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Roman Camp and Fort Design in Hispania: An Approach to the Distribution, Morphology and Settlement Pattern of Roman Military Sites during the Early Empire

ZUSAMMENFASSUNG

Die zunehmende Anwendung von Low-Cost-Methoden, welche Fernerkundungstechniken, GIS-Software und Prospektion kombinieren, hat die Erforschung der römischen Militärpräsenz im Nordwesten der Iberischen Halbinsel revolutioniert.

Die neuen, detaillierten archäologischen Daten erlauben bei der Untersuchung römischer Militäranlagen nun genauere Analysen des jeweiligen Standortes und der Morphologie. Es ist so nun möglich nachzuzeichnen, wie die theoretischen Grundsätze der *metatio castrorum* an die örtlichen Gegebenheiten angepasst wurden. Dieser Beitrag befasst sich mit drei Hauptaspekten: Morphologie, Verteidigungssystem und Standortmuster. Dennoch stellt er notwendigerweise nur eine Annäherung an diese Thematik dar.

ABSTRACT

The aim of this paper is to discuss some topics traditionally disregarded by the Spanish historiographical discourse due to the scarcity and heterogeneity of the archaeological data available. Luckily, in recent times the development of cost effective, specific methodologies based on the combination of remote sensing techniques, GIS software and archaeological field survey has revolutionized the studies on the Roman military presence in northwest Iberia. Consequently, the existence of new, detailed archaeological data allows the development of more precise morphological and locational analyses for the study of Roman military sites. Thus, we can now delve into the ways in which the theoretical principles of the *metatio castrorum* were locally adapted. This work is just a mere approach to this issue through the review of three main aspects: morphology, defensive system and locational pattern.

CALIBRATING THE ARCHAEOLOGICAL EVIDENCE

Only a dozen Roman military sites had been documented north to the River Douro by the end of the 1980s[1]. Fortunately, the development of urban archaeology and the improvement of field survey techniques opened the door to a new era in the following decade (Fig. 1)[2]. By the beginning of the 21st century not only had the number of sites discovered more than doubled, but also the archaeological evidence began to diversify. A series of temporary sites (marching camps, small fortifications and siege scenarios) relating to the Asturian-Cantabrian Wars (29–19 BC) or the immediate post-war period were found in the northern mountains[3]. This situation implied a gradual change of the static views on the Roman military presence, mainly based on the intensive study of permanent settlements.

The increasing use of remote sensing techniques (historical and modern aerial photography, satellite imagery, aerial LiDAR, photogrammetry) and geographic information systems (GIS) has accelerated this process in recent years[4]. By the beginning of 2016[5] over a hundred Roman military sites had been identified in northern Iberia[6], but only about 10 % of them could be somehow defined as permanent. Moreover, the discoveries were not limited to the Northern Spanish Plateau or the Cantabrian and Asturian regions, the traditional areas of study of Roman military presence: also the Galician and northern Portuguese territories began to show an unexpected archaeological potential.

A DIVERSIFIED MORPHOLOGICAL REALITY

A certain degree of heterogeneity should be expected when managing a large amount of archaeological data[7]. A close reading of the ancient theoretical treatises on castrametation reveals that no morphological solution was preferred, as long as the fortification followed a single rule: to maximize the internal area designed for the troops within a minimal defensive perimeter[8]. However, the adoption of a square/rectangular model was the solution preferred by the Roman army for practical reasons (Fig. 2)[9].

Our analyses seem to confirm this point, since the largest proportion (35.8 %) of the Roman military sites located north to the Douro shows a rectangular plan (Fig. 3)[10]. The percentage could be increased with the addition of the five square examples (4.2 %) and the 15 sites (12.5 %) which seem to follow an original square/rectangular pattern but are not completely preserved nowadays. Even the seven trapezoidal figures (5.8 %) could be considered a deviation of this general model.

The 14 ovoid-circular fortifications occupy a second place in the ranks (11.7 %), being the favourite solution for small *castella* or fortlets (33.3 % of them show this layout). Other

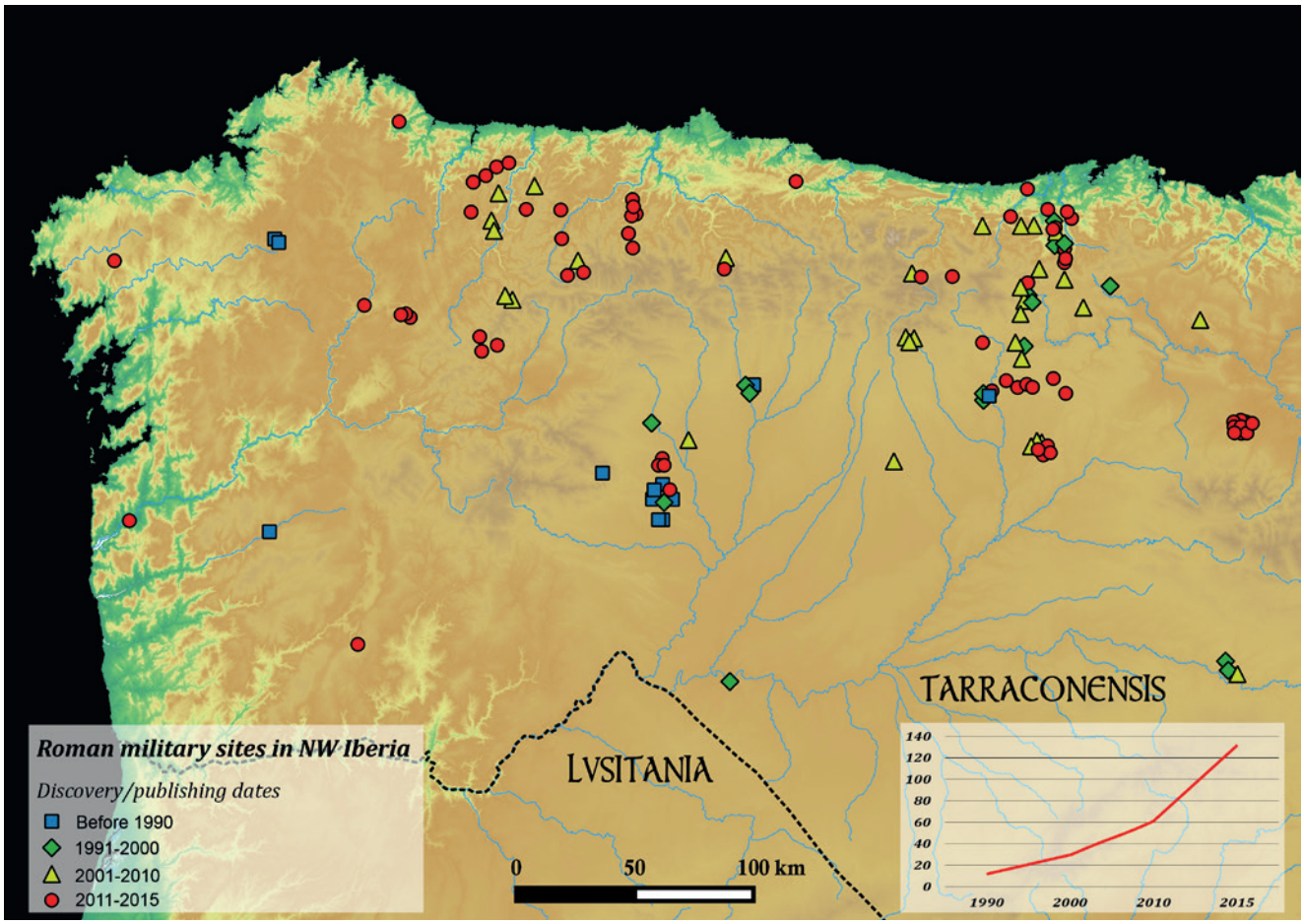

Fig. 1: Distribution of Roman military sites in northwest Iberia. Date of discovery/publishing.

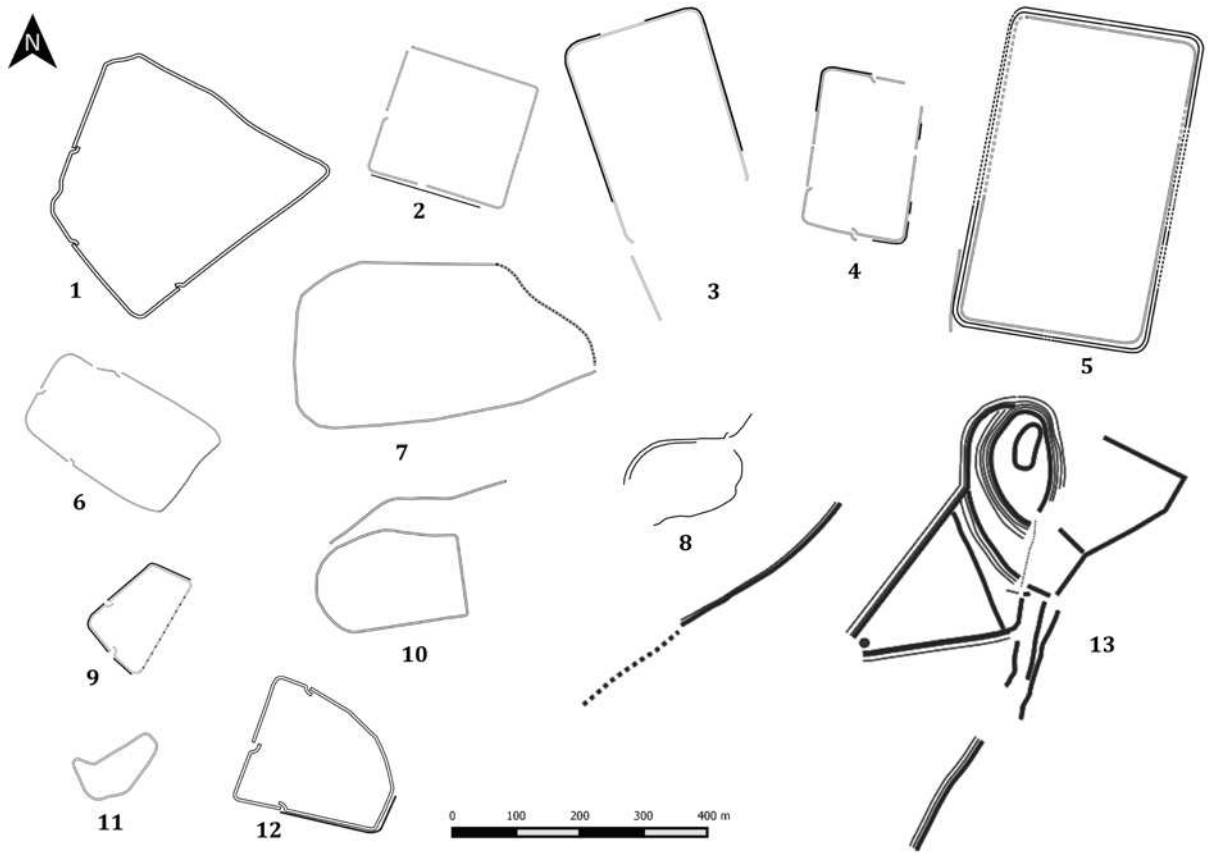

Fig. 2: A sample of the morphological diversity: El Xuegu la Bola (1), Cabianca (2), Monte dos Trollos (3), Valdemeda (4), Los Llanos (5), El Chao de Carrubeiro (6), A Pedra Dereta (7), La Garita (8), Moyapán (9), Llagüezos (10), A Recacha (11), A Serra da Casiña (12), Monte Curriellos (13). For locations cf. the paper of Costa-García et al. in this volume, 903 fig. 1.

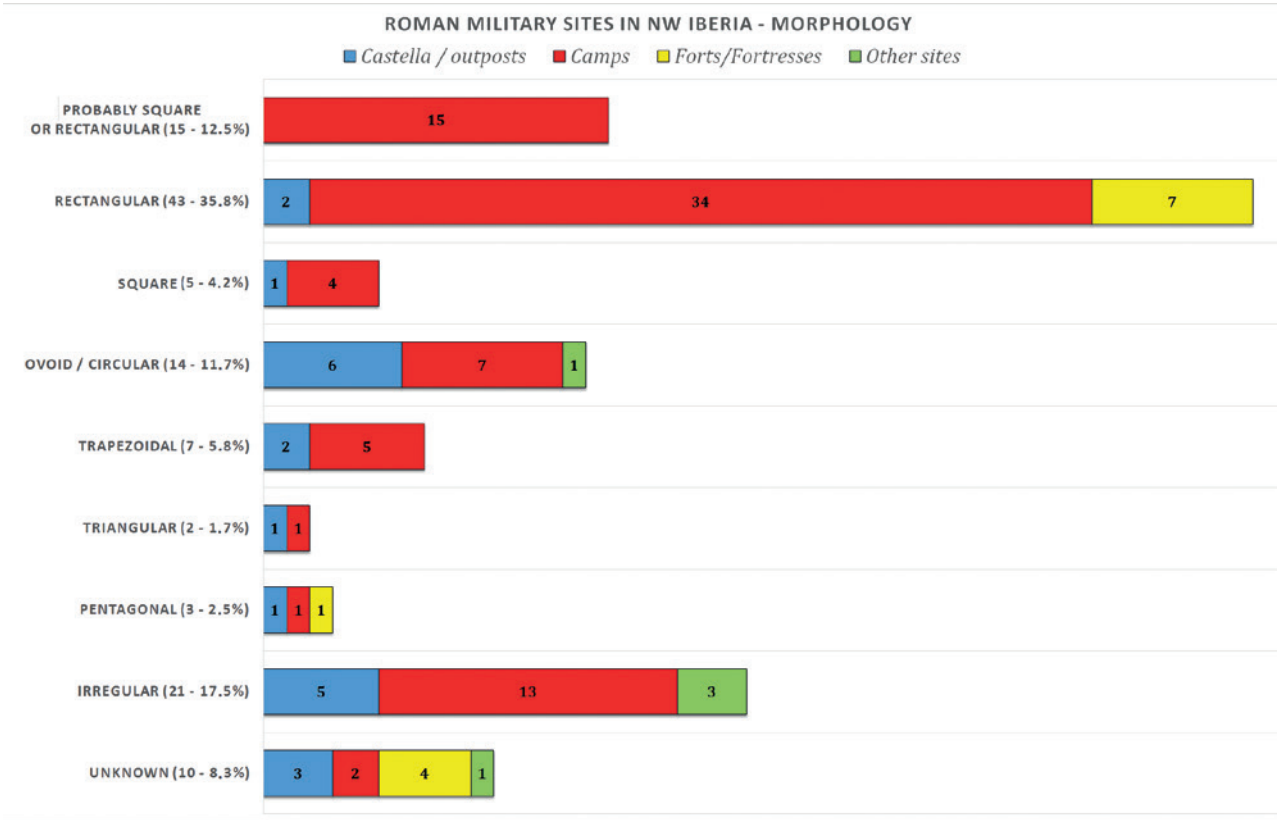

Fig. 3: Morphology of the sites studied here. Absolute values.

polygonal shapes, such as triangular (1.7 %) or pentagonal (2.5 %) figures are far less represented. Among the 21 irregular sites documented (17.5 %), several categories can be found: expanded enclosures, sites very dependent on the orography, linear defensive systems, and even reoccupied Late Iron Age settlements. The actual layout of ten sites (8.3 %) is entirely unrecognizable.

Although a strict distribution pattern cannot be detected (Fig. 4), the local orography usually determined the choice of a given morphological solution when establishing a military settlement. Furthermore, the adaptation and redrawing of the chosen theoretical modules was frequently forced. Thus, a more heterogeneous situation is registered in the mountainous areas, even among sites labelled under the same category (i. e. *castella*, marching camps etc.). For instance, the sites of A Penaparda (Galicia/Asturias), El Pico el Outeiro and A Pedra Dereta (Asturias) are three marching camps similar in size, but showing different morphologies. They follow the same mountain range and even if we cannot discard the diachronic possibility of three independent military units operating in the area, it seems more plausible that a single unit varied the shape of its camp during the advance into enemy territory.

The permanent camps demand special attention. The actual plan of some of them is not recognizable due to the difficulties of urban archaeology, as is the case in Herrera de Pisuerga (Palencia) and Astorga (León). However, the regular playing-card layouts seem to have been the general rule (58.3 %), providing we omit slight deviations observed in León (due to the local topography) and Rosinos de Vidriales (owing to the replacement of earthen ramparts by ones in stone). Precise patterns can be observed at those sites explored over a larger extent. For instance, the size (ca. 2.6 ha), module (6:5) and internal layout of the Flavian fort of Bande and the Trajanic-Hadrianic fort of A Cidadela (Galicia) are quite similar, revealing that these sites were probably constructed following the same plan[11].

A NOTE ON THE DEFENSIVE SYSTEMS

The Roman military sites of Early Imperial times in Iberia rarely show complex defensive systems. For instance, temporary fortifications with more than a single ditch are quite unusual. Surprisingly, these sites are mainly located on the Northern Spanish Plateau, far away from the mountainous zones where the Asturian-Cantabrian wars took place. There, the hardness of the soils often hindered the digging of a proper ditch, so the camps and small outposts were sometimes mainly defended by a rudimentary rampart of earth and stone. Regarding other defensive features, the gates protected by *claviculae* have been documented in up to 28 sites (27 % of the temporary camps and small fortifications in this study) (Fig. 5). On the contrary, the use of *titula* has been barely attested so far.

There are some impressive examples of the degree of complexity that these sites could achieve in northern Iberia, such as the famous sites of Monte Curriellos (Asturias) or Cildá (Cantabria) (Fig. 6). However, the multiple defensive perimeters, the terraced platforms and the use of *bracchia* were not a prerogative of those massive fortifications. Among the discoveries of recent years, some interesting morphological solutions can be perceived. For instance, the annex of the camp of Monte dos Trollos (Galicia) resembles that of La Poza (Cantabria); Picu Viyao and A Pedra Dereta (Asturias) show a triangular deployment of their *bracchia* similar to those of Monte Curriellos; Cueiru, Llagüezos, Llaurienzo (Asturias), Cildad and La Cabaña (Cantabria) also present multiple defensive lines or perimeters dividing different encampment areas. In the same

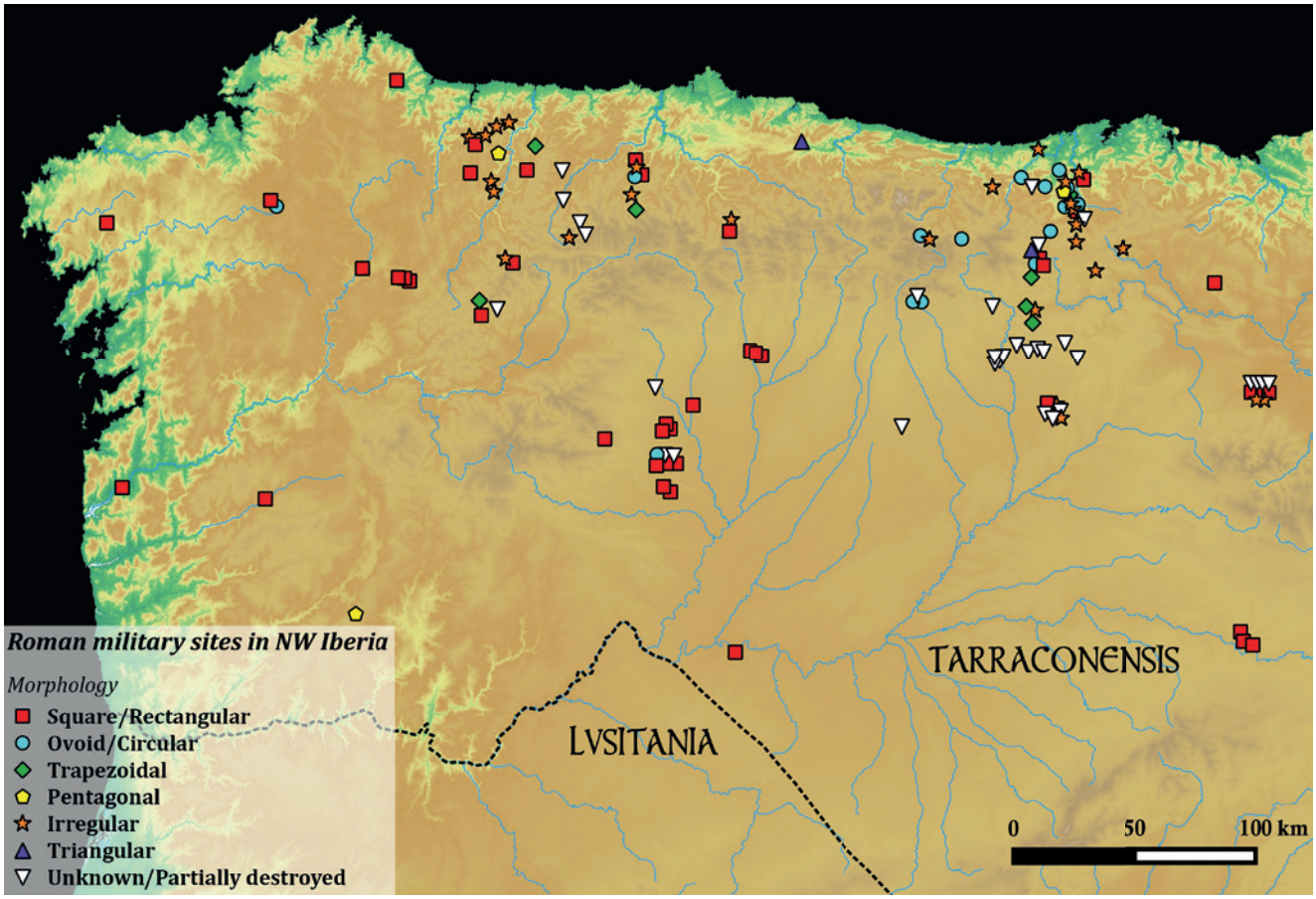

Fig. 4: Distribution of the Roman military sites in northwest Iberia. Morphology.

vein, the excavations at Monte Bernorio and Santa Marina (Cantabria), among others, revealed the reoccupation of Iron Age hill forts, the reinforcement of their old defences and the construction of new, stone walls. This phenomenon had been first detected in La Espina del Gallego (Canabria) at the beginning of the 21th century.

We know very little about the defences of permanent military bases during the Julio-Claudian period. *Fossae duplices* were detected in Astorga and Rosinos de Vidriales (phase 1), while the oldest archaeological contexts of Herrera de Pisuerga (phases 1 and 2) have not been properly clarified yet. The Augustan defensive system in León showed a box rampart and at least one ditch, elements replaced in Tiberian times by a new *agger* built with turves (*caespites*).

From the Flavian era onwards the masonry walls began to be the norm. Sometimes the old earth ramparts were replaced by stone, as the legionary fortress of León and the auxiliary fort of Rosinos de Vidriales (phase 2) show. However, the forts of Bande and A Cidadela were built in stone from the beginning. The slight morphological variations detected in their towers and gates could indicate the dating of the defensive systems, maybe reflecting their construction in the Flavian or Trajanic-Hadrianic periods. All of the related sites display only one ditch, except for León, where none has been detected yet.

DISTINCTIVE SETTLEMENT PATTERNS

The location of the camp was an issue naturally addressed by the ancient writers who dealt with the *castra metatio*[12]. Even if those treatises usually were ambiguous when dealing with this topic, two principles were commonly observed: the importance of selecting a "safe" place for the camp, and the need for the presence of some natural resources nearby.

Like many other aspects of the castrametation, the general ideas of a safe and supplied location rely more on the tight balance of certain variables than on the strict observation of all of them. For example, a location which is strong by nature does not necessarily imply a great altitude, but it should not be overlooked by higher ground. Equally, water was an essential resource and it could be judged as a positive agent or as a destructive element. Thus, the close presence of a spring or river guarding a flank of the settlement was always welcome, but locations prone to flooding were utterly avoided.

To a great extent the variables recorded by the ancient writers can sustain a GIS-based locational analysis. Issues such as relative height, local relief, slope, the close presence of water courses or optimal visibility are easy to register and quantify. Other variables cannot be reconstructed a priori due to the lack of reliable data, especially those aspects related to the ancient environment. However, supplementary palaeoenvironmental analyses could provide very useful information to fill this gap. Likewise, the exact position of the enemy and direction of the march could be also inferred from the placement of the gates in a camp[13], so a more accurate knowledge of the defensive perimeters is mandatory. In short, many difficulties could be overcome through specific, micro-level analyses of these sites following the most basic principles of landscape archaeology. Surprisingly, Roman military archaeology in Spain has shown little interest in this kind of approach up to date.

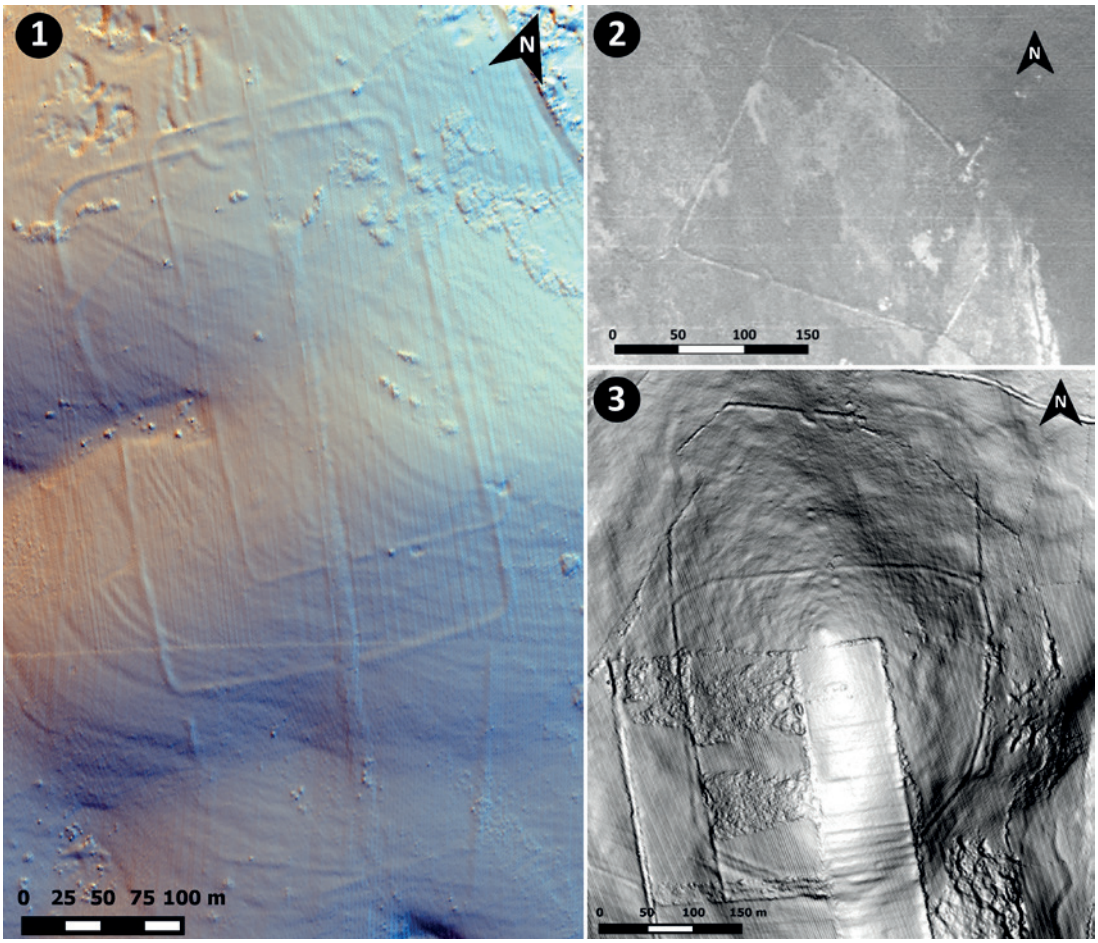

Fig. 5: The use of *claviculae*. The enclosures of La Poza (Multihillshade LiDAR-based visualization) (1), A Serra da Casiña (1946 USAF Aerial Photography - PNOA) (2) and El Cincho (Gradient slope LiDAR-based visualization) (3).

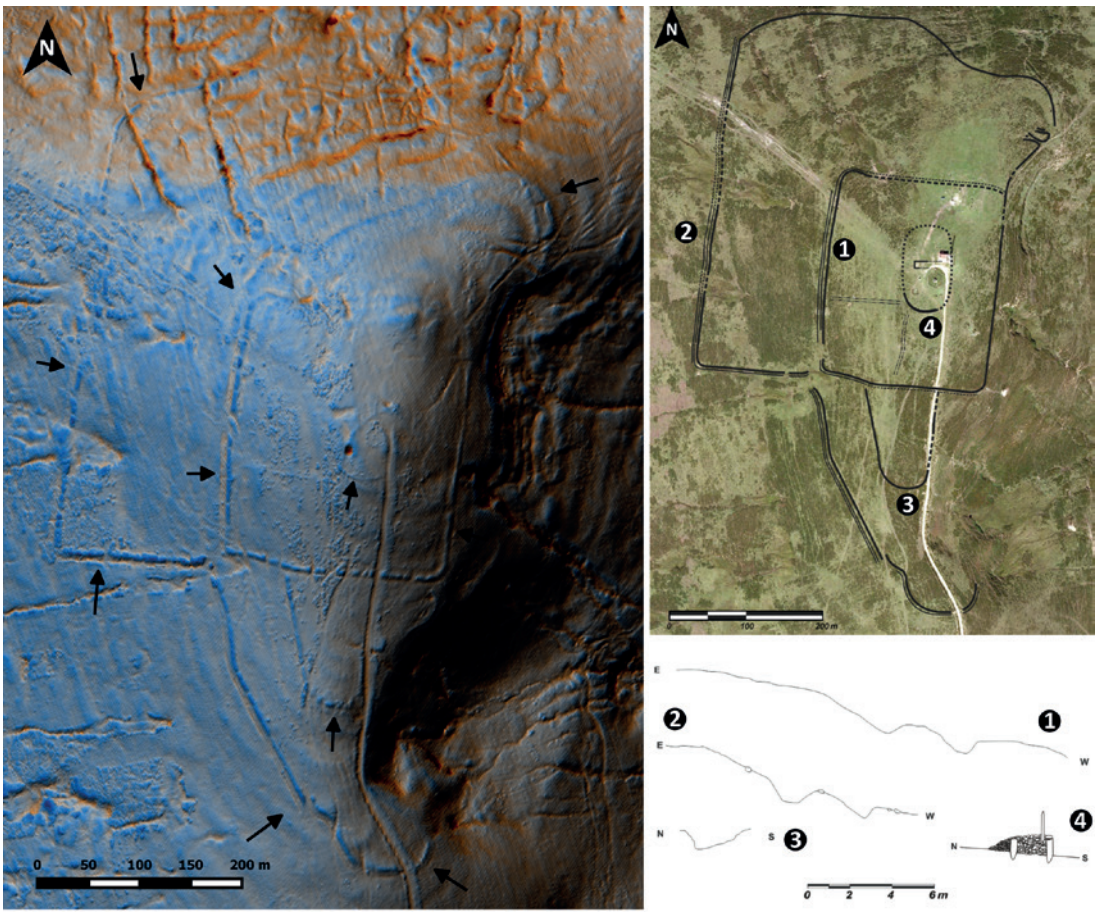

Fig. 6: The Roman complex of Cildá. LiDAR-based visualization using the Resampling filter of SAGA GIS (left); a plan of the site over PNOA orthophotography (above right); sections of the different defensive lines (below right).

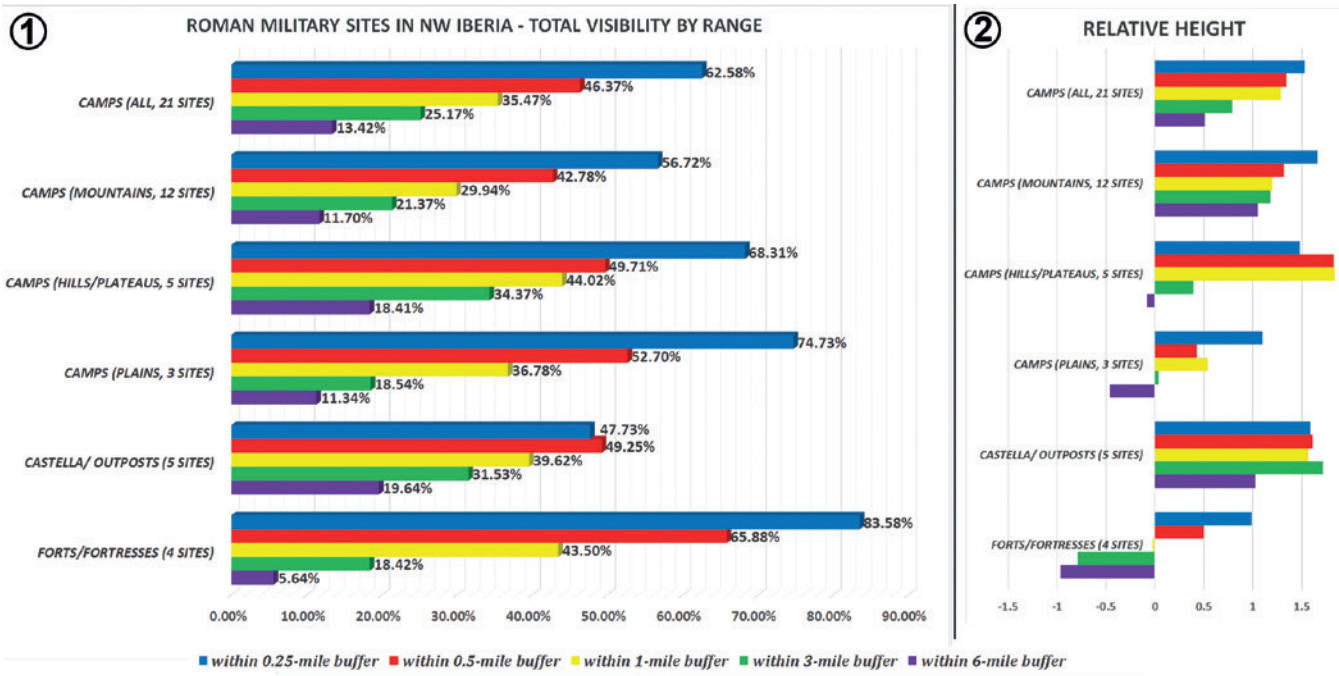

Fig.7: Total visual control of the surroundings of the sites (expressed in percentage values within a given perimeter) (1) and their relative altitudes (mean values of the sites compared to the mean values of the surrounding terrain delimited by a given perimeter, expressed in relative values between -2 and +2 points and within a set range) (2).

Due to the restrictions of the data available and the strict spatial boundaries of this work, the analyses using GIS software[14] were limited to a selective sample of 30 sites (25 % of the total). Regarding the variables taken into consideration, they were grouped under two main categories. The first one tries to delve into the locational pattern of the sites[15] and it comprises four subordinated analyses:

a) To define the position of the settlement bearing in mind some generic situations recorded in ancient manuscripts[16].

b) The calculation of the relative height of the site[17]. Five buffers based on Roman measures were defined in order to analyze this factor in different ranges: ¼, ½, 1, 3 and 6 miles.

c) The study of the local gradient[18]. This issue is important to define two aspects: the natural prominence of the position and the runoff of water (a basic logistic observance)[19].

d) The proximity of streams and to what extent they help to reinforce the defensive position[20].

The second category tries to define the visual control pattern of the sites. This approach includes both visibility and visual prominence analyses[21], in order to understand not only the way in which the sites effectively controlled the surrounding areas but also if they occupied a prominent place within those landscapes[22]. Five visual range areas were defined following the above-mentioned Roman mile buffers. This focus tries to detect specific behaviours considering the tactical, strategic and logistic nature of every site.

Do the marching camps (21 sites) follow the main rules of "safe locations"? To a great extent they actually do, showing a close relation with those theoretical principles. Their relative heights are over the mean altitude values of the surroundings, and that guaranteed a quite good visual control of them, at least in the closest ranges (below 1 mile) (Fig. 7). Nevertheless, specific patterns were also detected after grouping the sites in accordance to their generic location.

The first category includes the marching camps placed in mountainous areas (12 sites). They show a relative height always well above the mean (over +1 point), but that does not imply a better visual control due to the complex orography of these regions[23]. Indeed, it could be defined as highly selective, since the control of key positions such as mountain passes, hill ranges or the very accesses to the camp were prioritized over the complete control of the surroundings. The blocking of mountain routes or immediate access to water sources were issues commonly observed too, revealing that the final location of the sites was strongly dependent on strategic factors, as the orientation and morphology also were. The steep slopes (5–27 %) are also an understandable feature. The tendency to locate the rear part of the camp over the mountain ridges must be stressed, so the front gate of the site is usually placed on lower ground. All these issues probably reflect the fact that those settlements belonged to war scenarios.

The mountainous *castella* and lookout posts (5 sites) should be analyzed separately. They were placed on the most elevated but less accessible locations, so they were frequently isolated[24]. That situation also adversely affected the visual control in the closest areas, but in return it was enhanced in the farthest distances[25], allowing the surveillance of key positions and natural routes through mountain ranges and valleys. Those objectives probably were of certain importance during war and post-war eras, revealing policing scenarios.

The Roman camps established on plains (3 sites) present less prominent locations, especially in the farthest ranges. All the same, their visual control is among the best in the closest ranges[26]: fords, natural routes and passages can be commonly found in these zones. A more intensive use of

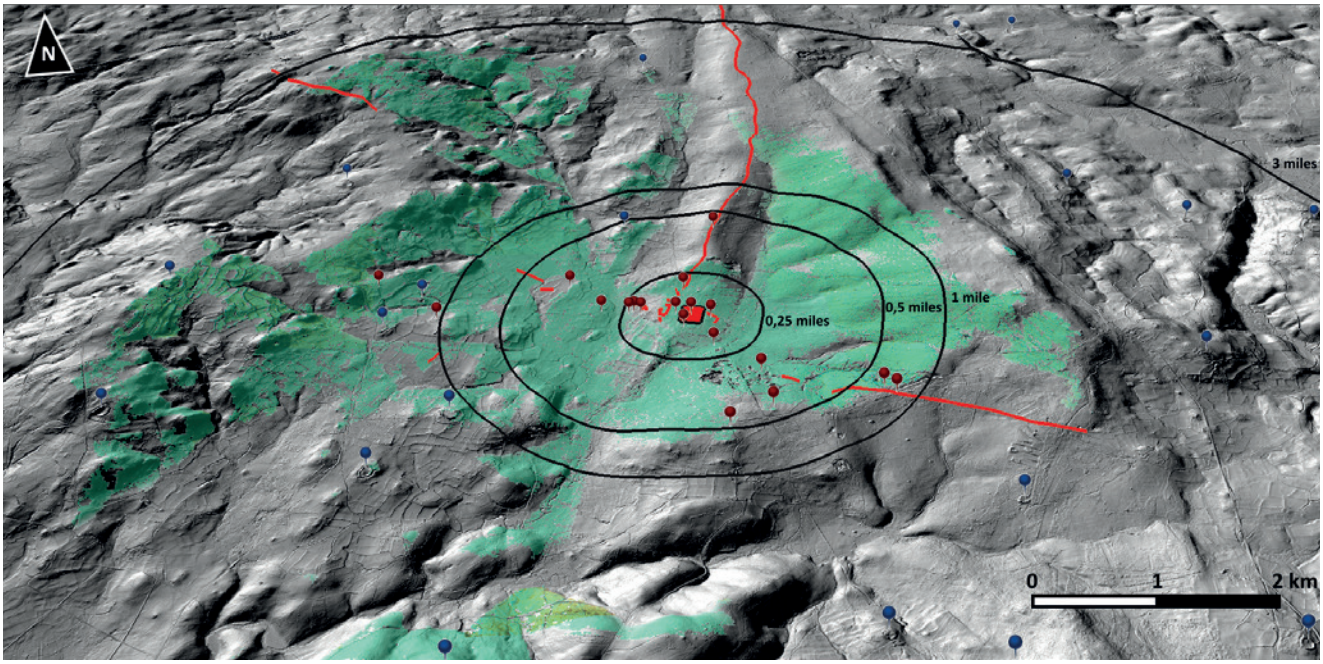

Fig. 8: The fort of A Cidadela. Visual control in relation to the Roman (red) and Late Iron Age (blue) sites.

streams to reinforce their position is also attested, so the locations near to river confluences were quite frequent[27]. Thus, these sites reveal a strongly premeditated defensive milieu and a strategic exploitation of the surrounding landscape. The gentle slopes (<1 %) allowed a smooth water runoff and the articulation of regular playing-card layouts.

One last category dealt with camps located on hills (5 sites). These usually occupy prominent positions over plains or valleys implying a more extended and uniform visual control[28]. Once again the overlooking of key positions such as natural passages or fords is very frequent. Likewise, meanders and confluences were commonly selected when placing these sites. As it happened with the mountainous examples, the gradient values were very dependent on the morphology of the hills (from <1 % to ca. 15 %) but it usually conditioned the layout of the enclosures to a lesser extent. There was also a tendency to place the rear part of the camp on the upper area of the hill.

Finally, the so-called permanent sites (4 sites) were usually positioned not in "safe locations", but in places suitable for life. Plains or hills with gentle slopes were preferred when establishing a fort or fortress, even if they were overlooked from higher ground in the vicinity[29]. However, these locations guaranteed excellent visual control over the immediate surroundings as well as providing a significant prominence in the close and medium ranges[30]. The preference for watersheds and confluences can almost be considered as a rule, and may reflect an attempt of delimiting a sort of military exclusion zone. Considering the complexity of the archaeological landscapes developed around these sites (Fig. 8), maybe the logistic principles were stronger than the strategic ones.

CONCLUSIONS

Despite the great progress made in the last decades, Roman military archaeology in Iberia is still developing as a discipline. Although a large amount of data has been accumulated through the years thanks to the gradual introduction of new techniques and methodologies, no monographic work has tried to synthesize that information or, at least, to classify it following typological rules[31]. The study of the Roman military presence in Spain seems to be anchored in descriptive approaches, ignoring the enormous need for more analytical perspectives.

This modest paper is just an attempt to break that inertia. Even considering the limitations of the archaeological data available, interesting conclusions can be extracted from the joint study of these sites through the simplest statistical and locational analyses. What is more, this research field is far from being exhausted and further analyses on the accessibility and defensibility of the sites could be implemented[32]. However, in order to really understand the impact of the Roman military in these territories, it is necessary to better understand the surrounding archaeological landscapes through comprehensive, interdisciplinary studies.

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1 Morillo 1991.
2 Morillo 2002; Peralta 2002.
3 Camino et al. 2007; Peralta 2006.
4 Menéndez et al. 2013.
5 This paper reflects the state of knowledge in March 2016, when it was submitted. Since then, new sites have been discovered in north-western Iberia.
6 Camino et al. 2015.
7 For this paper we have only taken into consideration those archaeological

sites where it is possible to attest archaeological structures linked with the military presence. The total number of individual sites (comprising the different phases of each site) is 120 (82 temporary camps, 21 *castella*/small outposts, 12 "semi-permanent" or "permanent" fortresses/forts, 3 defensive lines and 2 towers). Owing to space restrictions, the citations regarding these sites have been limited to a minimum. For an updated review we refer to the most recent monographic studies on the subject: Camino et al. 2015; Costa 2013; Morillo 2014.

8 Veg. mil. 1.22–23, 3.8.

9 Pol. 6.32–33; Ps.-Hyg. 21.

10 We are aware that this value also reflects the tendency of the discipline to immediately detect this canonical shape over other less obvious manifestations of Roman military presence.

11 Costa 2011.

12 Pol. 6.32–38; Ps.-Hyg. 57; Veg. mil. 1.22; 3.8.

13 Ps.-Hyg. 56; Veg. mil. 1.23.

14 Both ArcGIS 10.3 and QGIS 2.10 software were used for these calculations. The 5 m LiDAR-based digital elevation models (DEM) were granted by the Spanish National Plan of Aerial Orthophotography (PNOA). Some 1 m digital terrain models (DTM) were also generated from the interpolation of raw LiDAR data of the PNOA using LAStools (Repidlasso GmbH) and SAGA GIS software.

15 Parcero/Fábrega 2006; Stančič et al. 2000.

16 The morphology of the land (i. e. plain, hill, mountain, valley etc.), location on a summit or slope and the presence of higher ground in the surroundings.

17 RH = (SH-MA)/STD, RH being the relative height, SH the height of the site, MA the mean altitude of the analysis area and STD the standard deviation of the values of the mentioned area. A positive result implies a prominent position of the site, while a negative one indicates that it lies under the mean height values.

18 The gradient was measured from the epicentre of the site following four main axes, and the results are expressed in percentage values. G = ((H1-H2)/D) x100, H1 being the height at the site's epicentre, H2 the height at the end of each axis and D the horizontal distance between H1 and H2.

19 It can also help to define the orientation of the site, since the most elevated point was commonly reserved for the commander's tent and the front gate facing the enemy should be located in the farthest wall (Ps.-Hyg. 56; Pol. 6.32).

20 These values were obtained in degrees measuring from the epicentre of each site, after which they were converted to percentage values.

21 Llobera 2001; Llobera 2003; Wheatley 1995; Zamora-Merchán 2013.

22 These analyses were carried out using the Viewshed algorithm of ArcMap 10.3. For the visibility calculations the OFFSETA was set at 2.8 m (the sight height of a man – 1.6 m – plus the height of a regular *agger* – 1.2 m), the radius limited to 10,000 m and the Z Factor to 1.7 m (the height of a person). For the "visibilization" calculation the OFFSETA was set at 1.7 m and the OFFSETB at 1.2 m (the *agger* only).

23 Percentage values from closest to farthest range: 56.1 %, 42.8 %, 30.4 %, 22 % and 11.3 %.

24 Relative height values are over +1 point and they even reach +3 points.

25 Percentage values from closest to farthest range: 47.7 %, 49.2 %, 39.6 %, 31.5 % and 19.6 %.

26 Percentage values from closest to farthest range: 74.7 %, 52.7 %, 36.8 %, 18.5 % and 11.3 %.

27 In this way, more than 50% of the defensive perimeter was protected by water courses.

28 Percentage values from closest to farthest range: 68.3 %, 49.7 %, 44 %, 34.4 % and 18.4 %.

29 Relative height values usually became negative from less than a mile onwards.

30 For instance, the fort of A Cidadela visually controls more than 50 % of the territory within a 1 mile buffer. The visual prominence of the site is over 80 % within the same area.

31 Costa 2013.

32 Llobera et al. 2011; Parcero Oubiña 2013.

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