



Archaeological methodology applied to the analysis of battlefields and military camps of the Second Punic War: Baecula



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ARTICLE INFO

Article history:

Available online 10 February 2016

Keywords:

Second Punic War
Battle of Baecula
Battlefields
Conflict archaeology
GIS
Archaeological survey

ABSTRACT

This paper is a synopsis of the archaeological surface survey methodology applied to the location and analysis of a Second Punic War battlefield at Baecula. The strategy undertaken has allowed us to reconstruct the battle scene and analyse its material remains, camps and other elements and load them into a GIS, which we are using to show the initial proposals for a micro-territorial analysis of the scenario. We present the application of the system to the visibilities of the battlefield between the armies, based strictly on the archaeological data recovered from it.

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1. Introduction

For more than ten years we have been working on the archaeological analysis of a battlefield located near the Iberian *oppidum* of Baecula, the scene of a confrontation between the generals Hasdrubal Barca and Scipio the African. This research grew out of a wide-ranging proposal to study the Second Punic War in the Alto Guadalquivir region (Fig. 1) and led to a critical review of scenarios that had been historiographically set in stone thanks to prior research and toponymic similarities. To do this it was necessary to construct a complex methodology combining diverse techniques. These were aimed at the localization and analysis of scenarios that were contextually very particular due to their configuration and very brief duration, barely a few days.

This method was developed in line with the various research phases and the different analytical scales. The localization phase was based on a macro-territorial study encompassing a large part of the present-day province of Jaén, reaching a micro-spatial scale at an item level. The coordinated reading of scales, linked to the flexibility of an adapted method, allowed us to make an exhaustive study of a scenario that is currently a contextual and methodological benchmark for the analysis of ancient battlefields.

In this context, the role played by classical writings should be understood within the methodological system as yet another variable and not as a focal point in any of its analytical phases. For example, the topographic details described in the written sources are crucial, but in all cases were subjected to a critical process, while remaining aware that archaeological research can contribute new data not included in those ancient sources, which often suffer from the bias of their author and the context in which they were written.

The development of this methodology is therefore key to the analysis of ancient battle scenes (Bellón et al., 2015a), enriching the general panorama of similar cases, such as those from the well-known sites of La Palma at the mouth of the River Ebro (Noguera, 2008, 2012; Ble et al., 2011; Noguera, 2012), Andagoste (Álava), and El Pedrosillo in Badajoz (Gorges and Rodríguez, 2006).

This research area can be added to those developed, mainly in Europe, as part of what is known as conflict archaeology. The most tangible evidence of this can be seen in such international projects as the Bloody Meadows Project, the University of Glasgow's Centre for Battlefield Archaeology and the periodical international meetings of the Fields of Conflict Conference. Although most of the fields of conflict analyzed belong to more recent periods (Towton, Marston Moor, etc.), our methodological perspective is similar to that of projects undertaken in Germany, including Harzhorn (Geschwinde et al., 2011, 2012) and Kalkriese (Harnecker, 2004; Rost and Wilbers-Rost, 2015), as we are dealing with a battlefield and encampments with very limited temporal contexts of just a few days.

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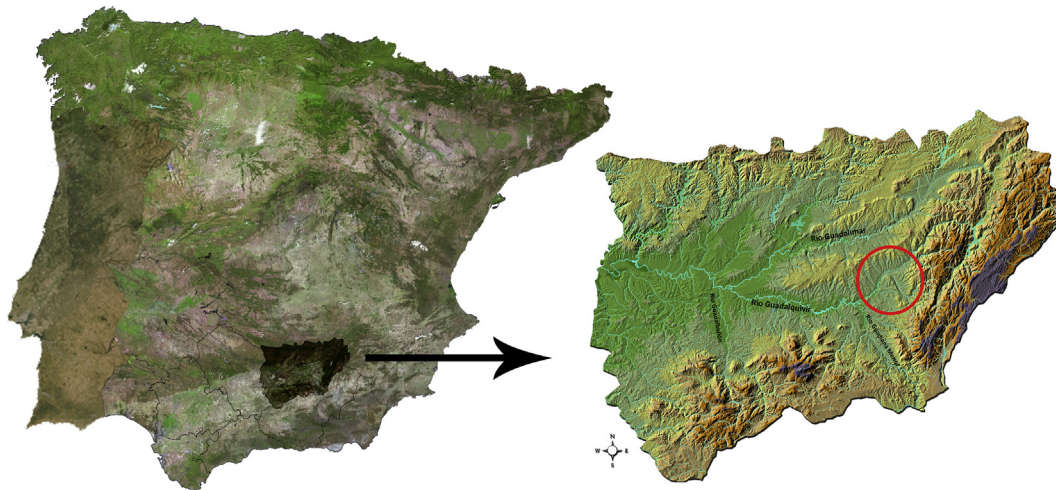


Fig. 1. The Iberian Peninsula showing the location of Jaén province (Andalusia). On the right: the location of the study area.

However, the research focusing on Baecula has another important aspect. It is vital to understand the impact of such events on a local level, as well as the historical processes of the so-called “collateral damage” caused by large scale conflicts. This episode transformed the social situation and human landscape of the Alto Guadalquivir Valley (Ruiz et al., 2013).

After the taking of the port base of Carthagonova in 209 BC, the evolution of the Second Punic War tipped definitively in favor of the Romans. In this context, the Battle of Baecula (208 BC) was of prime strategic importance for various reasons. Most immediately it was the beginning of the Roman conquest of the Guadalquivir Valley and the mining zones of the Sierra Morena Mountains, and its outcome, according to the classical sources, led Hasdrubal Barca to transfer his army to Italy to support his brother Hannibal. Historiographically, therefore, Baecula has always been seen as a pyrrhic victory for Rome, as Scipio had been under strict orders from the Roman senate to prevent Hasdrubal from getting away with his relief army.

As Le Bohec (1996: 230) maintained, Hasdrubal preferred to lose the position and save the bulk of his army. This could be interpreted as a strategic victory for Rome, given that the loss of the position led to the effective conquest of its surrounding territory. However, in tactical terms Hasdrubal effected a masterful escape maneuver, as we have recently defended (Quesada, 2013; Bellón et al., 2015b). He set up a scenario that left him with both the possibility of reinforcing the other two Carthaginian armies (Mago Barca and Hasdrubal Gisco) and, in the event of a Roman attack, carrying out an orderly escape maneuver (with the bulk of his army and his war chest) with a hard-fought rearguard delaying action. The classical sources (Polybius and Titus Livius see Roman Sources used, at the end of the list of references; Polybius, 1996; Livius, 1993) record a hagiographic narrative in which the Roman general decisively attacked and surrounded a disorganized, surprised and chaotic Carthaginian army. As Domínguez (2015) has recently pointed out, there are internal contradictions in the descriptions of the Battle of Baecula, contradictions that have served to nurture the historiographic debate in this respect.

This article correlates precisely with the debate on the tactics employed by both sides and aims to demonstrate that Hasdrubal Barca's choice of campsite was premeditated. In other words, he was well aware of the orographic and topographic advantages of the Cerro de las Albahacas peak and its good defensive position. In our study we have used the traditional visibility tools provided by GIS, situating the areas of visibility of the different armies in the

zones in which we have detected material remains that determine where they took up positions during the course of the battle. On the other hand, our study shows that the position of the Roman camp, more than 6 km from the peak of Cerro de las Albahacas, was a determining factor in facilitating the escape maneuver carried out by the Carthaginian army. This analytical methodology emphasizes the importance of archaeological data compared to philological analysis when identifying ancient battlefields.

The aim of the Baecula Project is to analyze the Second Punic War and the social, political and cultural changes brought about by the subsequent Roman conquest of the Iberian territory of the Alto Guadalquivir. At the same time, we are aware that we are dealing with information involving various scales of historical analysis that involve the whole of the ancient Mediterranean.

2. *Oppida*, scenarios and scales: the archaeological surface survey to locate the battlefield of Baecula

The Baecula battlefield project is based on extensive knowledge gained from earlier projects on the Iberian Iron Age territory of the Alto Guadalquivir. These range from generic studies focusing on the countryside of Jaén province (Ruiz and Molinos, 1993) to the more specific investigations of individual sites such as the *oppidum* of Giribaile (Gutiérrez, 2002, 2011). This research also included the Sierra Morena mining zone project (Gutiérrez and Bellón, 2001; Gutiérrez et al., 2003), the surveys of the eastern part of Jaén province (Montilla, 1987; Montilla et al., 1989), and the investigation of the Guadiana Menor Valley (Chapa and Mayoral, 1998; Mayoral et al., 2003). Other research focused on the excavation, survey and territorial analysis of the *oppidum* of Las Atalayuelas (Castro, 1998), the micro-survey of the *oppidum* of La Loma del Perro and its surroundings (Bellón et al., 1998), research in the area of El Arroyo Salado (Torres et al., 2001; Torres and Gutiérrez, 2004) and the Víboras and San Juan Valleys, with the investigation of specific settlements such as Cerro Villargordo (Wiña, 2004), Cerro Alcalá (Lozano and Gutiérrez, 2006) and Cabeza Baja de Encina Hermosa (Cazalilla, 2005).

Many years of surveying the area have resulted in a map of the *oppida* in the Alto Guadalquivir, an indispensable starting point for identifying both the *oppidum* and the battlefield of Baecula. We began to create a road map of how to look for the site of Baecula using the ancient written sources and the chronology defined for the Iberian Iron Age sites. For this first phase we prepared a surface

site to be able to understand specific historical episodes. In other words, it is necessary to distinguish the “brief” episode of the battle in a “long” period of occupation of the hill, from the late Neolithic to the present day. The settlement evidence is localized and specific spatial distributions are at times superimposed.

It was necessary to adjust the surface sampling, which initially had been aimed at evaluating the spatial structure and size of the battlefield, to an extensive, delimited orographic unit characterized by a dispersion of finds over 500 ha. Therefore, we planned a surface sampling by drawing up concentrated transects in specific parts of the total area. The regularity of the olive trees planted on the land provided a more or less homogenous and statistically feasible grid system for transect definition.

Thus, the minimum unit of analysis was the grid. The grids were systematically surveyed using the same metal detector and a carefully determined protocol. This activity involved different teams, each of which had precise tasks ranging from visual and magnetic surveys to preparing the inventory and GPS record. The final phase of the process included the registration and classification of the material record in general categories, as well as rejecting finds from more recent periods.

By 2014 a total of 196 transects and 4842 grids had been covered – a total surface area of 611,822.14 m² (Fig. 3). In 2012 we opted for a complementary strategy that included (rather more sporadically) the analysis of extensive surface areas that linked the empty spaces between transects. The objective was to obtain information on continuous areas and avoid having a mosaic of intermittent data from the transect-based sampling system. This complementary sampling was important to cover key zones such as the summit of Cerro de las Albahacas, where the camp areas were also located.

The microsurvey tasks were based on the strategic combination of various archaeological survey sampling intensities, with the most intensive on the battlefield and the least intensive in the troop movement zones. In addition, we dug test trenches aimed at evaluating the sequence of the site or its specific structure, as in the case of the camp zones.

The overall strategy described above made it necessary to develop a homogenous recording system that could be applied to the entire area of the conflict. We gave priority to such aspects as cartographic support and the precise georeferencing of the actions undertaken. We used two recording tools: GIS (Geographic Information System) technology and field measurement using GPS, which have become fundamental to the construction of interpretations. GIS allowed us to manage the georeferenced data (more than 9000 items) quickly and easily, allowing the incorporation of new results, as well as modifications to the established fields and types.

The microsurvey data from Cerro de las Albahacas make up a vector-based GIS consisting of geometric spatial elements, such as points or areas. These elements have a series of associated thematic attributes that are processed through tables in a relational database. We collected surface finds (any type of evidence, although pottery predominated) and also buried or partially buried remains located with the metal detector (therefore only metallic remains, to which we assigned precise coordinates). This point/area distribution corresponds to the actual archaeological record.

Although all the artifacts may have coincided with the event of the battle, each was analyzed differently and subjected to different study processes. Each element generated a GIS feature class, a point in the case of metals and an area for the other finds. Each feature

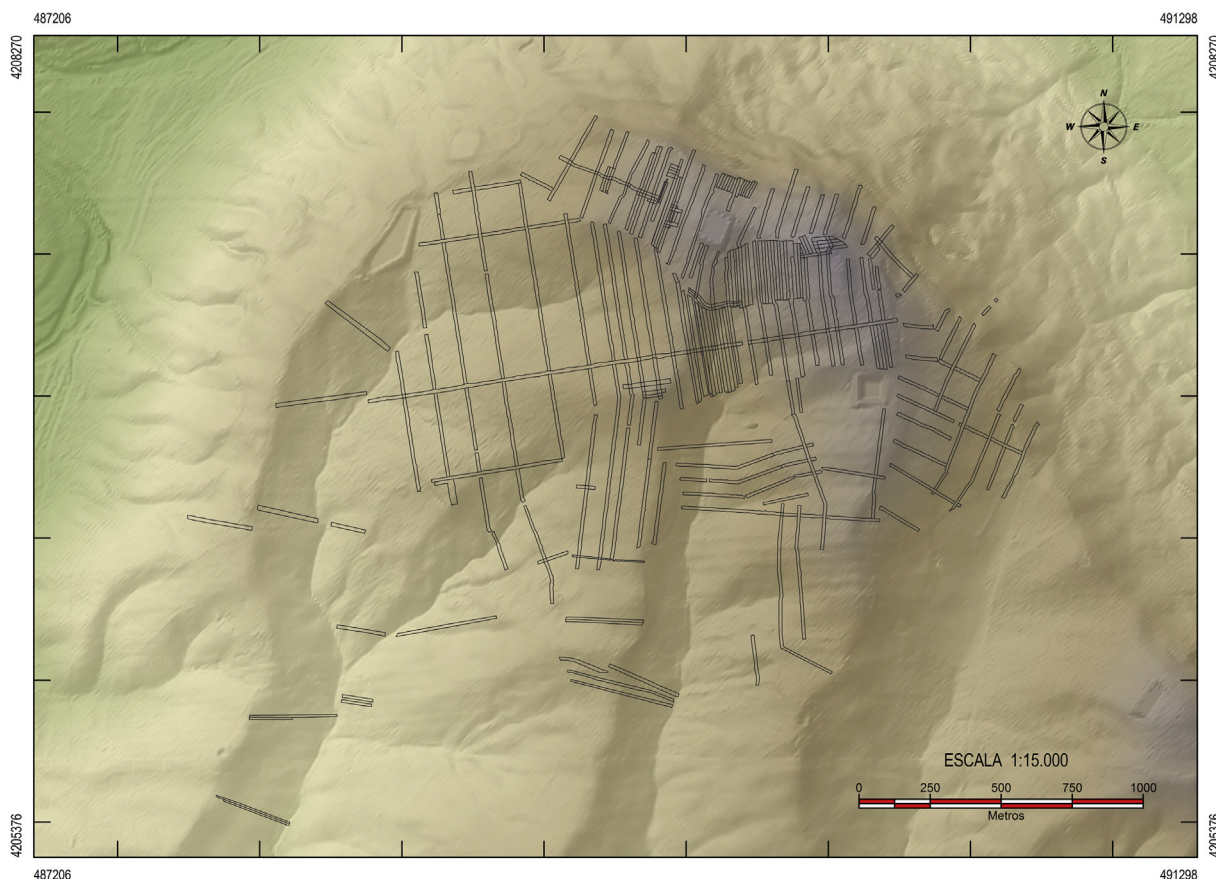


Fig. 3. Sampling survey system on Cerro de las Albahacas (2006–2014).

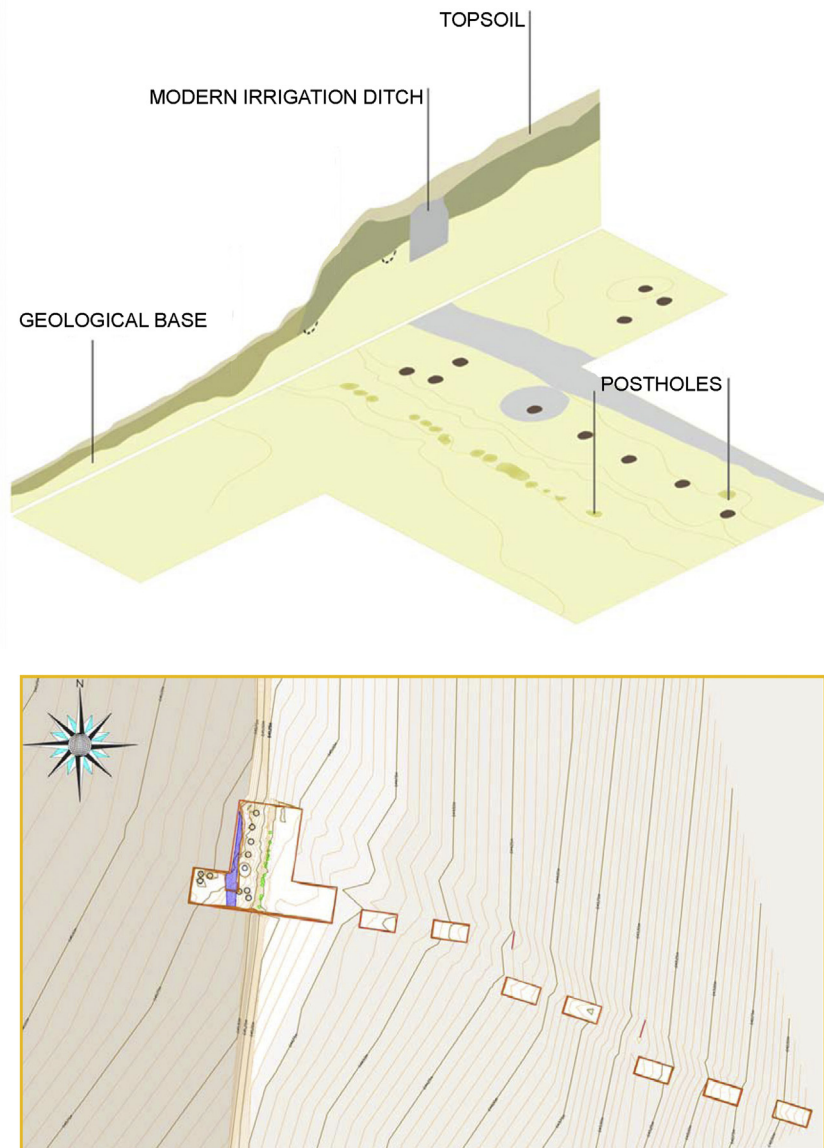


Fig. 7. Test Trench 3 in the Carthaginian camp (Camp A). Palisade (postholes).

3.3. Moments and actions: an approach to micro-times in archaeology

Based on different analytical aspects and scales, the archaeological interpretation is that this is the location of a battle site from the Second Punic War, which we have identified as the battle of Baecula (Bellón et al., 2004). We must reiterate that this is a research process that has gone through different stages from the location of this scenario to its specific analysis, supported by archaeological studies that have used different data and information. We currently have an aggregational or contextual archaeological visibility –the result of archaeological analysis– that allows us to take a micro-spatial approach to an expanded area that includes camps, troop movements, and the *oppidum* after which the battle is named. All this multiplies the size of the area involved in the battle action itself, on the scale of a landscape defined by its natural and cultural horizons, making it four or five times larger than the restricted site of the event.

The reconstructed sequence of the battle of Baecula constitutes a challenge for archaeological research, since the action was limited to a very short time, probably eight or nine days of activity on Cerro de las Albahacas, during which the actual battle was limited to the fourth day. Such short temporal processes, although linked to a specific action, i.e. an event, can be broken down into moments of activity expressed in stages. Seventeen moments have been established for the battle of Baecula, starting with the Roman skirmish at the gates of the first Carthaginian camp, through the key moments of the confrontation, the flight of part of the Carthaginian army and, subsequently, the departure of the Roman army. We have identified several of these moments archaeologically, including the construction of the Carthaginian camp on the summit of Cerro de las Albahacas, the Roman occupation of the same position, and the subsequent abandonment and intentional destruction of the site.

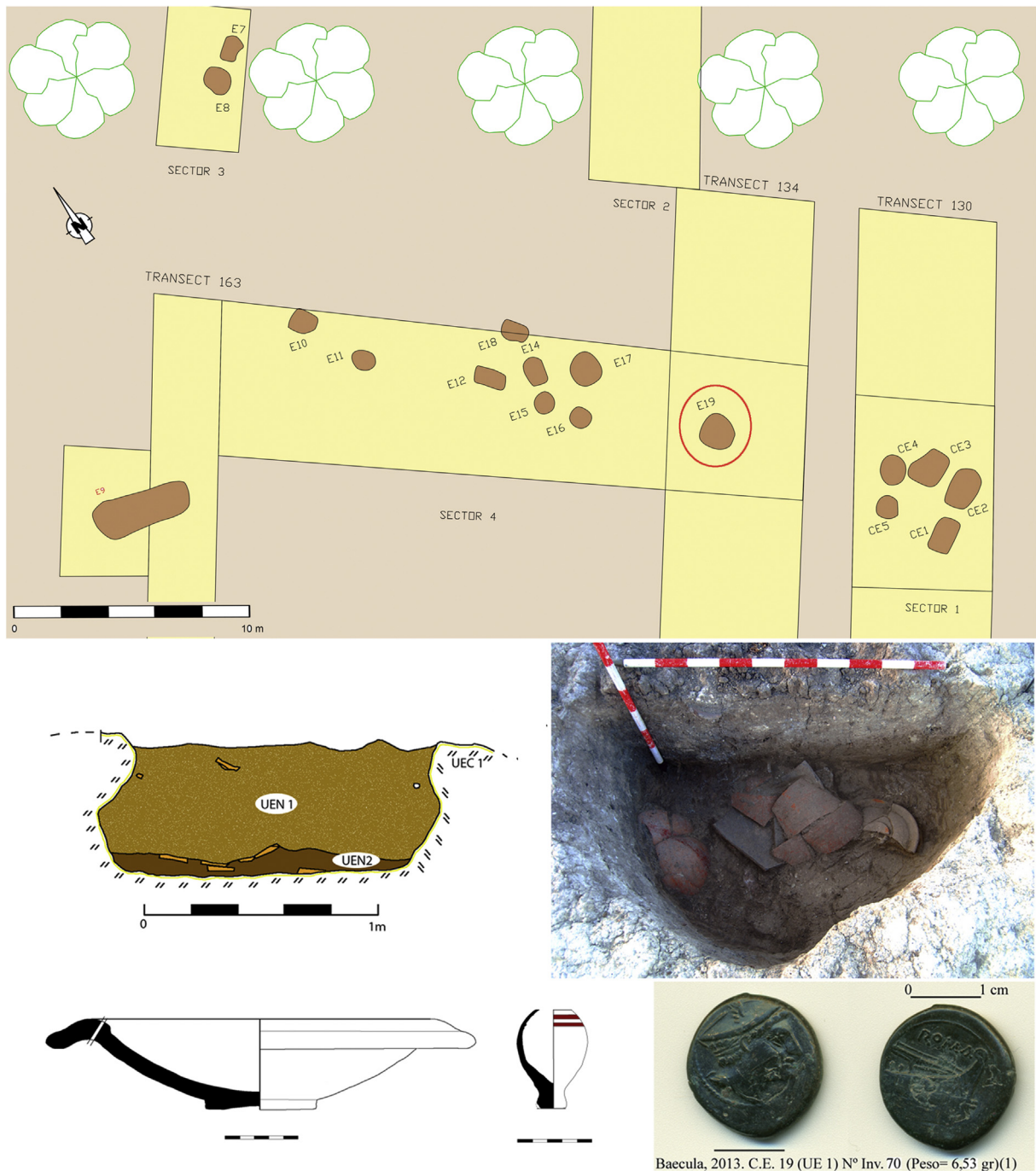


Fig. 8. Stratigraphy and imported finds from Pit 19. Carthaginian plate/mortar and ointment container (unguentarium) and a Roman semi-libral as (RRC 38/7).

4. Playing with the data: a test of the visibilities of the armies involved in the Battle of Baecula

Beyond the analysis of the distribution maps of the different types of artifact associated with specific types of troops or specific episodes in the course of the confrontation (for example, the greater or lesser presence of arms involved in hand-to-hand combat), the possibilities of GIS applied to this type of context are extensive. We are in an initial phase of exploring the capabilities of GIS when applied to the study of a battle scene. We present here the first trials relating to the studies of visibility on the battlefield

related to the precise zones in which the armies were positioned, the limits of the camp zones, and the specific fronts detected on the battlefield.

The availability of archaeological analysis of visibility using GIS has allowed the application of methodologies based on a larger amount of data, thus making them more representative and satisfactory (García et al., 2006). The evaluation of visibility in landscape archaeology has been given greater importance, mainly due to its strategic attributions (Criado, 1999). As a general rule, the field of vision from settlements has been evaluated, either in their immediate surroundings or using criteria of intervisibility with

This initial calculation of the viewshed was proposed not with any direct relation to the battle scenario, but rather to reliably represent the visibility from the summit of the hill with respect to the territory it overlooks. We therefore chose to calculate the visibility within a radius of 12 km from the central point of the polygon with which we delimited the camp areas, calculating its visual control over an area of more than 450 km².

The first step was to digitize the surroundings of the camp zones using a vector file (.shp) that was converted into a raster file with a cell resolution of 10 × 10 m. In other words it was divided into 7805 cells of 100 square m distributed evenly over the whole camp area. A central point was assigned to each of these cells, obtaining a total of 7805 equidistant viewing points, to which we assigned a viewing height of 1.7 m above ground level.

The analysis of visual control from the camp areas on Cerro de las Albahacas allowed us to interpret a series of key factors affecting the choice of the site for Hasdrubal's Carthaginian camp and, ultimately, the battle scenario (Fig. 9). Firstly, it has full and direct visual control over the Iberian *oppidum* of Los Turruñuelos, located some 3 km to the southeast and identified as the Iberian town of Baecula (covering an area of more than 20 ha). It offers considerable visual control both to the north –to the southern slope of the Loma de Úbeda hill and up to its summit– and the northeast, visually dominating the first foothills of the Sierra de Cazorla and the right bank of the River de la Vega, especially up to where it flows into the River Guadalquivir. Of particular note is the almost complete visual dominance of more than 20 km of the River Guadalquivir basin, stretching from the area of the present-day La Cerrada dam (to the

southwest of Cerro de las Albahacas) to almost as far as where the River Aguascebas flows into the River Guadalquivir to the northeast. To the south it also has extensive visual dominance, although this is somewhat decreased in parts by various hills of a certain size in a highland area with a more uneven landscape and scattered hills and hillocks that stretch as far as the Guadiana Menor valley. To the southeast, the Cerro de las Albahacas camps have large areas that are obscured by the proximity of larger hillocks and hills, including Loma del Quintanar, 3.7 km from the summit of Las Albahacas, and Cerro de Cabeza del Rey, 7.5 km to the southeast. It is possible that a large part of Scipio's Roman camp was not visible from the Carthaginian camp, although it could be seen clearly from their highest location.

Another interesting aspect is that this territory appears to have played a fundamental role in the communications routes of the Alto Guadalquivir, thanks to the presence of numerous historic fords in the zone. At least four fords across the Guadalquivir can be seen directly from the camp. Especially noteworthy is the visual control of the ford opposite the *oppidum* of Turruñuelos, barely 2.5 km from the camp.

In this context, the position and orography of Cerro de las Albahacas makes it an excellent lookout post from which to control the road from Tugia to the Guadalquivir river plain around Turruñuelos. There can be no doubt that Cerro de las Albahacas is a strategic control point covering an expansive area. This fact may explain the Carthaginian army's selection of this site to set up their camp. The choice was neither arbitrary nor improvised.

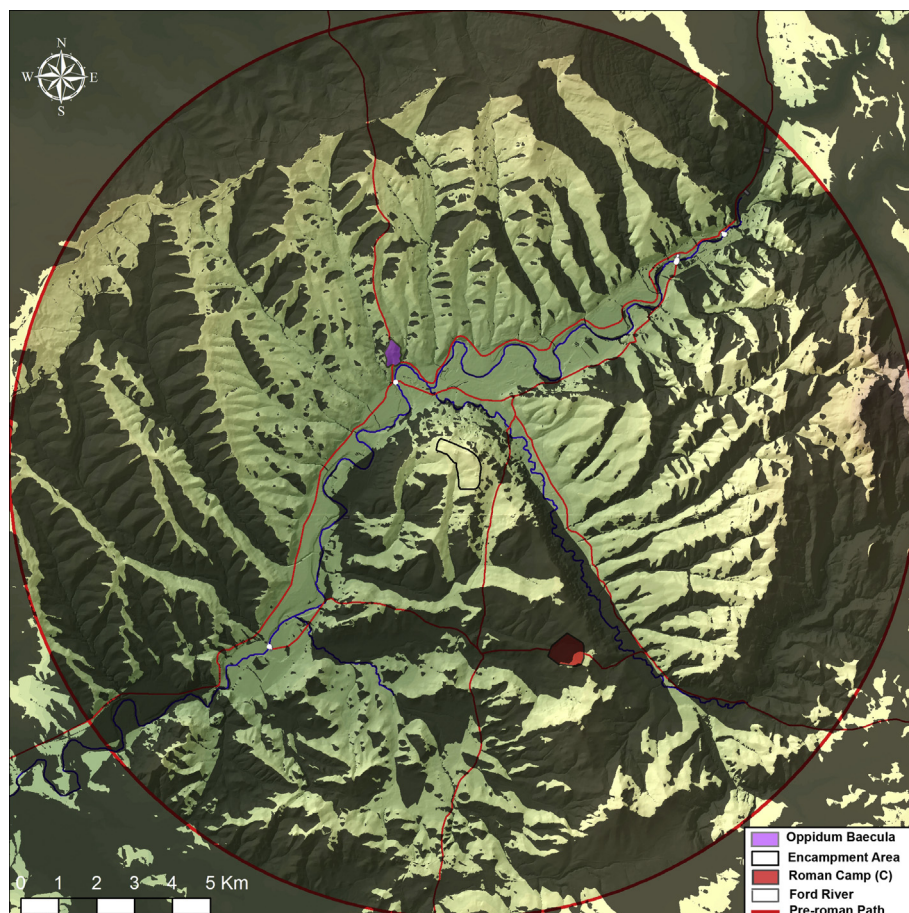


Fig. 9. Visual control from the Cerro de las Albahacas camp areas in a 12-km range.

4.2. Change of scale: zooming in on the battle

Thanks to the results of the investigations carried out on Cerro de las Albahacas in the last ten years, we are now in a position to identify the scenario of the battle of Baecula. The camp areas associated with the confrontation have been delimited archaeologically; we have identified and delimited specific areas and actions in the development of the events. We have detected and delimited archaeologically the places in which the armies formed and the zones where the initial clashes described by the literary sources took place.

Therefore, the change in the scale of analysis (microspatial) involves a changing the Digital Elevation Model (DEM) used to adjust to this new micro-territorial scale. We have a DEM with a cell size of 1×1 m covering an area of approximately 1150 ha, in which the central nucleus of the battle is found. On such a small scale we were interested in ascertaining the visual control between the four zones that were key to the unfolding of the battle: the Carthaginian camp, the formation of the Roman front, the Carthaginian front, and Cerro del Glande, which may be the “lower plain to which they sent down the Numidian horsemen and the Balearic and African light arms bearers” described by Livy (Livy XXVII 18, 5 to 7) (Fig. 10).

4.2.1. The Carthaginian camp

The perimeter of the camp was digitized, with a polygon delimiting an area of 53.7 ha. We used the National Inter-Ministerial Photogrammetric Flight aerial photography taken between 1977 and 1983 and data obtained from the archaeological

surveys and excavations. Once again, using the same methodology, the polygon delimiting the camp by means of a shape file was converted into a raster file, in this case with a cell size of 5×5 m, obtaining a total of 5385 cells, to which we added a value of 1.7 m for the viewer height.

The resulting model (Fig. 11.1) shows a visual control representing two large, almost symmetrical areas, while toward the west, southwest and northwest the visual control is very poor. It is practically limited to a direct visual link to almost the whole of the Arroyo de los Estopillos basin and Cerro del Glande hill in the foreground. There is an enormous obscure area covering the head of the Arroyo de la Cañada Negra basin.

Finally, a large part of the eastern slopes of the Arroyo de la Cañada Negra can be seen in the distance from the camp. This means there is virtually no direct view of the central zone of the battlefield. However, the eastern area is almost completely visible, only interrupted occasionally by the pronounced slopes descending to the River de la Vega. Likewise, it exercises total control over the stretch of cattle road that still exists today and descends through a ravine to the River de la Vega. This communications route may be the ancient road previously referred to as connecting the *oppida* of Tugia and Turruñuelos-Baecula, which would have joined up with the Via Heraklea from the Guadiana Menor after ascending to the county of La Loma.

4.2.2. The Carthaginian front

The classical sources give a detailed description of the topographical features of the hill: “opposite of the stockade there was a

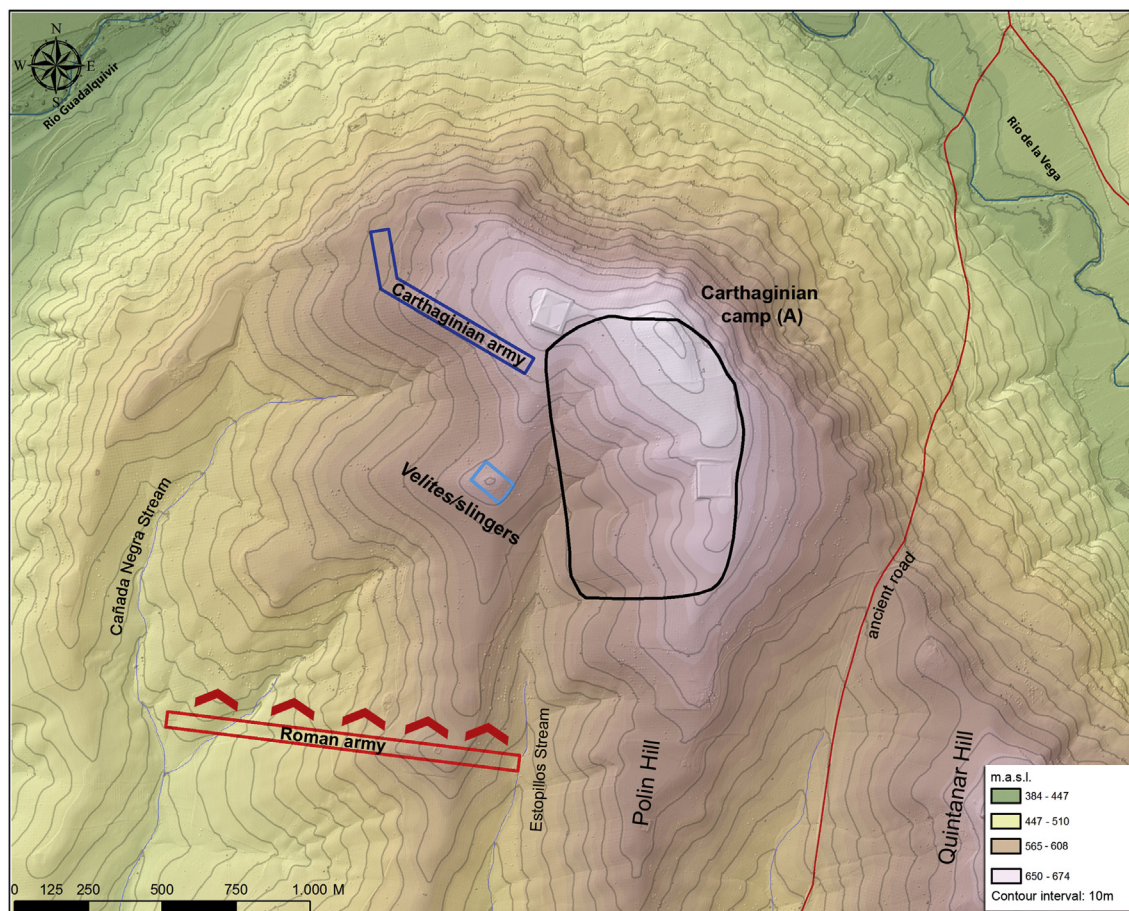


Fig. 10. Cerro de las Albahacas with the positions of the armies just before the battle.

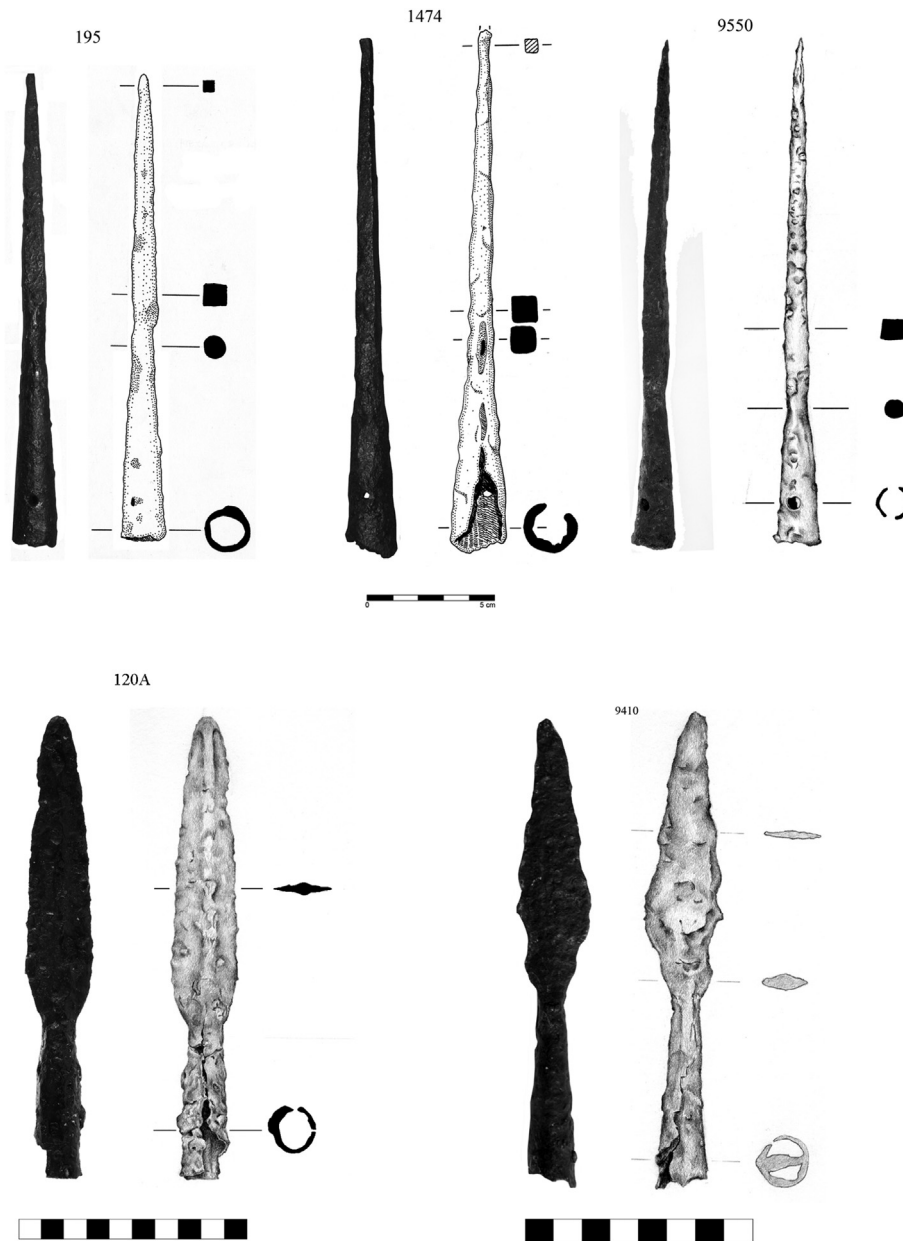


Fig. 12. Some examples of javelins and spears found in the area.

control of Cerro del Glande highlights the strategic importance of this promontory during the course of the battle (Fig. 11.3). It has an almost total visual control of its immediate surroundings, which is substantially reduced from the 500 m of reference established as the calculation buffer radius. It has direct visual contact with a large part of the Carthaginian front, as well as with Camp A to the north and east respectively. To the south it controls a large part of the area in which the Roman army formed. However, it has large obscured areas towards the east, mainly the western slope of the Arroyo de la Cañada Negra, controlled from Camp A.

The visual control from the Carthaginian front and Cerro del Glande (Fig. 11.4) are complementary in that they dominate almost the whole battle scenario. From both positions it would have been possible to see the formation of the Roman army, a large part of its advance to Cerro del Glande, almost all of the head of the Arroyo de la Cañada Negra, and the Carthaginian camp. However, the sum of the two viewing zones clearly shows

the absence of any view from the Carthaginian positions on the northern, eastern and western slopes of Cerro de las Albahacas. Therefore the Carthaginian positions deployed on the battlefield had no direct view of the road across its northern slopes along which the bulk of the Carthaginian army withdrew, following the aforementioned route between the *oppida* of Tugia and Baecula.

Nevertheless, if we combine both positions of the Carthaginian army, the visibility from Camp A does exercise considerable control of the scenarios. The visibility covers the battlefield and the route of retreat, a context we have interpreted as a determining factor in the strategic action taken by the Carthaginian general as a planned evasive measure in the face of the Roman attack (Bellón et al., 2015b: 533–588). This was possible thanks to the distances of the positioning of the respective camps and the topographic configuration of the scenario we present here.

this way we created a rectangular polygon 1196 m long and 50 m wide, making a total of 6.31 ha. We established a total of 2088 evenly distributed viewing points with a viewer height of 1.7 m and a point in the centre of each of the 25 m² cells into which we divided the theoretical Roman front (Fig. 13). With this polygon we aimed to ascertain what the Roman army would have been able to see once it had been deployed in battle formation.

The result of the Roman front viewshed analysis shows us a reduced visual control conditioned by the topography of Cerro de las Albahacas (Fig. 14). Although it offers almost complete control of its rearguard (southern area) and practically the whole Carthaginian camp, Cerro del Glande and its western extension, located 850 m from the Roman front, act as a barrier, hindering the view of the Carthaginian army front and precluding visual control of the head of the Arroyo de Cañada Negra, a zone that would be obscured shortly after the central nucleus of the battle took Cerro del Glande. Towards the east, visual control was limited by the Loma de Polín hill, which prevented a direct view of the path descending to the River de la Vega. Its visual control is curtailed in a disadvantageous position and at no time is it greater than 1.5 km towards the north, impeding the view of the northern and eastern limits of the Carthaginian camp, as well as of the northern slopes of Cerro de las Albahacas across which, as we have already seen, the Carthaginian army retreated.

5. Results and discussion

These first tests of the use of GIS tools on a battlefield were very selective and oriented towards the internal analysis of a process that took place over a very short time in a large area. This is unusual for the visual analyses traditionally applied in archaeology. Nevertheless, the battlefield offers other possibilities, such as combined studies of artifacts and topography through buffers and formulas that allow us to determine the firing positions of specific projectiles, the location of specialized army corps, etc. Moreover, we are dealing with an archaeological record that must be understood within a dynamic context. Abandonment was the result of specific processes we know of from the specialized bibliography: troop movements, the launching of projectiles that are lethal within specific ranges, etc. It is this subject that offers the most promise for the use of GIS analysis.

In this case study, the application of the visibility models to the troop positions was effective, given that they were directly related to the planned evasion maneuver carried out by the Carthaginian general, Hasdrubal Barca. The choice of the site where the camp was set up was fundamental and indicates prior knowledge of the place and its strategic possibilities.

There is another element to emphasize in the discussion of the battle scenario: the distance between Camp C (from where the Roman attack was launched) and Camp A (the Carthaginian camp). These positions are separated by a distance of approximately 7 km, enough to facilitate the aforementioned planned withdrawal maneuver carried out by the Carthaginian army (Bellón et al., 2015a). In orderly retreat, it was quickly able to reach the zone of the fords across the Guadalquivir, while the visibility of the Roman army was impeded.

We have no similar trials or studies for ancient battlefields. Moreover, our case study is the only one available for the Second Punic War, making it a methodological laboratory currently under analysis and with enormous research potential.

Acknowledgements

We would like to thank M. Navazo, J. Jordá and A. Maximiano for their kind invitation to participate in this edited volume. This work

was supported by the Project of Excellence *Iliturgi: conflicto, culto y territorio* (P12-HUM-2619) and the Project *3D y SIG para la interpretación y difusión de un acontecimiento histórico-arqueológico: la Batalla de Baecula en el camino de Aníbal*, R+D+i Projects for Young Researchers (MINECO, HAR2014-59008-JIN).

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