, one of which (the farm house at Quinta do Deão) was recently transformed into an attractive archaeological museum, the site is almost free from modern building constructions. It is, however, cut into two unequal parts by the national road (no. 359) leading from Castelo de Vide to Portalegre.

The exact extent of the ancient territory of Ammaia remains unknown, but it was no doubt considerable, extending to the north up to the River Tejo and to the east deep into modern Spain. It probably formed an area of about 60 by 60km, with Ammaia as its central focus (Mantas 2000). The town lay in a hilly landscape, geologically dominated by quartzites and schists, surrounded by an extensively undulating to sometimes nearly flat landscape of granites. The topographical situation of the town is no doubt linked to the presence in this hilly environment of the Holocene valleys of the Rio Sever and of a main tributary descending from the north-west, from the area of Castelo de Vide. The abundance of natural water springs in the area was clearly an extra attraction for the Roman settlers. The impressive historical hilltop site of Marvão, located some 2.5km north of the Roman town site, visually dominates the landscape. Its role as a possible predecessor of the city of Ammaia must certainly be taken into consideration, although there is no conclusive evidence for this today. Recent surveys in the area north of the urban centre of Ammaia, show a quite intense dispersion of Roman farms and farmsteads in the immediate hinterland of the town (Carvalho 2003, 73). They certainly illustrate the Roman Imperial success of the urban centre in exploiting its hinterland.

Last updated: Mon Nov 21 2005

3 Geoarchaeological Approaches

The site of ancient Ammaia and its natural hinterland form the background of several geoarchaeological investigations presented here by our team. They concern questions about the topographic and stratigraphic development of the urban centre itself as well as about the human exploitation of natural resources lying within its territory.

With this study we approach the cultural landscape around Ammaia by means of techniques which combine methods drawn from both geosciences and archaeological survey. The specific problems of assessing and reconstructing a Roman landscape, much altered by physical movements of the soil and by a two-millennia long period of human interference, will therefore be tackled in a multidisciplinary way. This means first of all making use of all relevant cartographic material, such as the 'Carta Geológica de Portugal' (Fig. 4) and the 'Carta Militar de Portugal', available vertical aerial photographs, such as those of the Instituto Português de Cartografia e Cadastro (date: 1952, scale: circa 1:15,000) (Figs 5–7) and relevant satellite images from the Aster and Landsat satellites.

Figure 4: Geological situation of Ammaia. [View static image]

Figure 5: Vertical aerial photograph with indication of the main features of the local hydrography and known Roman springs. [View static image]

All important pre-existing archaeological information (Fig. 8) is inventoried and mapped and new fieldwork organised. This fieldwork, combining traditional archaeological survey techniques and geomorphologic observations, including augerings and the study of stratigraphic sections, is used to build a database of landscape features and sites with archaeological relevance for the period concerned. As many field data and cartographic elements as possible are being assembled in a Geographic Information System (GIS), specifically developed for this project. This GIS will enhance new cartographic material of crucial importance in reconstructing the landmarks of the territory of Ammaia in the first centuries of our era and help to evaluate and interpret the evolution of the landscape shortly before, during, and since Roman times.

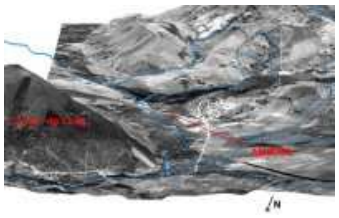

Figure 6: Local hydrology positioned on a 3D-image.

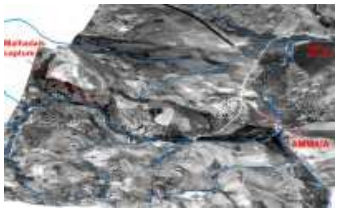

Figure 7: Local hydrology positioned on a 3D-image.

Figure 8: Location of excavated features related to the microtopography of part of the site of Ammaia (cf. Pereira *et al*. 2000). [View static image]

Several typical geoarchaeological themes have been approached in the project so far. They include:

- a tentative reconstruction of the erosion history of the urban site as a whole and of the sector of the forum in particular; this involves studying the degree and character of erosion and fills and locating the origin of the accumulation debris;
- identification and landscape analysis of the sites of a possible Roman theatre and amphitheatre and modelling the supposed location of the Roman circuit walls related to the natural topography;
- study of water collection and distribution in and around ancient Ammaia, including the location of source areas and tracing and mapping Roman aqueducts;
- locating and evaluating by way of site catchment analysis the areas of possible natural resources (e.g. stone building materials, exploitable minerals) used by the Roman town dwellers;
- general location and spatial analysis of elements which structure the humanised Roman landscape, such as rural settlements, villas, roads, bridges, enclosures, culture terraces and other field systems.

In this article we will describe some of these investigations and present the most noteworthy results obtained so far.

---

back forward contents home

4 Tracing the Circuit Wall of the Roman City

A series of field observations during the summer campaigns of 2001 and 2002 aimed to check the validity of a recently propounded city wall hypothesis (Note 5). At an early stage of this research, our fieldwork led to the conclusion that this 'desktop-made' working hypothesis was completely unrealistic. In general, it does not comply with the topographic reality of the field and it must therefore be completely abandoned.

Our proposal is to start working from the premise of a smaller city enclosure, a reduction of almost a quarter, leaving most of the western part of the earlier proposed plan out of the circuit wall. This higher western part is in fact a continuation of the NW-SE orientated hill Malhadais, and is not an isolated hilltop as might appear when seen from a position more downslope. Its gradient, on average between 11 and 17°, is much too steep to allow normal house building in Roman times. We also noted that the bedrock outcrops at surface level almost everywhere here and that its undisturbed state does not suggest ancient human interference for building purposes. An inclusion of part of this higher area within the wall circuit (as a kind of 'acropolis' or strategic lookout) is altogether possible, but this should then be done according to 'logical topographic arguments'.

Detailed observations of the topographic, geomorphologic and archaeological nature on that part of the landscape around which most archaeological findings have so far been located, lead us to propose here a new working hypothesis for further study of the urbanisation of Ammaia. This geoarchaeological fieldwork comprised a full assessment of present-day terracing and field boundaries, a general evaluation of the dispersal of archaeological debris (e.g. building materials, pottery) in the fields, and careful mapping of still visible positive or negative remains of the circuit wall itself, some of which were discovered during recent excavation work by our Portuguese colleagues. In our analysis we gave due consideration to the argument that the Roman town builders took great care to use the topography of the terrain realistically. When evaluating this, we approached the state of the terrain today with the eye of geomorphologists, who take account of the sometimes intricate erosion history of a hilly landscape during a life-span of almost two millennia.

Our working plan for the exact location of the ancient urban area proposes the existence of a quite regular, almost rectangular walled area, only somewhat elongated in a south-westerly direction with a small hilltop extension. The surface area of the walled Roman town structure of Ammaia would then

approach some 20.8ha. The location of this relatively small urban area was certainly well chosen. Apart from its general situation in a suitable agricultural area with good provision of water and other natural resources (see section 2), the Roman topographers chose their site well. The town lay on a predominantly west–east orientated footslope, developed between the base of a low hill culminating at +607m and the valley of the Rio Sever. Both north and south of this footslope a small tributary stream joins the Sever from the west (Fig. 3). The geological substratum of the site is composed of Devonian clayey schists, a metamorphic rock with subparallel orientation of the micaceous minerals (Fig. 4). The weathering product of the schists gives rise to sandy clay soils. The greater part of the enclosed city area was situated between +520 and +560m, on a gently sloping terrain. Only the small elongated western segment of the city area (see above) was on a steep slope.

The most distinctive element of the organisation of the site was, of course, its wall circuit. Let us therefore have a closer look at its proposed trace, starting from the most regular north-eastern side and moving counter-clockwise (Fig. 13).

---

back forward contents home

Last updated: Mon Nov 21 2005

4.1 North-eastern side

Here the city wall could be traced in a straight line, parallel with the Rio Sever and the modern road along it. The ancient wall location partly coincides with a modern field boundary, in part marked by a small dividing wall, and with the location of the northern wall of the museum and a former farm building (Fig. 9).

Our hypothesis, already formulated during the first field campaign, that this simple field boundary was a remainder of the original Roman wall, was confirmed during the 2003-2004 excavation campaigns near the archaeological museum. On this side of the city the defences, or more accurately the town enclosure, consisted of a double system, with a V-shaped ditch, cut into the schist bedrock on the exterior and the actual wall on the interior (Fig. 10).

The ditch is quite shallow (nowhere deeper than 1.40m below the original surface level) and seems also to have had a drainage function. The *c.*1.25m thick wall had a foundation of large river pebbles bound by whitish mortar, cut into the schist bedrock, and an upstanding wall structure of irregular ashlar blocks (mostly granite and quartzite) bound by an *emplekton* of mortar. The remains of this wall could be observed over a length of more than 100m, starting from a slight bend near the north-eastern corner of the town. Almost halfway along this north-eastern side of the town we noticed an interesting concentration of well-cut blocks of granite, lying around in the adjacent field. One of them is clearly the base of a column of the same type as the columns near the so-called 'porta sul', which could indicate that here also we are confronted with elements of a former city gate.

Figure 9: Stone walled modern field boundary, partly coinciding with the circuit wall of the Roman city

Figure 10: Excavation in 2004 of the north-eastern side of the circuit wall of Ammaia (courtesy of the Fundacao Cidade de Ammaia)

---

back forward contents home

Last updated: Mon Nov 21 2005

4.2 North-western side

To date, this side of the wall circuit has given less clear evidence. Firstly, because on its northern side modern roads (e.g. the national road no. 359 to Portalegre) and some recent housing have more extensively altered the natural condition of the topography, and secondly because no above-ground structures of the wall are preserved *in situ*. Still, the almost straight delineation of the wall circuit proposed by us, connecting the valley edge of the Rio Sever with a high location uphill, seems very logical from a geomorphological point of view. Examination of landscape features demonstrated that the urban area was bordered on this side by a narrow, but originally (in Roman times?) quite steep palaeo-valley, with its head some 450m uphill from the northern corner of the city. Extension of the former habitation zone beyond the line proposed by us seems therefore not very probable. Surface materials of an archaeological nature are also virtually non-existent in this lower-lying area to the north-west. The trace of the city wall probably coincides here with a present-day local road that is partly built on a terrace structure, giving support to the southern sides of this palaeo-valley. In support of this, we observed that this robust terrace wall and also an area uphill parallel with this small road, contain many ancient building blocks - clearly 'Roman style' spoils comparable to those near the still-standing 'porta sul'. In contrast almost all field boundaries north of this line use only the local schist.

Last updated: Mon Nov 21 2005

back forward contents home

4.3 South-western side

Our south-western delimitation of the urban area is based on the presence of clear, linear demarcations in the wooded area of the eastern slope of the Malhadais hill. These linear structures (in part simple earthworks with a width of 1–3m and a preserved height of no more than 0.5m, in part standing field walls) at the same time mark the cadastral limits of the fields in this area. These earthworks and low walls contain many blocks of granite, some of which have the 'Roman cut', comparable to *in situ* blocks discovered during excavation of the city wall near the museum. In one location, near the top of this hillock a larger and almost round heap of granites, schists and other rubble could even suggest the presence of a tower compound in the presumed wall circuit. It is in a very strategic location and permits a wide panoramic view over the immediate surroundings of the Roman city. The presence of such a tower compound, if confirmed by further fieldwork and preferably excavations, could well explain the extension of the town's walled area to this almost uninhabitable (too steep) hilly area of the landscape.

back forward contents home

Last updated: Mon Nov 21 2005

4.4 South-eastern side

This final part of the wall circuit was easier to map. We can probably locate the southern corner of the town wall in a field south of the national road (no. 359) to Portalegre. The surface scatter of pottery and small building materials is quite well delineated here and a concentration of the latter (especially brick and tile) even suggests the precise location of another tower compound. In a northern direction from this point, the wall circuit again (also see the situation on the north-western side of town) delimited a small valley around a still active tributary of the Rio Sever (Fig. 11). Again it seems that the Romans avoided this wet and unstable area when designing the town limits. This former wall circuit becomes more and more visible at surface level in the direction of the excavated 'porta sul', first as a kind of recent terrace wall (*c*.2m wide) with many granite *spolia* and rubble, further to the north as still standing walls of the Roman and later urban defences. The so-called 'porta sul' or southern gate (Fig. 12) now consists of the well-preserved remains of two round towers, which defend a *c*.6m wide monumental entrance of the town (Note 6), where a street paved with neatly cut blocks of granite opens into a porticoed square (Note 7).

Figure 11: View of the south-eastern side of Ammaia from the lower (palaeo-)valley located here

Figure 12: Excavated remains of the so-called 'porta sul' or southern gate

Immediately north of the gate compound, the original Roman town wall is still visible over a length of a few metres. Although it is wider here (1.95m), its construction with ashlar blocks and mortar binding is nearly identical to that observed in the excavation sector near the museum (see 4.1). Further to the

north-east the ruins of the original Roman city walls give way to much thinner and less well-constructed post-Roman walling, suggesting an interesting continuity of occupation within this sector. The standing *in situ* structures soon make way for a simple terrace wall full of *spolia*, again delimiting the wet and lower lying valley grounds to the east. The trace of the former circuit can, however, still be seen, as well as some variations in its alignment, imposed on the builders of the city wall because of the state of the terrain. They clearly chose to build on the bedrock, which resulted in a locally more sinuous trace, before reaching the north-eastern corner of town and the starting point of this description.

---

back forward contents home

Last updated: Mon Nov 21 2005

5 The Urban Pattern and its Degradation

Our fieldwork and the resulting hypothesis regarding the line of the Roman wall circuit, together with the results from the recent excavations and other field observations within the now well-delimited town area, give us a clearer image of the main characteristics of the urbanisation of Ammaia (Fig. 13). Although the ancient site is for the most part unexcavated, and the on-going digs and study of archaeological materials will have to generate more data to understand the chronology of this urban development, we can already distinguish and infer the main layout of this urban site during the Early Empire. It must be remembered that Ammaia, unlike some other towns in *Lusitania* and nearby *Baetica* (See e.g. Alarcão 1988a and 1988b; Gorges and Rodriguez Martin 1999; Fear 1996), was probably a virtual greenfield site as no signs of pre-Roman presence were encountered in the four excavated sectors so far. Consequently we can assume that it was built by, or under guidance of, Roman architects, and so would have taken on a Roman guise almost automatically. Ammaia was a new site, and so could be constructed to a standard Roman plan.

Figure 13: New archaeological scheme of Ammaia (transposed on the aerial photography) as based on our new field observations and earlier fieldwork. [View static image]

Its 1810m-long walled enclosure was certainly interrupted by several gates, possibly as few as five, and reinforced by an unknown number of towers, of which we might have located only two with some certainty (Fig. 13). The precise location of the gates can be mapped with some confidence: they are the well-preserved 'porta sul', the presumed gate at the centre of the north-eastern city side and a gate near-centrally placed in the north-western city side. All of them are no doubt connected with the main street axes of the town: the *cardo maximus* and the *decumanus maximus*. The first was partly excavated near the monumental 'porta sul', a gateway possibly on the road to the provincial capital Merida (Carvalho 2003, 76-77). This *cardo* divides here into two equal and symmetrical halves a porticoed square made of fine granite, and continues in the direction of the heart of the city, the forum. The monumental planned forum complex, possibly of Flavian date, is a rectangular NW-SE oriented square *c*.95×70m (just a little too square to fit the Vitruvian ideal

proportions of 3:2. Vitr., V, I, 2), limited on the north-east by this parallel *cardo maximus*. It is built partly on an artificial terrace, flanked on three sides by a *porticus* (or *cryptoporticus*). On its remaining south-eastern side the forum is probably delimited by a monumental *basilica*, while its north-western half contained a centrally placed temple, of which a high podium is the well-preserved relic. South of this grand complex a thermal installation, topographically connected to the forum, was partly excavated in the 1990s (Fig. 20).

The *cardo maximus* no doubt continued its SE-NW trace in the direction of the north-western city side, where it connected to another gate. Aerial photographs of 1952 clearly show its direct relation with the line of a Roman road leaving the city in that same direction (Carvalho 2003, 75-76, photo 2). From the gate which we were able to locate in the centre of the north-eastern city wall, the presumed *decumanus maximus* probably reached the forum area just south of the main city temple. Its continuation further upslope, beyond the forum, is not proven.

Although a strictly gridded street pattern was not as essential to the classical city as has often been assumed, the evidence we have from Ammaia appears to suggest a quite regular layout for most parts of the urban area, probably with the exception of the steep western extension. There is not only the strict organisation of the town with a quite rectilinear circuit wall, a planned regular forum and two main road axes, but elements in the present-day morphology of the slope, on which the town developed, also suggest this further regularity of the original city plan. Probably already in Early Imperial times the city houses and public buildings were erected on top of a system of north-west/south-east orientated man-made terraces, some of which were arranged as streets parallel with the main *cardo* and thus exactly perpendicular to the slope. At the surface of the agricultural land covering the area west of the forum today, several traces of such an ancient terrace system can still be seen. It is altogether too early, however, to suggest a modular system, based on the *actus*, for the layout of such a terraced street network.

Post-Roman degradation of this terrace system, coupled with the gradual abandonment of the inhabited area, no doubt explains many of the erosion processes that occurred in this central and western part of Ammaia. Our fieldwork in the sector of the footslope immediately west of the newly proposed city area showed the existence of many breaches in the actual terrace walling. A first appreciation of the nature of soil material in this sector, together with clear indications for a finely stratified colluvium of similar soil material in the sections of the *porticus* excavations on the forum, indicate that the source of this colluvium should be sought in this *intra* and immediate *extra muros* hilly area of the site. Heavy degradation of culture terraces in the upper part of the walled town and immediately west of this sector could therefore be responsible for most of the post-Roman colluvium cover of the forum area and of other areas of town situated to the east of it. Further detailed evaluation of these excavated sections, together with an assessment of the archaeological finds in the fills, will allow these events to be precisely dated, which could be during different phases of Roman and post-Roman occupation and land use.

Finally, there remains the question of the Roman use of the immediate extra-mural areas of the city. A recent study of aerial photographs and historical documents (Carvalho 2003), as well as some old discoveries of archaeological material interpreted as grave goods (Note 8), all point to the presence of several roads, bridges and some not yet well located Roman cemeteries. Excavation work and more detailed survey will be necessary to clarify these matters further and to map the funerary areas with some precision. Furthermore, there are indications that the sector immediately north-west of the now delimited urban area contained one or even two monumental building complexes designed to present public performances. One semi-circular area, partly hollowed out of the slope near the western extremity of the city (Fig. 13), might well be interpreted as the location of an ancient theatre. Its seating area was then built into the hillside to save material and at least part of the seating could have been made of wood, a fact not uncommon in the Iberian context – the location of theatres and

especially amphitheatres outside the city walls is another common phenomenon in Roman Spain and Portugal (Fear 1996). From a geomorphological point of view, this site lies at the head of the small palaeo-valley which delimits the inhabitable and sloping town area to the north-west (see above). The semi-circle, now obliterated by thick woodland, is delimited on the valley side by a low earthwork, containing many pieces of granite. This could be the remains of an original scene building, now obstructing the normal colluviation process in this area.

We could find less direct evidence to indicate the possible presence of an amphitheatre constructed immediately downslope of this theatre site (as suggested by a large oval zone of crop marks on the vertical aerial photographs). Its location, almost centrally in the palaeo-valley, seems very unlikely from the point of view of stability (Note 9).

---

back forward contents home

Last updated: Mon Nov 21 2005

6 The Aqueducts of Ammaia

It is clear that the Roman town of Ammaia was well provided with drinking water. The monumental nature of its town structures, with public buildings (e.g. bath houses) and paved streets, possibly adorned with some public fountains, from the start needed an efficiently functioning system of aqueducts bringing running water at a constant flow to certain parts of the town. Water provision systems for Roman towns in *Lusitania* are relatively well known, see e.g. Etienne and Alarcão 1974 (Conimbriga), as are different types of hydraulic systems for rural economic or domestic purposes, see e.g. Quintela *et al*. 1999. As the Romans usually followed the 'no nonsense – least effort' principle for bringing this water to town, geoarchaeological fieldwork and GIS modelling can be very helpful in reconstructing the routes and ways of distribution. Our on-going work in the field consists partly in tracing the possible places for easy and logical water capture in Roman times, hereby considering aspects of hydrology, topography, archaeological remains and other practicalities. Thus far we have been able to determine and partly study the two main sources for water collection and transport to the Roman town: the springs at 'Olhos de Agua' and a newly discovered aqueduct along a small western tributary of the Rio Sever (Fig. 14).

Figure 14: Cadastral layer with indication of the main features of the local hydrology and recently discovered Roman springs. [View static image]

The western flanks of the hill 'Cabeço do Leão' on the other side of the Rio Sever, east as seen from Ammaia, form part of an area rich in water sources, all to be found at the contact of schists and dolomites. The fractured dolomites act here as aquifer, while the underlying shists are the aquitard. In particular, the site of a 19th-century mill at 'Olhos de Agua', immediately east of the Rio Sever, where the contact between dolomites and schists crops out, is suited for capture – even today this is an important point of capture, bringing water at a constant flow, averaging around 50 litres per second, to the town of Portalegre.

The concentration of springs lies some 8m above the level of the most easterly part of the Roman

town, the area in front of the museum at Quinta do Deão. The distance from this spring area to the town wall is only some 300m, which means that this possible aqueduct could have been built with relatively minor effort, although the construction of a bridge was necessary.

During our first campaign of fieldwork (2001) we observed several indirect archaeological indications in this area that could point to the existence of a Roman aqueduct bringing water from this rich spring, via a bridge over the Rio Sever, to the lower parts of the town. They are: a series of ploughed-up Roman building remains near the present-day water source, the remains *in situ* of a foundation possibly for a Roman bridge near the eastern edge of the river (a bridge existed here until the end of the 16th century, Carvalho 2003, 72) and some larger granite building blocks, which can be interpreted as Roman spoils, in the walls of an abandoned small farm building near the river at 'Olhos de Agua'.

More convincing still were our observations the next summer, when we were fortunate to be able to study this area of natural springs in the best of conditions. Since major building works, to transform the farm complex at 'Olhos de Agua' into a centre to study the surrounding natural park, involved the temporary drying of the artificial pond on top of the springs, we had the opportunity to study several ancient structures for water capture, pre-dating the 19th-century 'industrial' installations. Although exact chronological information remains absent, we consider that at least a couple of the discovered capture points could go back to the Roman era. Several of them are located at the foot of the valley side, and in one case a foundation of a quite regular construction appeared. Partly cut into the quartzite bedrock, partly constructed with irregular boulders, a basin was formed of irregular rectangular shape. This construction of *c.* 1.5 × 1.3m was probably only the sub-structure of a more monumental spring capture. A few metres from this *in situ* installation were found a concentration of relocated Roman building blocks of identical imported granite: two rectangular pieces and two fragments of small columns. More fragments of Roman columns (granite and quartzite) were observed at a short distance from these capture points, at least suggesting major Roman interference with the water collection in this area. It is not yet clear, however, whether these Roman installations were purely functional (e.g. basins, water tower, *specus* construction) or also involved the presence of a sanctuary or *nymphaeum*.

Further research would be necessary to trace the exact location of the aqueduct bringing the waters of 'Olhos de Agua' to the lower parts of the Roman town. It is very probable that such an aqueduct crossed the Rio Sever near or at the location of the former bridge.

---

back forward contents home

6.1 The western aqueduct

To reach the upper parts of the city the Romans had to collect and derive water from the hilly area west and south-west of Ammaia. This is a general area of numerous and abundant springs and of the formation of several small water courses giving rise to small ponds.

Geologically (Fig. 4), the area is dominated by orthogneisses, schists, dolomites, alluvial deposits, slope deposits and quartzites. The latter are very resistant to erosion and hence result in high ridges. Where rivers cut across these rocks, they form steeper, narrower, valleys than in the surrounding orthogneisses or schists, because it is more difficult for water to erode these valleys. So, the difference in prevailing rock types and hence the difference in erodibility of the rivers in the area, results in different valley types. The varied lithology can further result in the origination of spring levels, which occur when relatively permeable rocks (e.g. fractured dolomites, unconsolidated deposits) overlay relatively impermeable rocks (e.g. schists). In places where their contact outcrops, spring levels can occur.

During our fieldwork in this area we were able to locate several of these springs, but most seemed to be locally used only and it remains unclear to what extent the Roman town inhabitants made use of them. One such spring lies at *c*. 1km south-west of the ancient city wall, near Quinta do Padre Francisco (Fig. 3). In fact this 'spring' is more accurately a capture point at the head of a small valley. Its present surrounding vegetation implies that there is a continuous flow the whole year round, certainly a valid argument for the Romans. The capacity of the flow seems, however, quite small and if an attempt is made to reach the upper parts of the city from here, it would involve following a more than 1km-long line along the flanks of the hill, with a supposed crossing of a narrow valley near the actual Ponte da Madalena. Another example was found near the Luisa Manuela farm, just south of the most south-western edge of the Roman town. Water coming from the western hills filters through a layer of sand and pebbles to the surface and forms a kind of small *lacus*. This low-lying capture point could have been used in antiquity as a local water resource for inhabitants of the western part of town.

Our geo-archaeological reasoning suggested that we should not only look for springs, whose location often implied that the Romans had to cross a river and, therefore, spend much on costly infrastructure to reach their town, as is the case with the spring near Quinta do Padre Francisco. The Romans preferered not to expend undue effort (see Section 6), implying in this case that they

would try to avoid building an expensive bridge over a steep and rocky valley in order to reach the town. It is more likely that they would look for a constant water source, which they could easily divert partly to town. For this the creation of an artificial lake would be unnecessary, but instead a series of piled up blocks along the route of a rivulet can be sufficient, as can be seen today in some parts of the Mahgreb in Morocco (De Meulemeester, pers. comm.).

The most likely source of water for collection the whole year through, with high capacity and with distribution to the upper parts of town and the forum area, was seen in the small tributary of the Rio Sever which joins this river coming from the west (left bank) near 'Olhos de Agua'. During an intense fieldwalking effort in the summer of 2004 we were finally able to locate the Roman point of capture at some 550m east of Carvalhal, just north of the road from S. Salvador da Aramenha to Ribeirinha, on the southern flank of Malhadais hill (further referred to as the Malhadais capture) (Fig. 14). This place, recognised in a narrow passage of the steep and rocky valley, diverting a small stream of water from the mainstream of the river, is still in use today for the local water supply. Several intensive cuttings in the granitic bedrock suggest the presence of a now lost small river dam. Along the left bank of this rivulet, some 65m downstream, a narrow gully (0.20 to 0.60m wide and max. 0.40m deep) was clearly cut into the steep rocky valley flanks. Some 25m further downstream the gully passes into a classical Roman type *specus*, found here by us *in situ*. A series of connected U-shaped monolithic blocks, with an average length around 1.5m and an internal gully of some 0.38m wide and 0.32m deep, were set in a neat rectilinear construction, just above the winter bed of the rivulet. This construction, now completely hidden by intense vegetation, was partly cleared and mapped over a distance of several metres, freeing at least seven monolithic blocks (Figs 15, 16 and 17). The examined part of the *specus* lies some 5m north of the present-day rivulet, and some 2.3m higher than the river bed. Its absolute height is 570m, or some 45m higher than the base mark near the most easterly part of Ammaia, the area in front of the museum at Quinta do Deão.

Figure 15: The Roman *specus* of the western aqueduct discovered in 2004

Figure 16: The Roman specus of the western aqueduct discovered in 2004 – detail

Figure 17: The Roman *specus* of the western aqueduct discovered in 2004 – detail

Further mapping of its path remains necessary, but it is now already clear that this aqueduct neatly follows the left bank of this tributary of the Rio Sever, passing immediately above the Ponte da Madalena to reach the higher parts of the town of Ammaia near its most southern corner (Fig. 3). Once inside the walled city area, probably after passing a not yet discovered *castellum aquae* in this area, the aqueduct can be linked to a granite *specus* (with schist cover stones) of exactly the same type, which was by chance, found *in situ* west of the forum area some years ago (Figs 18 and 19) (dimensions: length 0.93m, width 0.59m, height 0.48m; Borges 2003, 93, photo 4). The south-west/north-east orientation of the latter points to the location of our newly traced aqueduct and at the same time suggests the general direction of the forum baths as its final destination. The estimated distance of the western aqueduct, as we like to call it, from its spring to the entrance into town, covers some 0.76km. The last part *intra muros*, until the forum baths, is nearly 0.3km long. It descends some 30m from its source at +570m altitude to the town baths at some +540m above sea level (Fig. 20). In addition to supplying the (public?) baths, as is often the case in Iberian towns, this aqueduct could also supply the upper parts of the town area with fresh water.

Figure 18: Remains of the *specus* of the western aqueduct found in the western part of the Roman town area. At a depth of 1m the canalisation was found *in situ*

Figure 19: Extracted remains of the *specus* of the western aqueduct found in the western part of the Roman town area

Figure 20: Canalisation excavated in the baths of the forum of Ammaia

---

back forward contents home

Last updated: Mon Nov 21 2005

back forward contents home

7 Future Work

This joint geo-archaeological mission in Portugal has not yet finished its work in and around the ancient town of Ammaia. Although the main traits of the city topography and its Roman water supply have now been revealed and carefully mapped, many more elements can be brought into the picture by way of this interdisciplinary approach. Several survey actions taken during the field campaigns have provided elements for further contributions to the ancient history and historical geography of this Roman town and its territory. The positive identification in 2004 of a granite quarry used in ancient times for supplying the town with solid building materials will certainly lead to a specific archaeo-geological approach.

The same applies to our already partly successful search for the places of origin of rock crystal extraction in antiquity, an important activity by the inhabitants of this Roman city. Furthermore, contributions can be made to the already on-going Portuguese surveys on the territory of Ammaia, revealing new and important data about the ancient roads serving the city, the field systems and the rural settlements. We have also started to investigate the degradation and abandonment of the city in late antiquity and the early Middle Ages, partly connected with the massive erosion of the hillslopes on which the city was once built.

back forward contents home

Last updated: Mon Nov 21 2005

Bibliography

Alarcão, Jorge de, 1988a *Roman Portugal*, vol. **II**. Warminster.

Alarcão, Jorge de, 1988b *O Dominio Romano em Portugal*, Mem Martins.

Borges, S., 2003 'A cidada romana de Ammaia as termas do forum (notícia preliminar)', *Ibn Maruan* **12**, 85-97.

Carvalho, J., 1998 'Ocupação humana no concelho de Castelo de Vide desde a Pré-historia à Alta Idade Média', *Ibn Maruan* **8**, 183-91.

Carvalho, J., 2003 'Ammaia e a sua rede viária, algumas propostas de trabalho', *Ibn Maruan* **12**, 69-83.

Etienne, R. and Alarcão, J. de, 1974 'O aqueduto romano de Conimbriga. Relatório preliminar', *Actas do III Congresso nacional de arqueologia*, Porto, 5-8 Nov. 1973, Porto, 283-91.

Fear, A.T., 1996 *Rome and Baetica. Urbanisation in Southern Spain c.50 BC–AD 150*, Oxford.

Gorges, J.-G. and Rodriguez Martin, G. (eds), 1999 *Economie et territoire en Lusitanie romaine*, Madrid (Collection de la Casa de Velázquez, 65).

Guerra, A., 1995 *Plínio-o-Velho e a Lusitânia*, Lisboa.

Guerra, A., 1996 'Ammaia, Medobriga e as Ruínas de S. Salvador de Aramenha. Dos Antiquários à Historiografia Actual, "A Cidade"', *Revista Cultural de Portalegre* **11**, Nova Série.

Mantas, V., 2000 'A sociedade luso-romana do municípiode Ammaia', *Sociedad y Cultura en Lusitania Romana* **IV**, Mesa Redonda Internacional, Mérida, 391-420.

Mantas V., 2004 'A Rede Viária Romana do Território Português', *História De Portugal* (Dir. João Medina) II, 438-469.

N.N., 2001 *Norte Alentejano. Onde o tempo é tempo*. Região de Turismo de São Mamede, Portalegre.

Oliveira, J. *et al*. 1996 'Cidade de Ammaia – Marvão, Relatório dos Trabalhos arqueológicos desenvolvidos em 1995', *Ibn Marwan* **6**.

Pereira, S., Carvalho, J. and Borges, S., 2000 'Numismática Ammaiense, Notas Preliminares', *Ibn Maruan* **9/10**, 55-70.

Quintela, A.C., Mascarenhas, J.M. and Cardoso, J.L., 1999 'Barrages romains au sud du Tage (Portugal)', in J.-G. Gorges, and G. Rodriguez Martin (eds), *Economie et territoire en Lusitanie romaine, Madrid, 1999* (Collection de la Casa de Velázquez, 65), 197-226.

Vasconcelos, J. Leite de, 1935 'Localização da Cidade de Ammaia', *Ethnos* **1**, 5-9.

Vermeulen, F. and De Dapper, M. (eds), 2000 *Geo-archaeology of the Landscapes of Classical Antiquity, International Colloquium Ghent 23-24 October 1998*, Babesch Supplement **5**, Leuven-Paris-Sterling.

---

back contents home