Papers of the British School at Rome **92** (2024), pp. 1–21
doi:10.1017/S0068246224000047

EMERGING EMPIRES AND OPPORTUNISTIC LAND-USE LEGACIES: TESTING A NEW MODEL ON ROME'S CONQUEST AND COLONIZATION THROUGH ARCHAEOLOGICAL SURVEY DATA IN THE TERRITORIES OF COSA AND TARRACO

by Anita Casarotto

This paper tests a new model to study the Roman conquest and colonization of the Western Mediterranean. This recent model depicts Roman expansion as a more sustainable process than previously assumed, which tapped into, reinforced and integrated wider Mediterranean settlement trends. Contrary to what is assumed by traditional narratives, colonization did not entail the immediate destruction and restructuring of native landscapes — but rather the integration, opportunistic reuse, appropriation and development of previous land-uses and settlements. Two legacy datasets collected through pedestrian survey in the colonial territories of Cosa (Italy) and Tarraco (Spain) were used to test this model on a supranational scale. The analysis indicated that certain portions of the native landscape were possibly integrated into the Roman Empire without initial drastic changes being reflected in the settlement patterns or the landscape.

In questo contributo si propone un nuovo modello interpretativo del processo di conquista e di colonizzazione romana del Mediterraneo occidentale, che si rifà alla teoria che vede nell'iniziale espansione di Roma un evento inseritosi all'interno di un fenomeno demografico ed economico generalizzato, già in atto nel bacino del Mediterraneo. Dalla presente analisi si evince che la colonizzazione non comportò un'immediata distruzione del paesaggio locale, ma piuttosto un'integrazione e un utilizzo opportunistico delle risorse, infrastrutture o insediamenti rurali preesistenti. Partendo dal riesame dei dati raccolti in precedenti progetti di ricognizione di superficie, vengono di seguito presi in considerazione due casi di studio: la colonia di Cosa in Italia e quella di Tarraco in Spagna. Sulla base della distribuzione spaziale degli insediamenti, l'analisi qui proposta evidenzia come certe porzioni territoriali sembrino essere state assimilate all'interno dell'impero romano senza particolari modifiche iniziali del paesaggio.

1. INTRODUCTION

Recent archaeological and anthropological scholarship on colonization has moved the focus of discussions on imperial expansion from the long-term impacts of colonialism for native communities (such as violence, cultural suppression, territorial transformations, settlement destruction and the relocation of peoples) to addressing the various stages of the colonization process. Especially, there is

a growing interest in the 'contact period', defined as the initial stage of cultural interaction between native and colonial communities.[1]

These studies stress the heterogeneity and complexity of this process, which varies greatly from context to context, while also highlighting a general trend in how colonial newcomers, for their own benefits, may have initially adapted to unknown territories and adopted autochthonous land-use practices to avoid a major restructuring of the landscape. Most conquered territories were not an empty, pristine, untouched wilderness — but were modified landscapes with settlements, infrastructures and services constructed by the native populations for their survival and growth (Ingold, 1993; Kolen, Renes, Bosma, 2016). In some portions of the landscape colonists may have thus encountered pre-existing land parcels, drainage systems and modification to the forests, vegetation and soil carried out by other inhabitants (Coughlan and Nelson, 2018). Rather than experiencing immediate destruction, these native landscapes resiliently survived through the inheritance, reuse and/or readaptation of the environment and land-use methods in later colonial periods.

The early conquest of the Americas by Columbus (1492–1502) represents a useful parallel case study that can be examined to understand potential Roman colonization practices. Recent research combining archaeological studies, historical sources and ethnographic surveys (Hofman et al., 2014, 2018; Hofman, Valcárcel Rojas, Ulloa Hung 2020; Herrera Malatesta, 2022) illustrated that the Iberian villages established on the island of Hispaniola (modern Dominican Republic and Haiti) after Columbus's first voyage targeted areas that had been previously abandoned or were unused by local communities, but which were easily defended. These areas were not particularly suitable for agriculture but, interestingly, were located at the margins of fertile rural land farmed by indigenous peoples or nearby previous settlements. These Iberian villages were probably established in these locations for the strategic access to indigenous peoples' resources, building material, infrastructures and land. In contrast to traditional narratives (cf. Kulstad-González, 2020), the early stages of the colonization of the Americas by the Portuguese and Spanish Empires probably did not cause an immediate, drastic and costly reorganization of territory. Instead, colonization was underpinned by an opportunistic strategy whereby colonial institutions maintained and exploited the indigenous knowledge of the landscape and the pre-existing structures and infrastructures for their own purposes.

The tendency in human behaviour to reuse what is already available, in terms of (agricultural) know-how, land-use and landscape infrastructures, is in line with the principles of least effort (Zipf, 1949) and ecological inheritance (Foster et al., 2003; Coughlan and Nelson, 2018) which manifest in our daily lives, history and nature. These concepts may cast a new light on the logic behind the settlement

[1] For example see Butzer, 1992; Bender, 2001; Sluyter, 2001; Silliman, 2005; Pelgrom, 2008; Stek, 2009, 2013; Verhagen et al., 2016; Nuninger et al., 2016; Düring and Stek, 2018; Coughlan and Nelson, 2018; Cherry and Ryzewski, 2020; Schneider and Panich, 2022.

choices made during early colonial periods. Humans generally opt for the optimal strategy, inheriting and taking advantage of readily available resources, building materials and/or structures to avoid the efforts and costs that the destruction and subsequent reconstruction would entail. This may occur, for instance, during the formative phases of 'start-up' enterprises — such as in the first colonial explorations and pioneering formations of colonies — when the initial resources available for investments are usually limited or new to the colonizers, and the lack of a reference against which to evaluate decisions hampers the long-term foresight of potentially risky actions. This may apply to situations where the local contexts are unfamiliar and social and environmental factors are unknown or unpredictable, such as during migrations in unexplored territories.

Recent reconsiderations of the conventional historical accounts in Roman archaeology have posited new observations that are in line with aspects of these anthropological concepts. Scholars have argued that the traditional image of Latin colonies during the early phase of mid-Republican colonization in central-southern Italy (late 4th–3rd century BC) must be corrected. The idea of agricultural city-states with urban centres and rigidly divided landscapes (typically by centuriation), created through resettlement and land reforms that swept away native landscapes, does not fit with the archaeological record.[2] The careful reinvestigation of archaeological survey evidence in the early colonial landscapes of Latin colonies founded before the Second Punic War has revealed that clustered settlements (e.g. agricultural villages) targeting specific ecological niches and separated by unoccupied land prevailed, instead of dense and geometrically ordered settlement distributions (e.g. mononuclear farms) placed according to regular land divisions.[3] Scholars have thus begun to question the logic behind such clustered settlement patterns.

1.1. A NEW INTEGRATIVE SETTLEMENT MODEL FOR EARLY ROMAN COLONIZATION

A new model has been proposed for one colonial territory in Southern Italy to explain the clustered pattern present (Casarotto, Pelgrom, Stek, 2019), which can be more widely tested using other case studies to assess its plausibility on a larger scale. Based on the reassessment of legacy survey data (Casarotto, Pelgrom, Stek, 2016; Casarotto et al., 2021) and new fieldwork results (Pelgrom et al., 2014, 2016), it was observed that colonial period settlements in the territory of the colony of Venusia (southern Italy, established in 291 BC) were clustered around the newly founded colonial town and within marginal niches that were not particularly favourable for agriculture. These niches

[2] Pelgrom, 2008; Pelgrom and Stek, 2014; Stek, 2017, 2018; Pelgrom, 2018; Casarotto, Pelgrom, Stek, 2019; Casarotto et al., 2021.

[3] Torelli, 1991; Pelgrom, 2008; Stek et al., 2015; Casarotto, Pelgrom, Stek, 2016; Stek, 2018.

bordered the rural catchment areas of native farming villages, many of which continued to be settled after the conquest during the colonial period. From these places the rural infill possibly infiltrated the native landscape and tapped into existing resources, organically absorbing and reusing previous settlements, their rural networks, roads, infrastructures, agricultural and pastoral practices and land-division systems (Pelgrom, 2008, 2018; Stek, 2018). Stek has proposed another example of a deviating colonial landscape — the colony of Alba Fucens (303 BC) in the Apennines — where villages around the Fucine Lake and transhumance routes dominated the settlement pattern. These villages were apparently geared towards lacustrine and transhumance economic opportunities rather than the expected agricultural economic framework, with colonization in this area clearly developing 'beyond the Romanising agro-town' (Stek 2009, 2018).

Coming back to Venusia, the pre-existing structured landscape created by pre-Roman communities over time was not erased nor immediately reorganized by colonial settlers. This is probably due to the heavy investment and cost its destruction would have required (Pelgrom, 2008). For agricultural purposes and other necessities, it was presumably easier (and certainly less costly) for the Roman colonial community to exploit the landscape as it was without major changes, at least initially. This can be plausibly argued as digital geospatial analysis has demonstrated that the organization of pre-colonial land-use was the most influential factor in settlement strategies during the Hellenistic period, instead of other physical environmental conditions in the territory of Venusia (Casarotto, Pelgrom, Stek, 2019). In the past, scholars have lent great importance to natural constraints — in particular to the favourable soils for types of agriculture — and have downplayed the influence of the territorial organization of native communities as being irrelevant or having been erased by the Roman conquest.[4] In contrast, geospatial analysis on data patterning has indicated that settlements in the territory of Venusia during the early Hellenistic and colonial period adapted to a pre-existing situation by preferentially occupying the available (unused or abandoned) space, regardless of its natural properties.

The initial organization of the settlements in Venusia during the colonial period was more sustainable than previously assumed, as it complemented, rather than replaced, the existing territorial organization by adaptively filling the relatively scarcely settled portions and inheriting other portions of the already-structured rural landscape, including some villages. While it is impossible, using survey ceramic evidence, to imply a direct link between the new settlements of the Republican period and an influx of Roman colonists (Dores Cruz, 2011), it is possible to formulate hypothetical scenarios for the observed settlement distribution by assuming that the settlements during the

[4] Salmon, 1969; White, 1970; Brown, 1980; Rathbone, 1981; Settis, 1984; Celuzza and Regoli, 1982; Carandini et al., 2002: 108–10; Járrega Domínguez, 2010; Ejarque et al., 2022. Compare the criticism of this view in Keay, 2001, 2013; Terrenato, 2001, 2007; De Cazanove, 2005; Bradley, 2006; van Dommelen and Terrenato, 2007; Pelgrom 2018; Grau Mira, 2022.

colonial period were inhabited by Roman colonists (these colonial groups were also diverse, having various ethnical and geographical origins; see Bradley, 2006).

Following this observation, several scenarios are possible. The first is that the genocide or expulsion of pre-existing communities was implemented by the aggressive Roman colonial power. Livy (9.45.17) posits that genocide accompanied the conquest of the wider area surrounding Alba Fucens. Another possible scenario is that indigenous peoples may have been relocated to marginal areas and that the colonial settlers occupied their rural properties, including some villages. Alternatively, local native communities may have been allowed to continue inhabiting their villages, but were forced to share a quota of the food production obtained from farming the surrounding countryside with the new colonial community living nearby in clustered settlements.

A hypothetical scenario explored further in this article is that the initial Roman expansion was an opportunistic more than an oppressive phenomenon of integration, driven by and evolving from the variable factors of local contexts. Roman expansion could have tapped into a wider, pan-Mediterranean phenomenon of rural infill, demographic growth and agricultural intensification also in marginal areas, a phenomenon that had already started in the early Hellenistic period (4th–early 3rd century BC), thus in pre-conquest times, and can be observed archaeologically in both the territories left uncolonized and those that were colonized.[5] In this scenario, Roman conquest and colonization are seen as an integral part of this large-scale Mediterranean settlement trend that began earlier, and are also conditioned by this trend. According to this integrative scenario, the colonial community, when settling a new territory opportunistically, could benefit from the nearby pre-existing assets by following an adaptive (clustered) rural settlement strategy (in which conflicts, frictions, competitions and negotiation for resources between colonial and non-colonial communities/elites that shared the same contested territory could be expected) that led over time to an organic integration and reuse of the native landscape without major restructuring.

Another scenario is linked to the limits of the survey methodology. The empty zones, and thus the resultant clustering in the survey record, instead of indicating scarcely settled niches might be due to methodological biases (Banning, 2002: 39–79; Van Leusen, 2002; Attema et al., 2020), including the inability of archaeologists to recognize in the field certain site types, such as small, simple farms, through traditional pedestrian survey.[6] However, recent research has shown that the effects of survey biases, such as surface visibility (Casarotto et al., 2021) or geomorphological processes (Casarotto et al., 2018), are primarily limited to finer scales of analyses (e.g. intra-site analysis in small-scale off-site surveys) and cannot explain the overall, ubiquitous, large-scale cluster patterns that manifest in a majority of colonial and non-colonial territories.[7]

[5] Keay and Terrenato, 2001; Terrenato, 2007; Attema, Burgers, van Leusen, 2010; Stek 2012: 244; 2013: 340–343; Peralta and Bernard, 2022.

[6] Jones et al., 1985; Cambi, 1999; Millett, 1991; Palet Martínez, 2005; Rathbone, 2008.

[7] Pelgrom, 2008; Attema, Burgers, van Leusen, 2010; Stek et al., 2015; Stek, 2018; Casarotto, 2018.

Independently of whether this clustered settlement pattern can be explained by past oppressive or opportunistic reasons, or by methodological difficulties in modern recording techniques, it is worth assessing whether the new integrative model proposed works as an additional potential scenario in explaining colonial settlement strategies of the western Mediterranean. This is applied through a GIS analysis of the settlement patterns underlying survey datasets collected in early Roman colonial regions of different countries. Previous regional surveys, including the research conducted in Venusia, have indicated clustering based on the survey datasets, which may provide grounding for this new integrative model of Roman expansion, challenging the long-held theory that Roman conquest and colonization entailed the destruction of native landscapes.

2. DATA

The selection of case studies was based on the types of available and accessible survey data. To implement a sound comparison, we attempted to limit the possibility that differences in site patterning between datasets was due to differences in recording techniques. Datasets were selected that had been collected by previous teams using the same or comparable survey methods in the same time-frame of the history of survey methodology (i.e. same level of technological sophistication). Moreover, survey results were accessible (online) or published in a way that allowed for precise GIS digitization and thus reuse. As the aim of this study was to test the new model on a supranational scale using a western Mediterranean perspective, case studies from different countries affected by Roman expansion and colonization were selected.

The territories of the towns of Cosa (modern Ansedonia) in central Italy and Tarraco (modern Tarragona) in northeastern Spain (corresponding to survey projects A and B in Fig. 1) were selected for analysis. Cosa (273 BC) and Tarraco (218 BC) were among the earliest territories to be conquered by Rome in the Italian and Iberian peninsulas (from the 3rd and 2nd centuries BC respectively) and are characterized by similar settings given their locations in key positions on the Mediterranean coast (Brown, 1980: 58–9; Celuzza and Regoli, 1982: 44; Moreno Escobar, 2020). The survey project results were published in Carandini et al., 2002, and Carreté, Keay, and Millett, 1995, as well as online in the Fasti Online Survey portal (Carandini et al., 2012) and the Archaeological Data Service (Keay and Millett, 2003). Survey research undertaken later in Tarraco (Prevosti and Guitart, 2011) was not considered in this paper as it is only partly accessible (the volume with the full dataset is forthcoming, Schneider, 2017: 15). Moreover, since the dating of land-division systems is notoriously difficult to establish (Celuzza and Regoli, 1985: 49–53; Pelgrom, 2008, 2018; Rodríguez-Antón, Magli, González-García, 2023), the

Fig. 1. Location of the survey projects in the region of Cosa (A, based on Carandini et al., 2002) and Tarraco (B, based on Carreté, Keay, Millett, 1995) in relation to modern major cities in Italy and Spain. Basemap: ESRI World hillshade.

previous hypothetical reconstructions of centuriation systems were not considered in settlement pattern analysis.[8]

Systematic field-walking survey projects were conducted in both regions during the late '70s, '80s and early '90s by teams that belonged to the same emerging Anglo-American survey school. These surveys used comparable recording techniques and levels of methodological sophistication.[9] The meticulous publication of the results of these two projects is outstanding, allowing for the reuse of their datasets for further analyses, such as the analysis presented in this study (Witcher, 2008; Casarotto, 2022). Both projects applied an intensive survey strategy that consisted of systematically walking within all accessible and visible field units with three–five people spaced 5–20 metres apart, who recorded the locations of notable concentrations of archaeological materials (e.g. pottery sherds), structures and off-site materials onto topographic maps. The projects also implemented a sampling strategy based on 1 km-wide transects located every 5 km in the territory, with larger portions being

[8] Celuzza and Regoli, 1982; Arrayás, 2005; Palet Martínez, 2005; Palet Martínez and Orengo, 2010, 2011.

[9] Dyson, 1978; Potter, 1979; Ammerman, 1981; Barker and Lloyd, 1991; Cherry, 1983; Bintliff, 1985; Barker, 1996.

investigated around the main centres in the *ager Cosanus* (e.g. the Valle d'Oro facing the colonial town). These transects covered 135.3 and 53.7 sq. km of the hinterlands of Cosa and Tarraco. In the Tarraco survey project the precise extent of the area walked within the transects was provided and corresponded to 11.3 sq. km.

In both projects the term 'site' was used loosely when structural remains and scatters with particularly high material densities were found on the surface of the terrain.[10] These material concentrations may have indicated that archaeological sites, such as ancient settlements (e.g. farms, villages and villas), are located underneath or in the surroundings of their discovery. The dating of sites was based on chronological classifications of the ceramic that was observed in the field and studied in the laboratory. In both territories, the clustering of sites during the pre-Roman (4th–3rd century BC) and conquest/colonial periods (3rd–1st century BC) was observed by previous studies.[11] In this paper we assessed whether this clustering during the Hellenistic period appeared randomly across the landscape or preferentially targeted areas that would ease the access to or use of legacy resources, settlements and infrastructures.

3. TESTING THE HINTERLANDS OF COSA AND TARRACO

Previous settlements and agro-pastoral investments (e.g. drainage, terracing, road and land-division systems; vegetation and forest clearance; soil improvements) may have been seen as an opportunity for new settlers, thus influencing subsequent rural patterns (Verhagen et al., 2016). Operating under this assumption, we described critical zones within the landscapes around Cosa and Tarraco whose clustered settlement distributions in the pre-Roman and conquest/colonial periods could fit the new integrative settlement model. To identify these zones, we conducted a point-density analysis in ArcGIS and focused on the areas that displayed high and localized site densities (i.e. point clusters) or nucleated settlements interpreted by the survey teams or other scholars as villages (technical details are explained in Casarotto, Pelgrom and Stek, 2016).

For the density analysis in the region of Cosa we considered the Hellenistic settlement sites (200 sites in total, dating *c.* 350–50 BC) located in the survey transects that covered the reconstructed hypothetical territory of the colony (Cardarelli, 1924–5). The same methods and criteria were applied to Tarraco, with a total of 44 Hellenistic sites identified (see Prevosti and Guitart, 2010; Houten, 2018: 248–50 for the hypothetical colonial territory) (Table 1). In

[10] On an arbitrary density scale, from 1 to 5 for Cosa and in the top 10 material percentile for Tarraco. More details are available in Carandini et al., 2002; Carreté, Keay and Millett, 1995: 56–61.

[11] Miret, Sanmarti, Santacana, 1991; Carreté, Keay and Millett, 1995: 26–38, 241–82; Pelgrom, 2008: 348–54; Casarotto, Pelgrom and Stek, 2016: 578–82.

Table 1. The percentages of rural territories as defined by different settlement densities (see also Fig. 2 and Fig. 4). In total 200 (for the region of Cosa) and 44 (for the region of Tarraco) Hellenistic settlement sites were studied. The sites were identified by the survey teams in the survey sample area (i.e. within the survey transects).

	Cosa survey project		Tarraco survey project	
Density (d = n° of sites per sq. km)	Entire land 135.3 sq. km	Suitable survey land 81.3 sq. km	Entire land 53.7 sq. km	Covered land 11.3 sq. km
$d \geq 5$	4.44%	4.15%	0.71%	1.78%
$d \geq 3$	18.53%	20.07%	5.25%	14.58%
$d \geq 1$	55.31%	59.86%	40.2%	72.03%
$d = 0$	44.69%	40.14%	59.7%	27.98%

general, site density was found to be slightly higher in the *ager Cosanus* both within the survey area and the site agglomerations. When we considered only the areas that had been pedestrian surveyed (for Tarraco this spatial information was provided in the survey publication and online: Carreté, Keay, Millett, 1995), or were most likely to have been pedestrian surveyed (for Cosa this was determined by excluding the forested, steep and urban zones and considering only the farmed land through a GIS simulation), we observed similar density patterns and comparable inter-distances between villages and localized clusters in the two survey areas.

What was different, however, was the size of the settlement sites within the clusters and the sizes of the possible villages. In general, larger sites were identified in the landscape around Tarraco than Cosa. For example, material scatters classified as villages in Tarraco were identified as 6–10 ha in size, and in Cosa of 1–3 ha. Small settlements in Tarraco were measured as *c.* 0.3–3 ha in size, whereas in Cosa a settlement site was considered small if the material scatter size measured less than 0.2 ha. This remarkable difference in surface scatter sizes may reflect the differences in rural settlement types, the variable impacts of modern mechanized agriculture (and differences in surface material preservation) or different density thresholds adopted by the two survey projects in the field for site identification and off-site and background materials (see above) (Attema and Schörner, 2012). Based on the available legacy data, it was not possible to estimate reliably the effects of these factors on site classification. If resources become available in the future, targeted field visits could examine this specific aspect (e.g. Seubers and Tol, 2016; Casarotto et al., 2021). To navigate this obstacle, we focused on spatial settlement trends as displayed by point-density distributions rather than by size (for the same approach, see Casarotto, Pelgrom, Stek, 2016).

3.1 THE REGION OF COSA

In the survey transects more distant from the city, ten site agglomerations were identified through point-pattern analysis (Fig. 2). Inside or near these habitation

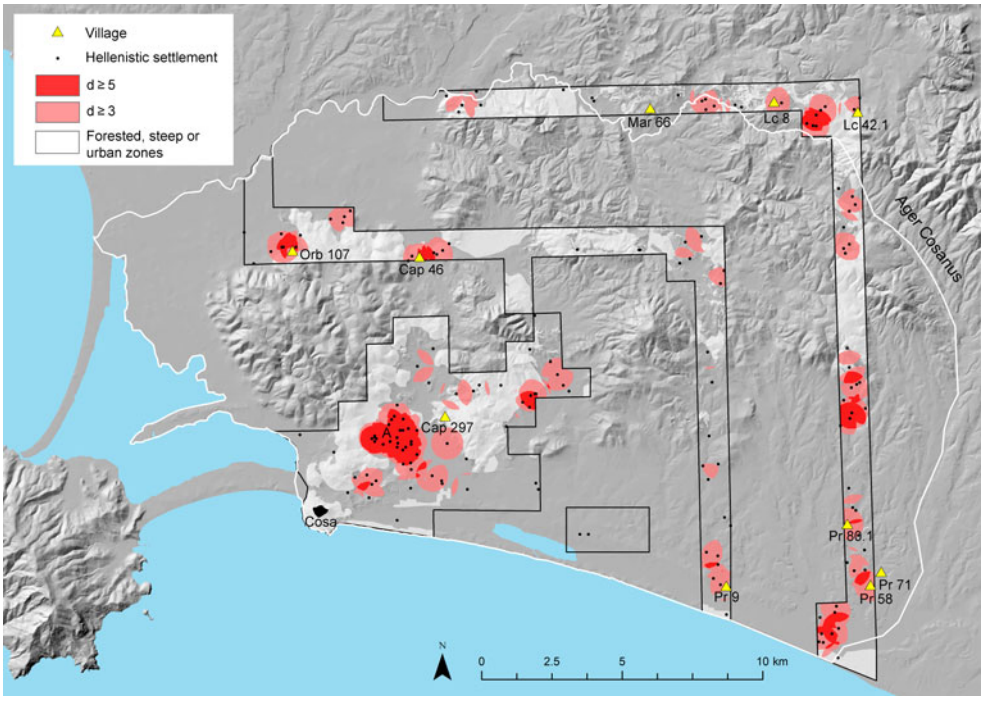

Fig. 2. Point-density analysis of the Hellenistic settlements in the survey sample area of the *Ager Cosanus* (marked by the white line). Each cell (measuring 20 x 20 metres) of the resulting raster density surface received a value (d) indicating the number of sites located in a circle of 1 sq. km. The labels correspond to the site codes (UT codes) reported in the survey publication (Carandini et al., 2002). Basemap: shaded relief (DEM 10 m TINITALY 1.1, Tarquini et al., 2023).

clusters, six villages were recognized by the survey team: two villages were founded during the early colonial period (3rd century BC) and four villages had already existed during the previous Etruscan period in the 4th century BC and were continuously occupied after the conquest in the 3rd century BC. Surrounding these villages, a few isolated small settlements (potentially farmsteads) were located. These villages had a minimum inter-distance of 2 km and a maximum inter-distance of 5 km from their nearest neighbours (Casarotto, Pelgrom, Stek, 2016). The zone around the town of Cosa (*c.* 2 km radius) was largely devoid of early colonial sites and may have corresponded to land that was directly exploited by the city.

A wide site agglomeration dated to the Republican period was observed in the southwestern portion of the Valle d'Oro, about 3 km from the city of Cosa (A in Fig. 2). Some scholars have interpreted this concentration as farms regularly distributed according to land-division systems,[12] while other scholars have

[12] Rathbone, 1981; Celuzza and Regoli, 1982; Attolini et al., 1991; Cambi, 1999; Carandini et al., 2002: 104–23.

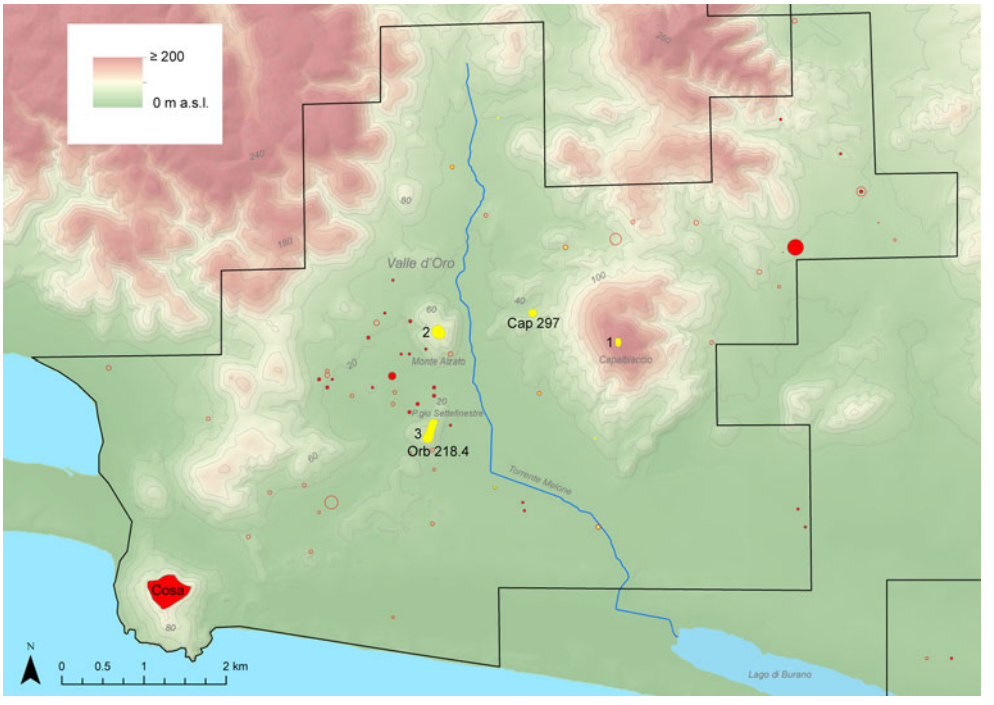

Fig. 3. Republican period settlement agglomeration corresponding to cluster A in Fig. 2. Red dots are settlement sites: full dots probably date from the 3rd century BC (Carandini et al., 2002: 117), while empty dots probably date from the 2nd century BC (Carandini et al., 2002: 162). The buffer sizes have been calculated based on the dimensions of the site types reported in the survey publication (Carandini et al., 2002: 59). The yellow polygons and dots indicate Archaic-Etruscan period settlements (Carandini et al., 2002: 84–5). The village codes correspond to those reported in the survey publication (Carandini et al., 2002: 379–409; Carandini et al., 2012). The location and size of Village 3 (located on the top of the Settefinestre hill, with eroded material having been washed downhill, explaining the elongated shape in the figure) is described in Celuzza and Regoli, 1985: 57 and Celuzza, 1985. Villages 1 and 2 are described in Celuzza and Regoli, 1982: 36; Attolini et al., 1982: 369; Carandini et al., 2002: 291–2. Basemap: shaded relief (DEM 10 m TINITALY 1.1, Tarquini et al., 2023) and 20 m contour lines.

posited this as a possible nucleated settlement or village (Pelgrom, 2008; Casarotto, Pelgrom, Stek, 2016). Whether this agglomeration represents an agricultural village, a loose group of dispersed farms or a combination of various settlement types (settled contemporaneously or at different intervals during the Republican period) (Chisholm, 1968; Roberts, 1996), it is interesting that it occurred in the area within the *ager* that shows a remarkable use in the Archaic period (6th–5th century BC) and an abandonment or scarce use in the 4th century BC before the arrival of the colonists (Carandini et al., 2002: 291–3; Attolini et al., 1982; Celuzza and Regoli, 1982) (Fig. 3).

This preference in the Republican period to target marginal, abandoned or scarcely settled zones within the previous settlement system has also been observed in Venusia in southern Italy (Casarotto, Pelgrom, Stek, 2019) and in other zones of the western Mediterranean affected by Roman conquest and colonization (Nuninger et al., 2016; Verhagen et al., 2016). The Monte Alzato and Poggio Settefinestre area in the Valle d'Oro (Fig. 3) may comply with this type of adaptive and organic rural settlement patterning. Abandoned, unoccupied settlements and agricultural land may have provided building materials and infrastructures for reuse to subsequent communities (e.g. roads and drainage systems). Previous investments in land and soil improvements by Iron-Age/Etruscan communities in the territory surrounding their villages (probably located in the Monte Alzato and the Settefinestre hills)[13] may have been an opportunity for successive settlers to cluster strategically in this area and utilize, integrate and develop the legacy land-use heritage (see discussion in Pelgrom, 2008, 2018). While the Archaic-Etruscan villages may not have been occupied, new Republican settlements may have been created in their surroundings within previously exploited areas. This is the same area where major Roman villas were constructed from the 2nd century BC, thus attesting to the possibility of a longer continuity in land use.

3.2 THE REGION OF TARRACO

Five localized, high site densities were identified by the survey team, one of which was classified as a probable village (Fig. 4). Near to these densities a couple of isolated small settlements (potentially farmsteads) were also located. These nucleated settlements had a continuous occupation from the Iberian period to the late Republican period (5th–1st century BC). In general, the entire landscape displayed remarkable settlement continuation (Carreté, Keay, Millett, 1995: 241–52, 272–82). These habitation clusters had an inter-distance of 6–8 km (i.e. 3–4 km catchment radii), which is a typical value for a village-based socio-ecological settlement model (Bintliff, 1999, 2000, 2009), and exhibited a clear preference for dominant positions in the landscape (Carreté, Keay, Millett, 1995: 245). The clusters were located on less fertile soil, whereas the surrounding landscapes had more fertile soil for agriculture (Carreté, Keay and Millett, 1995: 244–6). This preference to cluster in less productive portions of the landscape and to travel to the agricultural fields may indicate a land-use pattern that is typical of a multiple-core nucleated settlement system (Pelgrom, 2008), or a tendency to settle scarcely used portions of the landscape to ensure control and increase productivity during episodes of increased population growth (Terrenato, 2007; Stek, 2013). It

[13] See images in Attolini et al., 1982: 369; Celuzza and Regoli, 1982: 36; Celuzza and Regoli, 1985: 57; Carandini et al., 2002: 291.

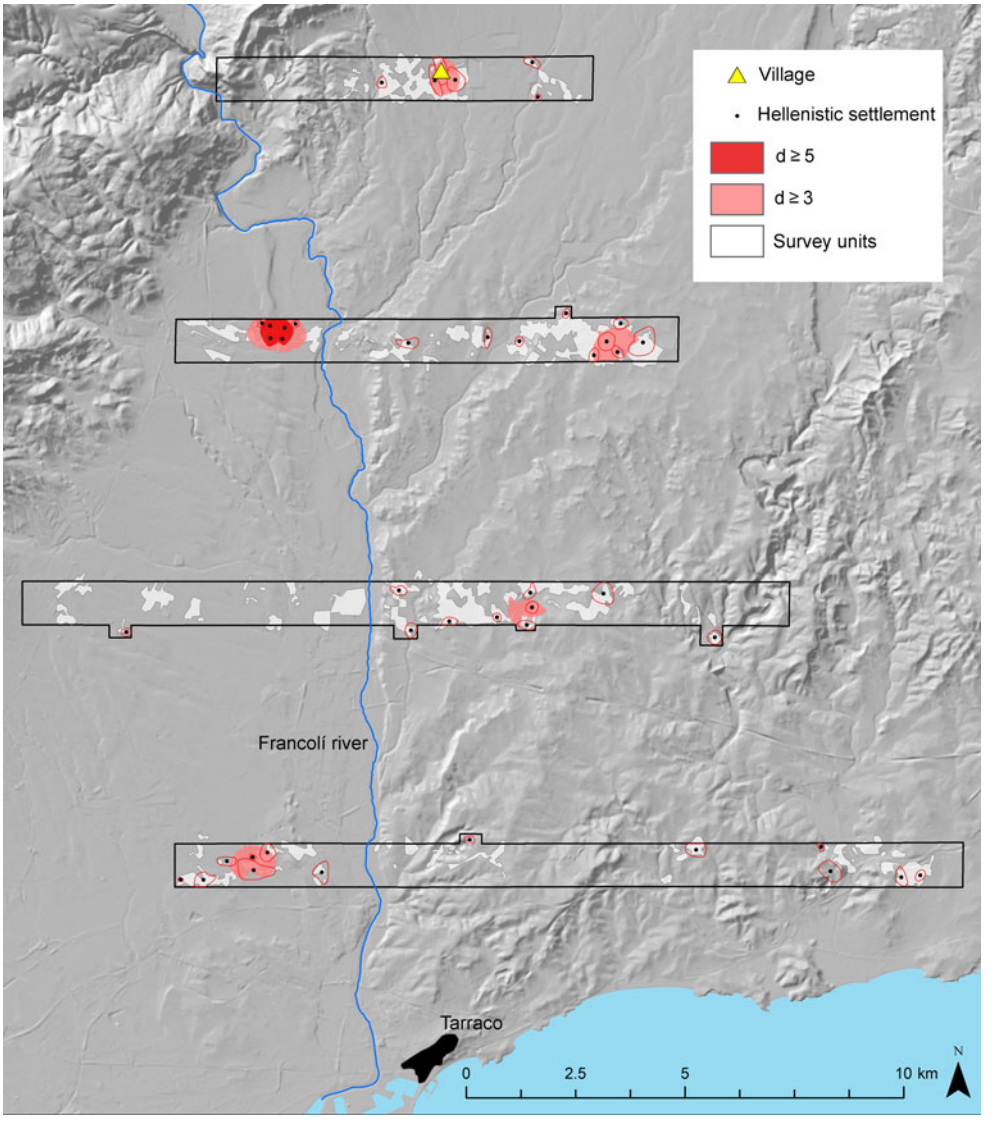

Fig. 4. Point-density analysis of the Hellenistic settlements in the survey sample area of the *Ager Tarraconensis* (all survey transects are within the supposed *ager*, the limits of which are not shown in the figure as they extend beyond the investigated area). Each cell (20 x 20 metres) of the resulting raster density surface received a value (d) indicating the number of sites located within a circle with an area of 1 sq. km. The perimeter of the sites as reported in the survey publication (Carreté, Keay, Millett, 1995) is displayed by the red lines. Basemap: shaded relief (DTM 25 m of Centro Nacional de Información Geográfica – CNIG).

was also noted that the zone around the town of Tarraco (*c.* 4 km radius) was largely devoid of sites and may have corresponded to land that was exploited directly from the city (Carreté, Keay, Millett, 1995: 251).

The lack of observed marked differences in site distribution from the survey results may indicate an ecological inheritance of land-use practices from the pre-Roman to the Roman period, such as in land-settlement strategies, agricultural methods and general territory use around these clustered settlements. It is true that the broad chronological resolution adopted by the survey project for dating these sites did not allow for the identification of the possible intervals of site abandonment (see the discussion in Carreté, Keay, Millett, 1995: 57–61). Regardless of who lived within these large settlements and during which moments of this long period, the available evidence for site distribution does not fit comfortably a scenario of drastic landscape restructuring or destruction of the landscape. Rather, the available evidence points to a long-term continuation (or re-occupation) of settlement types (and additionally of the land-use strategies) from the Iberian to the Roman period. It is vital to note that a homogeneous situation for the entire territory of the colony cannot be assumed, and it is likely that diverse settlement patterns may have occurred in the zones of the *ager* that are not considered in this paper (Prevosti and Guitart, 2011; Palet Martínez and Orengo, 2010, 2011).

4. CONCLUSIONS

This paper has shown that settlers during the conquest and early colonial period did not randomly scatter across the landscape, but rather adapted their choices to the pre-existing organization of land use adopted by the native community that inhabited the area. This resulted in a settlement pattern in which large, nucleated settlements prevailed. More analysis is necessary to better understand the actual character of these settlements. Precise dating through excavation, coring and other field techniques of the parcellation and drainage systems that are identified in colonial territories could significantly add to our understanding of land-use systems and their influences on settlement choices over time. Additionally, geophysical survey and excavation at the clustered settlements described in this article are limited or lacking: only excavation or targeted invasive probing of some of these clustered, nucleated settlements (e.g. the possible villages) can confirm whether they were villages, hamlets, villas, or other types of settlement agglomerations, and shed light on the identities and demographics of the people dwelling in these places (Curchin, 1991: 123–5). As it stands, however, according to the analysis conducted in this paper, the adaptive and integrative (but opportunistic) model presented for the Roman conquest and early colonization of the western Mediterranean is plausible: the effects of native land-use legacies may have significantly influenced later Roman period settlement patterns.

Colonial settlers may have conditioned their choices to follow and adapt to pre-Roman land-use organization. The decision to cluster only within certain zones could be explained by the possibility that the land these colonial settlers

encountered was not an untouched wilderness offering ample settlement options, but a landscape that was already densely settled (Terrenato, 2007; Stek, 2013) and shaped by native populations for multiple generations, thus constricting their choices. This structured and engineered native landscape, and thus the embedded legacies of previous land-use investments, probably functioned as an underlying footprint that constrained, guided or influenced the design of settlement developments during the later conquest and colonial periods. Based on the observations drawn from this analysis, it is possible to argue that the process of Italic and Iberian settlement in the rural hinterlands of the future colonial towns of Cosa, Tarraco and elsewhere (e.g. the Venusia hinterland in Casarotto, Pelgrom, Stek, 2019) established historical land-use and settlement patterns that influenced the trajectories of socio-ecological landscapes during the conquest and colonial periods. This paper put forward the possibility that Iron-Age and pre-Roman land-use legacies and settlement systems, such as villages and their surrounding (engineered and/or farmed) landscapes, probably served as key anchors in the development of subsequent colonial period settlement processes (for the general idea of Roman colonization targeting pre-existing economic and cultural hotspots, see Stek, 2017; e.g. sanctuaries: Stek and Burgers, 2015).

Previous settlement occupation represented both an ecological opportunity and constraint for successive settlement systems, and thus was one of the main anthropogenic factors influencing Roman conquest and colonization. If this interpretation is valid, the severity of the initial interaction between native and colonial communities should be downplayed: previously built environments were not always immediately destroyed by Rome but rather opportunistically exploited, maintained, adapted and developed during the conquest and colonial periods. The legacy landscapes constructed over centuries by native communities populating the western Mediterranean constituted an important socio-economic asset for the expansion of the Roman empire, offering rural resources, services and infrastructures (e.g. settlements, roads and land parcellations) that may well have been opportunistically reused by the Roman agrarian economy both in Italy and in the provinces.

Address for correspondence:
Dr Anita Casarotto
University of Groningen – Royal Netherlands Institute in Rome (KNIR)
Via Omero 10/12
00197 Rome, Italy
a.casarotto@rug.nl; *a.casarotto@knir.it*

Acknowledgments
This work was supported by the Cultuurfonds (Regato Fund) and was conducted in the framework of the project The Impact of Roman imperialism in the West (University of Groningen, KNIR-Royal Netherlands Institute in Rome).

REFERENCES

Ammerman, A.J. (1981) Surveys and archaeological research. *Annual Review of Anthropology* 10: 63–88.

Arrayás, I. (2005) *Morfología histórica del territorio de Tarraco (ss. III–I a.C.)*. Barcelona, Universitat de Barcelona, *Instrumenta* 19.

Attema, P., Burgers, G-J. and van Leusen, P.M. (2010) *Regional Pathways to Complexity: Settlement and Land-use Dynamics in Early Italy from the Bronze Age to the Republican Period*. Amsterdam, Amsterdam University Press.

Attema, P.A.J. and Schörner, G. (2012) *Comparative Issues in the Archaeology of the Roman Rural Landscape: Site Classification between Survey Excavation and Historical Categories*. Portsmouth RI, *Journal of Roman Archaeology* Supplementary series 88.

Attema, P., Bintliff, J., van Leusen, M., Bes, P., de Haas, T., Donev, D., Jongman, W., Kaptijn, E., Mayoral, V., Menchelli, S., Pasquinucci, M., Rosen, S., García Sánchez, J., Gutierrez Soler, L., Stone, D., Tol, G., Vermeulen, F. and Vionis, A. (2020) A guide to good practice in Mediterranean surface survey projects. *Journal of Greek Archaeology* 5: 1–62.

Attolini, I., Cambi, F., Celuzza, M.G., Fentress, E., Pasquinucci, M. and Regoli, E. (1982) Ricognizione archeologica nell'ager Cosanus e nella Valle dell'Albegna. Rapporto preliminare 1981. *ArchMed* 9: 365–86.

Attolini, I., Cambi, F., Castagna, M., Celuzza, M., Fentress, E., Perkins, P. and Regoli, E. (1991) Political geography and productive geography between the valleys of the Albegna and the Fiora in northern Etruria. In G. Barker and J. Lloyd (eds), *Roman Landscapes: Archaeological Survey in the Mediterranean Region*: 142–52. London, British School at Rome.

Banning, E.B. (2002) *Archaeological Survey*. New York, Plenum Publisher.

Barker, G. (1996) Regional archaeological projects: trends and traditions in Mediterranean Europe. *Archaeological Dialogues* 3.2: 160–75.

Barker, G. and Lloyd, J. (eds) (1991) *Roman Landscapes: Archaeological Survey in the Mediterranean Region*. London, British School at Rome.

Bender, B. (2001) Landscapes on-the-move. *Journal of Social Archaeology* 1: 75–89.

Bintliff, J. (1985) The Boeotia survey. In S. Macready and F. Thompson (eds), *Archaeological Field Survey in Britain and Abroad*: 196–216. London, Society of Antiquaries of London.

Bintliff, J.L. (1999) Settlement and territory. In G. Barker (ed.), *Companion Encyclopedia of Archaeology*: 505–45. London, Routledge.

Bintliff, J.L. (2000) Settlement and territory: a socio-ecological approach to the evolution of settlement systems. In G. Bailey, R. Charles and N. Winder, *Human Ecodynamics*: 21–30. Oxford, Oxbow Books.

Bintliff, J.L. (2009) Catchments, settlement chambers and demography: case studies and general theory in the Greek landscape from prehistory to early modern times. In F. Favory and L. Nuninger (eds), *Archaedyn. 7 Millenia of Territorial Dynamics. Settlement Pattern, Production and Trades from Neolithic to Middle Ages*: 107–17. Dijon, University of Burgundy.

Bradley, G. (2006) Colonization and identity in Republican Italy. In G. Bradley and J.P. Wilson (eds), *Greek and Roman Colonization: Origins, Ideologies and Interactions*: 161–87. Swansea, Classical Press of Wales.

Brown, F.E. (1980) *Cosa: the Making of a Roman Town*. Ann Arbor, University of Michigan Press.

Butzer, K.W. (1992) The Americas before and after 1492: an introduction to current geographical research. *Annals of the Association of American Geographers* 82.3: 345–68.

Cambi, F. (1999) Demography and Romanization in Central Italy. In J.L. Bintliff and K. Sbonias (eds), *Reconstructing Past Population Trends in Mediterranean Europe (3000 B.C.–A.D. 1800)*: 115–29. Oxford, Oxbow Books.

Carandini, A., Cambi, F., Celuzza, M.G. and Fentress, E. (eds) (2002) *Paesaggi d'Etruria. Valle dell'Albegna, Valle d'Oro, Valle del Chiarone, Valle del Tafone*. Rome, Edizioni di Storia e Letteratura.

Carandini, A., Cambi, F., Celuzza M. G. and Fentress E. (2012) Albegna Valley Survey [data-set]. *Fasti Online Survey* [distributor]. https://www.fastionline.org/survey/site/AIAC_47 (accessed on 22/03/2023).

Cardarelli, R. 1924–5. Confini fra Magliano e Marsiliana; fra Manciano e Montauto, Scerpenna, Stachilagi; fra Tricosto e Ansedonia; fra Port'Ercole e Monte Argenatrio. *Maremma* 1–2.

Carreté, J M., Keay, S. and Millett, M. (1995) *A Roman Provincial Capital and its Hinterland: the Survey of the Territory of Tarragona, Spain, 1985–1990*. Ann Arbor, Journal of Roman Archaeology Supplementary Series 15.

Casarotto, A. (2018) *Spatial Patterns in Landscape Archaeology. A GIS Procedure to Study Settlement Organization in Early Roman Colonial Territories* (Archaeological Studies Leiden University 43). Leiden, Leiden University Press.

Casarotto, A. (2022) Digitising legacy field survey data: a methodological approach based on student internships. *Digital* 2(4): 422–43. https://doi.org/10.3390/digital2040023

Casarotto, A., Pelgrom, J. and Stek, T.D. (2016) Testing settlement models in the early Roman colonial landscapes of Venusia (291 B.C.), Cosa (273 B.C.) and Aesernia (263 B.C.). *Journal of Field Archaeology* 41.5: 568–86.

Casarotto, A., Stek, T.D., Pelgrom, J., van Otterloo, R.H. and Sevink, J. (2018) Assessing visibility and geomorphological biases in regional field surveys: the case of Roman Aesernia. *Geoarchaeology: An International Journal* 33.2: 177–92.

Casarotto, A., Pelgrom, J. and Stek, T.D. (2019) A systematic GIS-based analysis of settlement developments in the landscape of Venusia in the Hellenistic-Roman period. *Archaeological and Anthropological Sciences* 11: 735–53.

Casarotto, A., Garcia Sanchez, J., Stek, T. and Pelgrom, J. (2021) Surface visibility and the validity of settlement patterns in legacy survey datasets. *Fasti Online Documents and Research, Archaeological Survey Series* 17.

Celuzza, M.G. (1985) I reperti anteriori alla costruzione della villa. In A. Ricci (ed.), *Settefinestre: una villa schiavistica nell'Etruria romana. La villa e i suoi reperti*. Vol. 3: 31. Modena, Panini.

Celuzza, M.G. and Regoli, E. (1982) La valle d'Oro nel territorio di Cosa. Ager Cosanus e Ager Veientanus a confronto. *Dialoghi di Archeologia* 4: 31–62.

Celuzza, M.G. and Regoli, E. (1985) Gli insediamenti nella Valle d'Oro e il fondo di Settefinestre. In A. Carandini (ed.), *Settefinestre: una villa schiavistica nell'Etruria romana. La villa nel suo insieme*. Vol. 1: 48–59. Modena, Panini.

Cherry, J.F. (1983) Frogs around the pond: perspectives in current archaeological survey projects. In D. Keller and D. Rupp (eds), *Archaeological Survey in the Mediterranean Area*: 375–416. Oxford, BAR International Series 155.

Cherry, J.F. and Ryzewski, K. (2020) *An Archaeological History of Montserrat in the West Indies*. Oxford, Oxbow Books.

Chisholm, M. (1968) *Rural Settlement and Land Use. An Essay in Location*. London, Hutchinson.

Coughlan, M.R. and Nelson, D.R. (2018) Influences of Native American land use on the colonial Euro-American settlement of the South Carolina Piedmont. *PLoS ONE* 13.3, e0195036. https://doi.org/10.1371/journal.pone.0195036

Curchin, L. (1991) *Roman Spain: Conquest and Assimilation*. London and New York, Routledge.

De Cazanove, O. (2005) Les colonies latines et les frontières régionales de l'Italie. *Venusia* et Horace entre Apulie et Lucanie: *Satires*, II, 1, 34. *Mélanges de la Casa de Velázquez* 35.2: 107–24.

Dores Cruz, M. (2011) 'Pots are pots, not people': material culture and ethnic identity in the Banda Area (Ghana), nineteenth and twentieth centuries. *Azania: Archaeological Research in Africa* 46.3: 336–57.

Düring, B.S and Stek, T.D. (eds) (2018) *The Archaeology of Imperial Landscapes: A Comparative Study of Empires in the Ancient Near East and Mediterranean world*. Cambridge, Cambridge University Press.

Dyson, S.L. (1978) Settlement patterns in the *Ager Cosanus*: the Wesleyan University survey, 1974–1976. *Journal of Field Archaeology* 5.3: 251–68.

Ejarque, A., Julià, R., Castanyer, P., Orengo, H.A., Palet, J.M. and Riera, S. (2022) Landscape footprints of peopling and colonisation from the Late Bronze Age to Antiquity in the coastal hinterland of Emporion-Emporiae, NE Iberia. *The Holocene* 32.4: 280–96.

Foster, D., Swanson, F., Aber, J., Burke, I., Brokaw, N., Tilman, D. and Knapp, A. (2003) The importance of land-use legacies to ecology and conservation. *BioScience* 53.1: 77–88. https://doi.org/10.1641/0006-3568(2003)053[0077:TIOLUL]2.0.CO;2

Grau Mira, I. (2022) A peasant landscape in the eastern Roman Spain. An archaeological approach to territorial organization and economic models. In J. Bermejo Tirado and I. Grau Mira (eds), *The Archaeology of Peasantry in Roman Spain*: 91–110. Boston, Walter de Gruyter.

Herrera Malatesta, E. (2022) The transformation of indigenous landscape in the first colonized region of the Caribbean. *Land* 11: 509. https://doi.org/10.3390/land11040509

Hofman, C.L., Mol, A., Hoogland, M. and Valcárcel Rojas, R. (2014) Stage of encounters: migration, mobility and interaction in the pre-colonial and early colonial Caribbean. *World Archaeology* 46.4: 590–609.

Hofman, C.L., Hung, J., Malatesta, E., Jean, J., Sonnemann, T. and Hoogland, M. (2018) Indigenous Caribbean perspectives: archaeologies and legacies of the first colonised region in the New World. *Antiquity* 92.361: 200–16.

Hofman, C.L., Valcárcel Rojas, R. and Ulloa Hung, J. (2020) Colonization, transformations, and cultural persistence in the Caribbean. In C. Beaule and J.G. Douglass (eds), *The Global Spanish Empire: Five Hundred Years of Place Making and Pluralism*: 55–82. Tucson, University of Arizona Press.

Houten, P.H.A. (2018) Civitates Hispaniae: *urbanisation on the Iberian peninsula during the High Empire*. Leiden University, Ph.D. thesis.

Ingold, T. (1993) The temporality of the landscape. *World Archaeology* 25: 152–74.

Járrega Domínguez, R. (2010) The impact of the organization of territory in a provincial capital: the colony of Tarraco and the Ager Tarraconensis. In C. Corsi and F. Vermeulen (eds), *Changing Landscapes. The Impact of Roman Towns in the Western Mediterranean*: 185–204. Bologna, Ante Quem.

Jones, M.K., Dillon, E.P., Quine, T.A., Rackham, O., Thomas, K.D. and Williams, L. (1985) I pendii collinari. In A. Carandini (ed.), *Settefinestre: una villa schiavistica nell'Etruria romana. La villa nel suo insieme*. Vol. 1: 31–9. Modena, Panini.

Keay, S.J. (2001) Rome and the Hispaniae. In S. Keay and N. Terrenato (eds), *Italy and the West. Comparative Issues in Romanization*: 117–144. Oxford, Oxbow.

Keay, S.J. (2013) Were the Iberians Hellenised? In J. Prag and J. Quinn (eds), *The Hellenistic West: Rethinking the Ancient Mediterranean*: 300–19. Cambridge, Cambridge University Press.

Keay, S.J. and Terrenato, N. (eds) (2001) *Italy and the West. Comparative Issues in Romanization*. Oxford, Oxbow Books.

Keay, S.J. and Millett, M. (2003) *Ager Tarraconensis* Field Survey Project [data-set]. *Archaeology Data Service* [distributor] https://doi.org/10.5284/1000351 (accessed on 20/03/2023).

Kolen, J., Renes, H. and Bosma, K. (2016) Landscape biography. In A. Adri van den Brink, D. Bruns, H. Tobi and S. Bell (eds), *Research in Landscape Architecture*: 120–35. London, Routledge.

Kulstad González, P. (2020) *Hispaniola – hell or home? Decolonizing grand narratives about intercultural interactions at Concepción De La Vega (1494–1564)*. Leiden, Sidestone Press.

Millett, M. (1991) Roman towns and their territories: an archaeological perspective. In J. Rich and A. Wallace-Hadrill (eds), *City and Countryside in the Ancient World*: 169–89. London, Routledge.

Miret, M., Sanmarti, J. and Santacana, J. (1991) From indigenous structures to the Roman world: models for the occupation of central coastal Catalunya. In G. Barker and J. Lloyd (eds), *Roman Landscapes: Archaeological Survey in the Mediterranean Region*: 47–53. London, British School at Rome.

Moreno Escobar, M.C. (2020) Linking seascapes and landscapes: the case of Tarraco (Tarragona, Spain) during the Roman Empire. In A. Cristilli, A. Gonfloni and F. Stok (eds), *Experiencing the Landscape in Antiquity* (I Convegno Internazionale di Antichità – Università degli Studi di Roma 'Tor Vergata'): 209–16. Oxford, British Archaeological Reports.

Nuninger, L., Verhagen, J.W.H.P., Bertoncello, F. and Castrorao Barba, A. (2016) Estimating 'Land Use Heritage' to model changes in archaeological settlement patterns. *LAC 2014 Proceedings*: 1–12. https://doi.org/10.5463/lac.2014.60

Palet Martínez, J.M. (2005) Estructuras agrarias en el territorio de Tarraco (Tarragona): organización y dinamica del paisaje en epoca romana. In A. Bouet and F. Verdin (eds), *Territoires et paysages de l'Age du Fer au Moyen Age – Melanges offerts à Ph. Leveau*: 213–26. Bordeaux, Ausonius.

Palet Martínez, J.M. and Orengo, H.A. (2010) The centuriations of the Ager Tarraconensis: spatial organisation and conceptualisation. In M. Prevosti and J.G. Duran (eds), Ager Tarraconensis 1. *Aspects històrics i marc natural*: 121–54. Tarragona, Institut Català d'Arqueologia Clàssica.

Palet Martínez, J.M. and Orengo, H.A. (2011) The Roman centuriated landscape: conception, genesis and development as inferred from the *Ager Tarraconensis* case. *American Journal of Archaeology* 115. 3: 383–402.

Pelgrom, J. (2008) Settlement organization and land distribution in Latin colonies before the Second Punic War. In L. De Ligt and S.J. Northwood (eds), *People, Land and Politics. Demographic Developments and the Transformation of Roman Italy 300 BC–AD 14*: 317–56. Leiden, Brill.

Pelgrom, J. (2018) The Roman rural exceptionality thesis revisited. *Mélanges de l'École française de Rome – Antiquité*, 130.1. https://doi.org/10.4000/mefra.4770

Pelgrom, J., Marchi, M.L., Cantoro, G., Casarotto, A., Hamel, A., Lecce, L., García Sánchez, J. and Stek, T.D. (2014) New approaches to the study of village sites in the territory of Venosa in the Classical and Hellenistic periods. *Agri Centuriati* 11: 31–60.

Pelgrom, J. and Stek, T.D. (2014) Roman colonization under the Republic: historiographical contextualisation of a paradigm. In T.D. Stek and J. Pelgrom (eds), *Roman Republican Colonization. New Perspectives from Archaeology and Ancient History*: 10–45. Rome, Palombi Editori.

Pelgrom, J., Lecce, L., García Sánchez, J. and Stek, T.D. (2016) Le indagini olandesi sul pianoro di Masseria Casalini Sottana (2013–2014). In A. De Siena and T. Giammatteo (eds), *Palazzo San Gervasio. Modalità insediative e pratiche funerarie dal territorio*: 277–88. Venosa, Osanna.

Peralta, D. and Bernard, S. (2022) Middle Republican connectivities. *The Journal of Roman Studies* 112: 1–37.

Potter, T.W. (1979) *The Changing Landscape of South Etruria*. London, Elek.

Prevosti, M. and Guitart J. (2010) Plantejament i precedents del treball. In M. Prevosti and J. Guitart (eds), Ager Tarraconensis 1: *aspectes històrics i marc natural / Historical aspects and natural setting*: 25–112. Tarragona, Institut d'Estudis Catalans.

Prevosti, M. and Guitart, J. (eds) (2011). Ager Tarraconensis 2. *El poblament / The population*. Tarragona, Institut Català d'Arqueologia Clàssica.

Rathbone, D.W. (1981) The development of agriculture in the 'Ager Cosanus' during the Roman Republic: problems of evidence and interpretation. *The Journal of Roman Studies* 71: 10–23.

Rathbone, D.W. (2008) Poor peasants and silent sherds. In L. De Ligt and S.J. Northwood (eds), *People, Land and Politics. Demographic Developments and the Transformation of Roman Italy, 300 B.C.–A.D. 14*: 305–32. Leiden, Brill.

Roberts, B.K. (1996) *Landscapes of Settlement. Prehistory to the Present*. London, Routledge.

Rodríguez-Antón, A., Magli, G. and González-García, A.C. (2023) Between land and sky — a study of the orientation of Roman centuriations in Italy. *Sustainability* 15, 3388. https://doi.org/10.3390/su15043388

Salmon, E.T. (1969) *Roman Colonization Under the Republic*. London, Thames and Hudson.

Schneider, J. (2017) *Ländliche Siedlungsstrukturen im römischen Spanien: das Becken von Vera und das Camp de Tarragona – zwei Mikroregionen im Vergleich*. Oxford, Archaeopress.

Schneider, T.D. and Panich, L.M. (eds) (2022) *Archaeologies of Indigenous Presence*. Gainesville, University Press of Florida.

Settis, S. (ed.) (1984) *Misurare la terra: centuriazione e coloni nel mondo romano*. Modena, Edizioni Panini.

Seubers J.F. and Tol G.W. (2016) City, country and crisis in the *Ager Crustuminus*. Confronting legacy data with resurvey results in the territory of ancient Crustumerium. *Palaeohistoria* 57/58: 137–55.

Silliman, S.W. (2005) Culture contact or colonialism? Challenges in the archaeology of Native North America. *American Antiquity* 70.1: 55–74.

Sluyter, A. (2001) Colonialism and landscape in the Americas: material/conceptual transformations and continuing consequences. *Annals of the Association of American Geographers* 91.2: 410–29.

Stek, T.D. (2009) *Cult Places and Cultural Change in Republican Italy: a Contextual Approach to Religious Aspects of Rural Society After the Roman Conquest*. Amsterdam, Amsterdam University Press.

Stek, T.D. (2012) Review of M.L. Marchi (2010) *Ager Venusinus* II. *Forma Italiae* 43. *BABesch* 87: 243–4.

Stek, T.D. (2013) Material culture, italic identities and the romanization of Italy. In J. DeRose Evans (ed.), *A Companion to the Archaeology of the Roman Republic*: 337–53. Oxford, Wiley-Blackwell.

Stek, T.D. (2017) The impact of Roman expansion and colonization on ancient Italy in the Republican period. From diffusionism to networks of opportunity. In G.D. Farney and G. Bradley (eds), *The Peoples of Ancient Italy*: 269–94. New York-Berlin, De Gruyter.

Stek, T.D. (2018) Early Roman colonisation beyond the Romanising agrotown: village patterns of settlement and highland exploitation in the Abruzzi mountains, Central Italy. In B. Düring and T.D. Stek (eds), *The Archaeology of Imperial Landscapes: a Comparative Study of Empires in the Ancient Near East and Mediterranean World*. Cambridge: 145–72. Cambridge, Cambridge University Press.

Stek, T.D. and Burgers, G-J. (eds) (2015) *The Impact of Rome on Cult Places and Religious Practices in Ancient Italy*. London, Institute of Classical Studies, BICS Supplement 132.

Stek, T.D., Modrall, E.B., Kalkers, R.A.A., van Otterloo, R.H. and Sevink, J. (2015) An early Roman colonial landscape in the Apennine mountains: landscape archaeological research in the territory of Aesernia (Central Southern Italy). *Analysis Archaeologica: An International Journal of Western Mediterranean Archaeology* 1: 229–91.

Tarquini, S., Isola, I., Favalli, M., Battistini, A. and Dotta, G. (2023) *TINITALY, a digital elevation model of Italy with a 10 meters cell size (Version 1.1)*. Istituto Nazionale di Geofisica e Vulcanologia (INGV). https://doi.org/10.13127/tinitaly/1.1

Terrenato, N. (2001) Introduction. In S. Keay and N. Terrenato (eds), *Italy and the West. Comparative Issues in Romanization*: 1–6. Oxford, Oxbow Books.

Terrenato, N. (2007) The essential countryside: the Roman world. In S.E. Alcock and R. Osborne (eds), *Classical Archaeology*: 139–61. Malden, MA, Blackwell.

Torelli, M. (1991) La fondazione di Venosa nel quadro della romanizzazione dell'Italia meridionale. In M. Salvatore (ed.), *Il Museo archeologico nazionale di Venosa*: 17–26. Matera, IEM editrice.

Van Dommelen, P. and Terrenato, N. (2007) Local cultures and the expanding Roman Republic. In P. Van Dommelen and N. Terrenato (eds), *Articulating Local Cultures, Power and Identity under the Expanding Roman Republic*: 7–12. Portsmouth, RI, *JRA* supplementary series number 63.

Van Leusen, P.M. (2002) *Pattern to Process: Methodological Investigations into the Formation and Interpretation of Spatial Patterns in Archaeological Landscapes*. University of Groningen, Ph.D thesis.

Verhagen, J.W.H.P., Nuninger, L., Bertoncello, F. and Castrorao Barba, A. (2016) Estimating the 'memory of landscape' to predict changes in archaeological settlement patterns. In S. Campana, R. Scopigno, G. Carpentiero and M. Cirillo (eds), *CAA 2015. Keep the Revolution Going* (Proceedings of the 43rd Annual Conference on Computer Applications and Quantitative Methods in Archaeology): 623–36. Oxford, Archaeopress.

White, K.D. (1970) *Roman Farming*. London, Thames and Hudson.

Witcher, R.E. (2008) (Re)surveying Mediterranean rural landscapes: GIS and legacy survey data. *Internet Archaeology* 24. doi: 10.11141/ia.24.2.

Zipf, G.K. (1949) *Human Behavior and the Principle of Least Effort: an Introduction to Human Ecology*. Cambridge, MA, Addison-Wesley Press.