RESSOURCENKULTUREN 27

THE FULL BRONZE AGE IN THE MIDDLE AND LOW GUADALQUIVIR VALLEY

A LANDSCAPE OF RESOURCES

Döbereiner Chala-Aldana

TÜBINGEN UNIVERSITY PRESS

The Full Bronze Age in the Middle and Low Guadalquivir Valley

A Landscape of Resources

D i s s e r t a t i o n
zur
Erlangung des akademischen Grades
Doktor der Philosophie
in der Philosophischen Fakultät

der Eberhard Karls Universität Tübingen

vorgelegt von

Dobereiner Chala-Aldana

aus

Bogotá (Kolumbien)

2023

Gedruckt mit Genehmigung der Philosophischen Fakultät der Eberhard Karls Universität Tübingen

Dekan: Prof. Dr. Jürgen Leonhardt

Hauptberichterstatter:	**Prof. Dr. Martin Bartelheim**
Mitberichterstatter:	**Prof. Dr. Gonzalo Aranda Jiménez**
	Prof Dr. Thomas Knopf

Tag der mündlichen Prüfung: 19. Juli 2021

Tübingen University Press, Tübingen

RessourcenKulturen

Tübingen University Press

RessourcenKulturen
Band 27

Series Editors:
Martin Bartelheim and Thomas Scholten

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TÜBINGEN
UNIVERSITY
PRESS

Bibliografische Information der Deutschen Nationalbibliothek
Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie, detaillierte bibliografische Daten sind im Internet über http://dnb.d-nb.de abrufbar.

Herausgeber der Reihe: Martin Bartelheim und Thomas Scholten

Die Online-Version dieser Publikation ist auf den Verlagswebseiten von Tübingen University Press frei verfügbar (open access).
http://hdl.handle.net/10900/149466
http://nbn-resolving.de/urn:nbn:de:bsz:21-dspace-1494665
http://dx.doi.org/10.15496/publikation-90806

1. Auflage 2024 Tübingen University Press
Universitätsbibliothek Tübingen
Wilhelmstr. 32
72074 Tübingen
tup@ub.uni-tuebingen.de
www.tuebingen-university-press.de

ISBN (Hardcover): 978-3-947251-93-3
ISBN (PDF): 978-3-947251-94-0

Redaktion: Dinah Beljanski, Hannah Bohnenberger, Regina Kocsis, Carolin Manzke, Uwe Müller, Henrike Srzednicki
Umschlaggestaltung: Henrike Srzednicki
Coverfoto: A herd of sheep and goats crossing the 'Las Adelfas' stream, which flows into the Guadalquivir Valley. Herding practices have been present in the Guadalquivir Valley for almost six millennia (photo by author).
Layout: Büro für Design, Martin Emrich, Lemgo
Satz und Bildnachbearbeitung: Henrike Srzednicki
Druck und Bindung: medialis Offsetdruck GmbH Unternehmensbereich Pro Business
Printed in Germany

‘...Y así, con lentitud que no descansa,
por las obras del hombre se hace el tiempo
profusión fabulosa.’

Pedro Salinas, ‘Cero’ ([1949] 2010)

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Acknowledgements

This manuscript is a modified version of my PhD dissertation, submitted in December 2020 and defended in July 2021. Part of the discussion around pottery typologies and GIS analyses has been already published in the RessourcenKulturen 17 'Landscapes and Resources in the Bronze Age of Southern Spain' under the title 'Beyond Culture Areas: Ceramic Typologies as Indicators of Spatial Interactions Between the Middle and Low Guadalquivir, Southeast and Southwest Iberia' (Chala-Aldana 2022, 33–83). New developments and results obtained after the submission of the dissertation are not included in this publication and will be published in the future.

I gratefully acknowledge the support of my friends and advisors during this long journey: Prof. Dr. Martin Bartelheim and Dr. Marta Díaz-Zorita Bonilla. Their always pertinent suggestions and contributions helped to happily develop the whole research.

I have learnt many things during all these years, and I will always be gratified for having such wonderful experiences with them in SFB 1070. I acknowledge the logistic support and the efforts made by SFB 1070 RessourcenKulturen in the University of Tübingen for fostering and giving a very well-structured frame to our research project.

Thanks to Prof. Mark Hunt Ortiz from the University of Seville for the contributions and the trust he gave us allowing us to perform the archaeometrical analyses of some materials from the site of Cobre las Cruces. Thanks to the students from the University of Tübingen, the University of Seville and everybody who collaborated during the field seasons and the laboratory phases. Special thanks to Mauricio Marciales Daza and Javier Escudero Carrillo: their joy and uninterested contribution to the research made all our field seasons always very special moments.

Thanks to the laboratories of Biogeology of the University of Tübingen, the Curt-Engelhorn-Zentrum Archäometrie Mannheim and the Centre for Isotopes Research (CIO) in the University of Groningen for the analysis of stable isotopes here presented.

Thanks to the people and the local authorities of Villaverde del Rio in the province of Seville, especially to Maria José Gallardo Velázquez, for the logistic support and for always being 'a bridge', helping our field campaign on many levels. I also want to thank Siah Beattie for the English proofreading and Elisa Facchinetti also for the proofreading, but mainly for being my partner and my support during the whole journey.

This is the only part of the text where I will mention this: in Colombia, where I come from, I was formed as a cultural anthropologist. In some way, this experience shared with you here in this text is also an ethnographical exercise on European Archaeology and on the way the Bronze Age is addressed by archaeologists in Europe, made by a 'non-European archaeologist'. This work presents my interpretation of the whole scientific field, from a situated perspective, the one of an outsider. Consequently, the writing style in the first chapter, reflecting this situated perspective, incorporates sentences in the first person. Readers are forewarned in case anyone finds this style challenging to follow. Finally, I acknowledge such ethnographical teachings, the good thoughts and the prayers of all the people from Bogotá and Palermo.

Zusammenfassung

Die ‚Vollbronzezeit' auf der südlichen iberischen Halbinsel (circa 2200–1550 v. Chr.) war eine Zeit des sozialen und kulturellen Wandels, welcher alle Bevölkerungsgruppen der Region beeinflusste. Archäologische Forschungen über diesen Zeitraum werden zwar seit mehr als hundert Jahren durchgeführt, weisen allerdings unterschiedliche Gewichtungen auf. Der bisherige Schwerpunkt lag auf den südwestlichen und südöstlichen Regionen; wobei das untere und mittlere Tal des Guadalquivirs weniger Beachtung fand. Trotz der wenigen verfügbaren Stratigraphien und der, im Vergleich mit den benachbarten Regionen, wenigen untersuchten Orte gibt es Hinweise darauf, dass das untere und mittlere Tal des Guadalquivirs nicht unbewohnt war und während der Vollbronzezeit keine passive Rolle spielte. Der vorliegende Text setzt sich mit der Forschungsgeschichte der erwähnten Region auseinander, sowie mit der Art und Weise, wie räumliche Beziehungen und Materialien von den Archäologen dargestellt und beschrieben werden. Die territorialen Modelle, die zur Beschreibung der in Südost- und Südwestiberien vermuteten Kulturräume verwendet wurden, wiederholen Interpretationen, die unsere eigenen Subsistenzparadigmen auf archäologische Befunde übertragen. Hier wird ein alternativer Ansatz vorgelegt, der materielle und immaterielle Elemente der Landschaften betrachtet, die als Ressourcen von Bevölkerungsgruppen der Bronzezeit genutzt wurden, um soziale und kulturelle Praktiken zu entwickeln und zu erhalten.

Abstract

On the southern Iberian Peninsula, the Full Bronze Age (approximately 2200–1550 BC) was a period of several social and cultural changes affecting the human groups settled along this region. Archaeological research regarding this period has been conducted during more than a century, yet the geographical distribution of this research was not uniform. The focus has been on the southeast and southwest parts of the Peninsula, leaving the areas belonging to the Middle and Low Guadalquivir Valley less attended. Despite the low number of stratigraphic sequences and sites studied (compared to its neighbouring regions), there is evidence that the Middle and Low Guadalquivir Valley was neither unoccupied nor had a passive role during the Full Bronze Age. This project reflects on the history of the research in this region and the way spatial relationships and material record are addressed by archaeologists who are dedicated to the study of this period of human prehistory. The territorial models produced for describing the cultural areas claimed for southeast and southwest Iberia ended up replicating discourses that favour the imposition of our own subsistence paradigm to the interpretations made on archaeological contexts. Here, an alternative approach is presented, which considers the material and immaterial aspects of the landscapes, used as resources by Bronze Age people to develop their social and cultural practices.

Introduction

Archaeology has everything to do with the past, but it also concerns the present. Our current ways of perceiving the material world have an influence on how we perceive the past. Such influences affect the way archaeologists approach different phenomena identified in the material record, possibly leading to biases and restricted scientific fields oriented towards paradigms and discourses already established as authority, rather than questioning how such discourses and ways of thinking developed.

One example is seen in the Archaeology of the Bronze Age. This period may provide some of the clues for understanding the way Western[1] societies organise themselves socially and politically today. Or at least this is what archaeologists have suggested over the last few decades. The Bronze Age has been described as a very conflictive period, full of ruptures with several expressions and sociocultural practices seen in the Megalithic times. The origin of the state organisation mode also seems to be located during this period, which implies the need to consider different questions regarding power, territorial control and social production. Indeed, most of the discussions about the Bronze Age have been oriented towards social complexity, the way some practices were transferred from one region to another and the territorial expressions of those encounters. Most of this has traditionally been thought to have occurred through violent events. The regions with the most Bronze Age sites identified, and consequently a higher investment of research, lead such discussions. At the same time, there are regions with less research investment and therefore fewer sites identified. These regions have commonly been thought of as unoccupied during this period; but realistically they have simply been understudied.

The research presented here focuses on the case of the Middle and Low Guadalquivir Valley during the Full Bronze Age (approximately 2200–1550 BC). This region has traditionally been considered a ‘gap’ in the knowledge about the Bronze Age on the southern Iberian Peninsula. Indeed, the number of Bronze Age sites identified, compared to neighbouring regions, is very low. Several hypotheses have been explored to explain this gap; yet, one of the main explanations can be found in the lack of systematic and regional studies in this portion of the Guadalquivir Valley.

The main objective of this research is to show that, rather than unoccupied, the Middle and Low Guadalquivir Valley had people living there, people who were moving and interacting with other regions, for example with the southeast and the southwest corners of the Iberian Peninsula. The approach presented here suggests some alternatives to the ones used for addressing the Bronze Age phenomenon in general, especially related to the way the spatial interactions of the human groups are described and also to the way both materials from the past and today’s material world are perceived.

Over the last several years, criticism about the way the material record of the Bronze Age in southeast Iberia has been addressed has increased; or at least, there has been more reflection on the previous and well-established theories. This publication follows the trend and reflects on how the history of research on the Iberian Peninsula has led to different representations of the Bronze Age that do not fit for a region such as the Middle and the Low Guadalquivir Valley.

This occurs not just because the amount of research has been low, compared to the southeast for example, but also because the few sites found and the few materials collected show a diversity that has not been yet properly characterised. This observed diversity has sometimes been used to consider this region a periphery of the so-called ‘Argaric territory’ and sometimes to consider it an

1 The term ‘Western’ is used in this text not necessarily to refer to a geographical location on the globe, but rather to a worldview based on cultural expressions, political and economic values originated in Europe and spread across the entire globe since the colonial period. Today, Western worldview influences many expressions in art, science, politics, economy so as the way people perceive the world and interact with the environment, regardless the geographical location.

autochthonous region. To further this discussion, we first need to address previous issues that have not been yet solved, especially the lack of more stratigraphic sequences, open-area excavations and material record.

Complementary to these reflections, this research presents a regional and systematic study of the Full Bronze Age in the Middle and Low Guadalquivir Valley, performed during 2017 and 2020 within the project: 'Use of Resource Landscape and Socio-Cultural Change in the Iberian Peninsula' – (second Phase), supported by the collaborative research centre SFB 1070 RessourcenKulturen at the University of Tübingen (Germany).

These two analytic categories, **landscape** and **resources** (along with the concept of **subsistence paradigm**), frame the reflections made throughout the whole text. The approach presented here is oriented to show how the Middle and Low Guadalquivir Valley was a landscape of resources. This landscape (and all the material and immaterial elements composing it) was used by Bronze Age people to shape or modify their social practices and interactions.

Landscape, resources and interactions during the Bronze Age in this region are discussed here according to the results obtained from three activities: (1) archaeological surveys and excavation of test pits throughout the study area, (2) the study of the pottery typology and its geographical distribution throughout the Guadalquivir Valley as well as (3) archaeometrical analyses performed on human remains from a Bronze Age necropolis excavated next to the ancient Guadalquivir mouth.

All these elements help to provide a possible picture of the Middle and Low Guadalquivir Valley during the Full Bronze Age. This picture includes the interactions among the sites identified and the different elements for establishing some material comparisons with its neighbouring regions. The analyses and discussions presented here intend to be an introduction to the problem of researching this period in this region. The project also wishes to motivate other archaeologists to pay attention to this understudied area and to consider the alternatives explored here when interpreting the material record.

This text has been organised in three parts. The first part consists of the geographical, chronological and theoretical framework of the research as well as the state of research regarding the Full Bronze Age in the Middle and Low Guadalquivir Valley. The main concepts used are introduced to the readers in order to guide them through the rest of the text. The second part presents the three activities performed during the development of this research project. For convenience and ease of reading, each one of the activities is presented with its own introduction, followed by a description of the methodology, a discussion of the results and some concluding remarks. The third part consists of a few general concluding remarks regarding the development of the research and the general ideas expressed within it.

Throughout the text, there is always the intentionality of generating awareness of our current ways of perceiving the material world and the way archaeologists contribute to such perceptions and representations. Finally, this text is an invitation to consider alternative approaches that may help overcome traditional models reproducing power relationships, predatory use of materials and violence, not only in the field of archaeology, but in society as a whole.

Part I: Context

1 Subsistence, Landscapes and Resources

1.1 Why Do We Perceive Things the Way We Do? The Subsistence Paradigm

Let us take a look at one of the most recent and popular influences of archaeology on people's (not academic) daily lives: strategy video games. Nowadays, one of the most frequent activities for kids and teenagers is spending time on their phones or consoles (Cummings/Vandewater 2007; Hygen et al. 2020). Advertisements for strategy games set in prehistoric and historical times repeatedly appear on social media feeds. In these games, the player's objective is to become a 'powerful civilisation' by accumulating enough **material resources** to sustain farmers and soldiers, and then conquer other territories. Most of these video games value strength and the use of violence as the unique means to beat opponents and, finally, dominate the course of history. Children and teenagers enjoy spending their free time upgrading objects or weapons to improve killing or conquer skills and competing to accumulate raw material on a virtual map.

Nowadays, a similar attitude towards material goods can be found not only in video games but behind other aspects of life as well. This can be seen in the way people constantly upgrade what they produce/wear/consume and post their material life on social media as a symbol of their success; in the discourses that invoke words such as 'liberty', 'democracy', 'God' or even 'peace' to justify the use of military violence to control territories rich in raw materials; or in the news reports about the global-market war and the gap between developed and undeveloped countries, which show a daily comparison of nations under a scale of economic wealth.

Where does it start? What is the origin of this logic that is seen today almost everywhere? This way of thinking and acting relates to something here addressed as the **Subsistence Paradigm**. This paradigm models the way most of us perceive, organise and use material things in the world in a way logically coherent with our worldview. It functions as a model for organising and understanding the material world. The importance or relevance of things is established according to certain **principles** that determine the **value** given to them. Value depends on how much things can contribute to the **survival** of a human group, a society or an institution. Principles orienting value have changed according to every human group and every worldview throughout human existence. Some of these principles are impossible to know because they already belong to forgotten memories, gone with the people from the past.

Here, the subsistence paradigm is used just as a way to critically define how people and individuals approach their surrounding material world to survive. Paradigms could represent those from Western rational-oriented worldviews and strategies to pre-capitalist ones. The subsistence paradigm, as a concept, has been used mainly in the frame of discussions around the impact of current global economies on Indigenous peoples (Mander/Tauli-Corpuz 2006) or to criticise the way Western anthropology has addressed the role of women or peasant populations in subsistence economies[2] of the historical past (Lin Marburg 1984; Bowie 1992).

Most of these discussions have originated during the debate between formalism and substantivism in anthropology and economy (Polanyi 1944). Whereas formalist ways of approaching economy consider rational logic and the strive for maximisation of benefits as sources of all economic decisions, substantivist approaches relativise this idea, considering the social and cultural context surrounding the group as an important factor in the way people decide how to organise their material lives; here, economy cannot be separated from the whole system of beliefs and worldviews that societies construct (Polanyi 1944).

2 Subsistence economies are those oriented towards the basic subsistence of the group rather than the transactional level. This field has been largely addressed by archaeologists as well as ethnologists to study the material life and the production processes in prehistoric or current non-Western economies, which are mainly Indigenous.

Substantivist approaches contributed to expose the tensions and biases that the Western worldview (with economies mostly oriented to the formalist perspective) has produced not only in archaeological research, but in most of the humanities, and they have also helped to change the perspective and the way we study and interpret people's material relations in the past.

For example, several material exchanges between Indigenous groups documented by ethnologists during the 19th cent. AD were performed under their own system of rules and principles – in other words, under their own subsistence paradigms. Marcel Mauss ([1924] 2009) noticed that such exchanges were linked to several aspects of the groups' life (not only the economic) which made part of their worldview. Events like the *potlatch* or the exchanges between the people from the Trobriand Islands mentioned in Mauss' work were expressions of 'other' (non-Western) ways of perceiving the material world. They were performed under their own logics, semantics and aesthetics. After being observed by the ethnographer, they were interpreted (or translated) under the logics, semantics and worldviews guiding the researcher (let us call it Western).

Sometimes such translations or interpretations are not considered by the Western political and economic powers when making contact with Indigenous peoples. This leads to a paradigm clash, and potentially to conflictive scenarios. Most of the time, value oriented principles are imposed from one group (usually the Western) onto another (the Indigenous) (Mander/Tauli-Corpuz 2006). In the case of First Nation communities in British Columbia, Canada, for example, the *potlatch*, guided under the principle of the gift (Mauss [1924] 2009), was banned because it was against the value of accumulation promoted by 'white men' (Bracken 1994). Imperialist-Colonialist practices (first against human groups and afterwards against young independent nations) have been the main diffusor of the **Western subsistence paradigm** all over the world.

According to the current social and cultural context, we could find **labour**, **domestication**, **technology**, **individualist competition**, **accumulation** and **prestige** to be the main principles influencing several material aspects of Western societies.

Once human groups define the principles orienting their way of valuing things, these principles become a structural element that gives order and sense to different material or immaterial scenarios in their lives. The Western subsistence paradigm, for example, and the values mentioned above permeate individual perceptions of the self and the world, as well as the language structuring collective scenarios like politics, media, art or science. Some of its principles are tacitly expressed in daily actions or in discourses that guide the comprehension of almost every phenomenon.

Let us focus on the discourses that are present in the study of the material life of the past. In the case of archaeology, for example, utilitarian economics and materialist logic (based on the five Western principles mentioned above) guide the discourses that shape the descriptions and theories about several social and cultural phenomena of the past. The occurrence of a 'paradigm clash' between the prehistoric groups being excavated and the scientists analysing them is impossible, as the two cannot interact with one another. This condition makes it easier for Western archaeologists to impose their own principles and subsistence paradigms on past societies.

This imposition influences the interpretations made and the perceptions identified at the spatial, relational and economic level. The development of the Western subsistence paradigm in archaeology and the implications of this paradigm on interpreting spatial and socio-economic relationships in Bronze Age southern Iberia will be addressed hereunder.

1.2 Subsistence Approaches in Archaeology

The relationship between people and the 'things' they produce or obtain, that is, their **means of subsistence,** is one of the main concerns in archaeological research. This relationship has often been addressed under a logic that is biased from the very beginning. Things are excavated, and our subsistence paradigm guides the interpretations made from them. One of the main characteristics identified in interpretations that use Western values when addressing phenomena from the past is that the relationship between people and their means of subsistence is seen as a predatory one.

Our subsistence paradigm taught us that the six principles mentioned above function as a means for developing our societies and to control our territories. Several studies are interested in how labour or domestication triggered social development or even biological evolution and resulted in the 'civilised' Western societies we see today. After decades of seeing how much Western economies rely on a predatory relationship with the planet, the principles of its paradigm started to be reviewed and put into discussion.

Even though the term 'subsistence' has been used widely in archaeology to describe the productive and transactional lives of prehistoric groups (e.g. Sahlins 1974; Earle/Christenson 1980; Frangipane 2018), it has less often been used along with the term 'paradigm' to critically discuss the way archaeologists interpret the material life of ancient groups.

Martinez Navarrete (1989) and Aranda Jiménez et al. (2015), for example, have resorted to the term paradigm to define the theoretical foundations of the interpretations made about the Bronze Age on the Iberian Peninsula. Both reviews have exposed the intentionality of the archaeologists in their interpretations, which is masked through the proposed theories and hypotheses that tend to be presented as real facts. Here, the term 'subsistence paradigm' is used to discuss the imposition of Western materialist perspectives on the interpretation of prehistoric people, which leads to ignoring the fact that, just as today's Indigenous groups have their own paradigms, people of the past also had their own ways of organising their material world. Although these ways may be impossible to know in detail, it is important for research to address them starting from what the empirical evidence tells us, rather than from the imposition of an already biased theoretical framework.

Science provides elements to reach a first level of interpretation (based strictly on the empirical evidence collected in prehistoric contexts). Despite that, some interpretations jump directly to a second level which aims to maintain an already elaborated discourse, overlooking what the empirical evidence really allows them to say. Departing from the empirical evidence may provide a less elaborated interpretation, but this will be more accurate in the end (see chapters 4, 5 and 6). Ian Hodder (2012) points out that approaches in humanities and social sciences tend to look at particular aspects of **things** and use the one that serves better for the discipline. Indeed, things play different roles in human's lives, and these roles sometimes cannot be addressed by just one single approach. Given this fact, each discipline takes what it wants from them focusing on some roles while overlooking others (Hodder 2012).

This is the same for the concept of means of subsistence. They are things, they play several roles in humans' lives, but determined approaches address them focusing on a specific role, depending on the particular interest of researchers and scholars.

Marx and Engels, in 'The German Ideology', make one of the first references to 'means of subsistence':

'Man kann die Menschen durch das Bewußtsein, durch die Religion, durch was man sonst will, von den Tieren unterscheiden. Sie selbst fangen an, sich von den Tieren zu unterscheiden, sobald sie anfangen, ihre Lebensmittel zu produzieren, ein Schritt, der durch ihre körperliche Organisation bedingt ist. Indem die Menschen ihre Lebensmittel produzieren, produzieren sie indirekt ihr materielles Leben selbst' (Marx/Engels [1846] 1969).

The term *Lebensmittel* or 'means of subsistence' is explained here as things humans use to create their material lives (*materielles Leben*). The production of these means is what makes humans different from animals (Marx/Engels [1846] 1969).

Marxism is just one of the approaches using subsistence as an analytic category. Since the mid-18th cent., a tradition of law and economy studies had been using 'subsistence' as a means for explaining the progress of human history as well as for classifying human groups (Pluciennik 2001). According to Pluciennik, three factors were relevant for the development of subsistence as an analytic category during this period:

first, individualism as a philosophical methodology; second, the foundation of modern economics and the growth of capitalist ideology; and third, the fact that science, masculine reason and 'natural law' became the most widespread ways of explaining the world.

Several studies in philosophy, politics and economics were then focused on explaining the evolution of the human species as something closely tied to the production of its material life and the differences between human groups as something related to the development of technologies for agricultural or industrial practices. This way of explaining is here addressed as the **Western subsistence approach**. Despite several schools of thought using different terminology to explain both cultural evolution and social differentiation, all of them can be considered to fall under the same **Western subsistence paradigm**.

For example, during the 19th cent., these studies introduced terms such as 'barbarism' and 'civilisation' as stages of human evolution (e.g. Morgan 1877; Engels [1884] 1972; Powell 1888), which served to distinguish between unadvanced and advanced groups. This discourse (present not only in archaeology but in Western society at large) justified colonialism and racism from European governments to the rest of the world and was the basis for the development of industrial capitalism in this century (Pluciennik 2001). Even Marx and Engels, as sons of this period, were influenced by these categories when explaining the material world.

During the beginning of the 20th cent., cultural history in ethnography and archaeology applied the Western subsistence approach (under categories – or principles – such as labour, domestication, technology or competence) in order to explain the emergence, existence and decadence of different cultures around the world. Unlike the classic Marxist perspective, which claimed a unidirectional evolution of humans towards technological progress, culture-historical approaches considered a geographically located and particularly developed history for every human group (Trigger 2010).

Despite the turn towards a relativist perspective and even repudiating evolutionism (Sahlins/Service 1970), culture-historical approaches were also interested in using a scale, based on the same categories – or principles – mentioned above, for classifying human groups and explaining differences between them (Pluciennik 2001). These explanations were mostly fuelled by nationalism, which has influenced disciplines such as archaeology since the 19th cent. (Kohl 1998). The so-called 'Neolithic Revolution' (Childe 1936), the search for the origin of ancient or current European or Asian nations, the competition between them in markets and wars and the diffusion of knowledge, objects and people between the 'civilised' and 'primitive cultures' were just a further expression of a way of thinking that was adapted to the political and economic environment of this period (Trigger 2010).

Some of the tools implemented by culture-historical approaches influenced the way archaeologists started to represent ancient ethnic groups (considered cultures) and territories (culture areas). Large catalogues of artefacts classified into typologies became the instrument for distinguishing between these groups and for developing chronologies for them (Trigger 2010). Their cartographic representations were maps with borders separating different culture areas, according to the set of materials identified for a determined region, and arbitrary arrows placed from one corner to another of the map, representing the movements and diffusion of knowledge, people and objects between culture areas. Such tools are still used for representing ancient human groups or different population movements during prehistory.

The second half of the 20th cent. brought changes in the way archaeologists interpreted the archaeological record. Functionalist approaches provided new insights and ancient human groups were addressed as dynamic systems, overcoming static models of classification (Trigger 2010). Thanks to the contributions of archaeologists such as V. G. Childe, Marxism recovered its influence, and social and cultural evolution was again in focus. Beyond classifying cultures, archaeologists started to be interested in processes of change, reflecting on how the lifestyles of groups around the world became complex or, on the contrary, remained 'primitive'.

These explanations regarding social complexity again used Western subsistence-oriented approaches, this time related to categories such as trade, technology, productive forces and the possession of the means of production (Childe 1947). In order to overcome diffusionism, the goal was to identify the origins of change inside human groups. Topics such as the origin of the state gained relevance and contributed to the definition of new categories for explaining social differentiation, power and prestige among them (Service 1984).

Since then, sociocultural change has mostly been explained through the categories behind the Western idea of subsistence. Archaeologists identified internal or external vectors of change mostly from the materials collected in the field. Such material became the main referent, leaving aside other vectors that could also play a role in processes of change. The structure and function of the material world, and not ideology (or superstructure, according to Marxism for example), were the primary sources for archaeological explanations (Trigger 2010).

During the last four decades, the advance of natural science and the use of cutting-edge techniques summed to neo-evolutionist perspectives triggered a bias towards the materiality of things never seen before in archaeology. The so-called 'New Archaeology' influenced the way archaeologists collected and interpreted data (Trigger 2010). The material record was subject to scientific analyses, and the analytic methods became closer to the principles of natural sciences. Human activities were mainly addressed under an ecologic perspective (Butzer 1982) and studied under quantitative parameters.

Energy intake, proteins, DNA, climate and the ecological relationships of humans to animals and plants became relevant when studying social and cultural processes of change among human groups. Considering humans as part of the ecological system contributed to the foundation of several economistic interpretations. At the same time, the use of these elements, in the frame of the Western subsistence approach, was useful for answering several questions regarding the development of social inequalities and the origin of social complexity.

Culture was considered an extrasomatic means of adapting to the surrounding environment (White 1959). Under this idea, quantitative data were also useful for explanations regarding population dynamics, kinship relationships, mobility, migration and social differentiation or rank according to the 'Archaeology of death' approach (Parker Pearson 1999). Scientific methods fit not only into the questions made during the last decades, but also into the whole structure of the archaeological scientific field constructed to date (Bourdieu 1975).

The Western subsistence paradigm has guided most of the research questions as well as most of the results published in scientific journals. Congresses and meetings host thousands of researchers going in the same direction, talking under the same semantic rules, understanding the world in the same way, thinking of the problems with the same vocabulary, scientific parameters and philosophic positions, making it almost impossible to consider other potentially useful roles for things. It is these other roles that Hodder suggests are voluntarily ignored. This occurs mainly because the scientific field (Bourdieu 1975) is structured under the principles of the Western subsistence paradigm.

Pierre Bourdieu explains how science, like any other social field, is the *locus* of competitive struggles, with particular agents looking for the monopoly of scientific competence and the recognition of speaking and acting legitimately as authorities in scientific matters. The operation of this field produces and presupposes a specific form of scientific interest that distinguishes what is competent or legitimate for this field and what is not; it defines vocabularies, methodologies and the ways of obtaining recognition or prestige among its members (Bourdieu 1975).

Most of the time, we ignore the ways in which our discipline also functions as a scientific field. There is an agenda in every congress or editorial board which defines what is relevant and what is not. There are struggles for prestige, competition for recognition and some ideas have become sacred and almost irrefutable because nobody wants to be seen as an outsider for questioning them. Following Hodder's and Bourdieu's statements, although things played different roles in ancient human groups, only part of those roles become relevant for archaeologists according to the interest they structured into their scientific field.

The Western subsistence paradigm (structured after two centuries of scientific tradition) now has a monopoly on archaeological research. It defines the character of things made by humans and pre-defines the vocabulary and research questions as well as the way young archaeologists must address the material record.

This paradigm is the reason why the past is explained to people today in the way that it is. Archaeologists do not produce video games about prehistorical warfare scenarios, with princes and competition for 'resources'; but the things they tell about the past influence how people understand it today, not only in schools or in museums, but also in their daily lives.

1.3 *Realpolitik*: The Western Subsistence Paradigm in Bronze Age Archaeology

Back to the example of strategy videogames, as mentioned before, one of their mechanisms is the obtention of material resources (e.g. accumulating enough meat, rocks, wood or metal) for sustaining both people and armies. The player is the leader of the group selected (most often referred to as a 'civilisation') and commands over the conquering of the whole map. Armies try to invade enemy territories and after the battle, the winner takes it all. Simple.

From a materialist-pragmatic point of view, this mechanism seems logical for the game. Violence and accumulation of raw materials appear as the only means of obtaining victory. Does it happen in real life? Did it happen exactly in such a way in the past?

André Leroi-Gourhan considered violence as inherent to the human species, as a zoological property or a natural fact intrinsic to the human roots. As with any other species, humans need to survive. Therefore, he thought that getting grouped, settling in a place for obtaining shelter or violently acquiring food (or other things from other groups) was something that simply corresponds to the behaviour of any living being (Leroi-Gourhan 1993).

This naturalist discourse of violence is heir to a tradition of reflections on the origin of wars (Clastres 2004). It brings back a perception of war as a 'natural condition' of humans (Hobbes [1651] 2017) and the idea of violence as an instrument for obtaining or even accumulating means of subsistence and as the catalyst of social dynamics (Leroi-Gourhan 1993; Marx [1867] 1947).

Hobbesian or Marxist points of view regarding violence could also be associated with the Western subsistence paradigm scheme of thought. Violence here is perceived as a feature intrinsic to different competitive attitudes among people or countries and as an attribute that is always present in big social or cultural changes. Despite evidence of violence has been identified in many contexts and places in human history, Western scholars use to address it as an universal phenomenon, and interpret it based on values and conceptions that have shaped their societies, however, violence could have several expressions and meanings depending on the worldview and subsistence paradigm involved. In the case of our 'Western' societies for example, these perceptions are expressed in the way individual competition occurs (with people exercising symbolic or physical violence to succeed in different fields), in the way technological innovation has been closely tied to warfare contexts or in the violent way nature has been domesticated and is treated today.

If there was something that could gather and describe all the violent perceptions of our societies, it would be the *Realpolitik* school of thought. *Realpolitik* has been considered an intellectual tradition for understanding international politics (Wohlforth 2009). It comprises different authors along different epochs, from Thucydides or Sun Tzu to Machiavelli, Hobbes or even Weber and Marx (Cabrera García 2014). Regardless of their philosophical orientation or the moment of history they analyse, these authors share a disenchanted and demystified theory of politics, highlighting the difference between what people think or say should be made (the ideal) and what is finally carried out (the real) (Cabrera García 2014).

This school of thought drives its attention to the effective behaviour of people and how this comes into conflict with the utopic postulates of how political institutions or societies should be (Bobbio 2004 in: Cabrera García 2014) and reveals the sometimes uncomfortable and raw side that politics and power have.

In summary, according to Wohlforth, the *Realpolitik* is based on the following four principles: groupism, egoism, anarchy and power politics.

- Groupism: 'Politics take place within and between groups, group solidarity is essential to domestic politics and conflict and cooperation between polities is the essence of international politics. To survive at anything above a subsistence level, people need the cohesion provided by group solidarity, yet that very same in-group cohesion generates the potential for conflict with other groups. Today the most important human groups are nation-states, and the most important source of in-group cohesion is nationalism.'
- Egoism: 'When individuals and groups act politically, they are driven principally by narrow self-interest. This egoism is rooted in human nature. Its expression, though, may be exacerbated, moderated, or even temporarily overcome by national and international political structures, institutions, and values.'
- Anarchy: 'The absence of government dramatically shapes the nature of international politics. Anarchic political systems of self-help both impose distinctive constraints on the ability of international actors to achieve their purposes and exacerbate group egoism.'
- Power Politics: 'The intersection of groupism and egoism in an environment of anarchy makes international relations, regrettably, largely a politics of power and security. Once past the hunter-gatherer stage, human affairs are always marked by great inequalities of power in both senses of that term: social influence or control (some groups and individuals always have an outsized influence on politics) and resources (some groups and individuals are always disproportionately endowed with the material wherewithal to get what they want)' (Wohlforth 2009).

A feature of *Realpolitik* is that it does not have a specific origin or a theoretical path marked under the tag 'Realism'. It is considered more of an 'attitude of mind' (Garnett 1984) or a 'philosophical disposition' (Gilpin 1986) found in several authors that converge with their opinions and texts on the principles mentioned above. Just as *Realpolitik* groups a way of understanding international politics from different epochs and different authors, the Western subsistence paradigm in archaeology could also be considered an attitude of mind that precedes any intellectual exercise of interpreting social relationships between groups in the past. It could be seen as a mental model that shapes the language used, the research questions made and the conclusions obtained. *Realpolitik* principles are similar to those ruling the Western subsistence paradigm, mainly because both come from the same philosophical tradition and have been shaped in the same historical and geographical contexts.

It is not difficult to identify how the principles of the *Realpolitik* are communicated to us in the media. At the same time, human history has always been linked to war, so war has been integrated as a daily element in the news. Nations are still the core of comparisons between humans on a global level and there is still a hierarchical organisation of them, with global powers deciding what happens in international scenarios, and relegated countries submitted to their will.

All these news headlines, history textbooks and pop-culture references to war and power generate models of thought that influence the way we, as archaeologists (but also people from our epoch), read not only current international politics, but also political relationships in the past, and may result in the production of biases in interpreting the way people interacted.

If there is a period in prehistory about which archaeologists take a position close to the ones of the *Realpolitik* for interpreting social relations, it is the Bronze Age. This period has been seen as the time when human groups started a process of complexity that rooted the political organisations we know today in Western societies (Arteaga 2000; Kristiansen/Larsson 2005; Fibiger/Scheidel 2013). It is considered the moment in which ancient institutions and power based mainly on charisma and specialised knowledge broke down and the beginning of institutions based on inherited status and individualist competition for wealth and political power, which would culminate in the development of the state (Lull 1983; Lull/Estévez 1986; Schubart/Arteaga 1986; Nocete 1988; Arteaga 1992).

A recent case could clarify this idea. In 2019, several newspapers and magazines around the world informed about a study that mentioned '[…] by 2000 BCE, the replacement of 40% of Iberia's ancestry and nearly 100% of its Y-chromosomes by people with Steppe ancestry […]' (Olalde et al. 2019, 1230). The study suggested that further archaeological and anthropological research will be needed to understand the processes that generated this replacement (Olalde et al. 2019, 1234). Right after being reported in press around the world, interpretations about the reasons of this replacement started to appear. The newspaper 'El País' from Spain, quoted an interpretation made by the geneticist David Reich one year before, in 2018, in a talk organised by the 'New Scientist' magazine where some preliminary results of the same study were mentioned. According to Reich, the replacement happened in the following terms:

'La colisión de estas dos poblaciones no fue amistosa, sino que los hombres llegados del exterior desplazaron a los hombres locales casi por completo' (Ansede 2018).

Translated: 'The collision between these two populations was not a friendly one. Men coming from outland displaced local men almost completely' (translation by author).

From the declarations made by Reich, the journalist wrote this news headline:

'Una invasión borró del mapa a los hombres de la península Ibérica hace 4500 años' (Ansede 2018).

Translated: 'An invasion erased Iberian men from the map 4500 years ago' (translation by author).

From then on, the headline became popular and was discussed among archaeologists and scholars from Spain and other countries in Europe. During the last two meetings of the European Archaeological Association congress (Barcelona 2018 and Bern 2019), several sessions which focused on the Bronze Age replicated the idea suggested by Reich and maximised by Ansede.

Central Europe and Iberian Peninsula Bronze Age archaeologists brought into discussion the evidence for violence and power struggles in their sites, agreeing with Reich about the possibility of such a warfare scenario during the Bronze Age. Social differentiation and conflict as an expression of these hectic times, with steppe men with horses invading farmers' settlements, was one of the main topics of discussion during the sessions.

It is worth noting the language used in the sessions' discussions. Words like 'warriors', 'battles', 'defence', 'control', 'territory', 'weapons', 'power' or 'prestige' were repeated many times when referring to descriptions of archaeological sites, landscapes or burials. As an anecdotic example, an archaeologist researching a Bronze Age site in southern Germany referred to a female burial with golden grave goods as the 'Princess tomb', even supplying a very ostentatious (and sexualized) reconstruction of the appearance of the woman buried there, similar to the ones used in videogames.

At the EAA[3] meeting in Barcelona in 2018, there was a session dedicated to the Bronze Age culture of El Argar. There, the mention of fortified settlements on hilltops, the presence of weapons such as halberds and swords in male burial contexts and some wound marks in bones were presented as evidence of a conflictive period or at least a very critical one in the social relations among groups.

Likewise, in a documentary made by the Spanish TV about the Argaric Bronze Age site of 'La Bastida de Totana', archaeologists referred to the site as a fortified place with walls, bastions and a palace. They spoke about the control and accumulation of agricultural production by a centralised power represented by elite warriors serving a chief; this evokes the idea of a pyramidal society with different classes and violent encounters with other groups (Navarro/Pimentel 2015).

All these publications in scientific papers, magazines, EAA congresses and TV documentaries claim territorial control, violence and centralised power as relevant elements during the Bronze Age, at least in southeast Iberia. There are other common aspects in studies regarding El Argar, directly replicating the *Realpolitik* principles.

3 European Archaeological Association.

Groupism: Human groups during the Bronze Age are mostly described as ethnic unities settled in territories with borders defined by the archaeologists. These groups are claimed to have been under the control of an elite and an army that defended the settlements from foreign invaders. The interactions in the past are interpreted departing from the basic unit of the groups, since the majority of the studies focuses mostly on the interactions between regions (or culture areas).

In the case of southeast Iberia, El Argar is described as a territory (Arteaga 1992; 2000; Lull et al. 2010b), in other words, an extension of land controlled by a group that was politically organised and had an identity different than other cultural entities or territories surrounding it; a group that already had a notion of space and knew how to measure it, how to set boundaries and administrate them (Lull/Risch 1996; Stuart 2010).

As products of these perceptions of El Argar as a territory, maps have been made according to the sites identified as Argaric in southeast Spain (Tarradell 1946; Lull et al. 2009a), a detailed delimitation of frontiers based on Argaric vs. non-Argaric traits in a region (Jover Maestre/López Padilla 2004), studies of the expansion of the Argaric limits (Lull/Risch 1996; Lull et al. 2009a; 2011) and even the documentation of Argaric enclaves in foreign territories (Lull et al. 2010a; 2010b; Martínez-Monleón 2014) as well as discussions about centre-periphery relationships between Argaric groups (Arteaga 1992; 2000; Nocete 1988).

Depicting El Argar as a territory also has implications on the way its political relationships are interpreted. It defines El Argar as a cultural unity different to its counterparts in other neighbouring regions, which are also delimited and considered as cultural entities (e.g. Valencian Bronze, La Mancha Bronze). At the same time, the idea of a controlled land implies the existence of a political organisation that administrates it (a state) (Lull/Risch 1996) and defends it from external threats.

Egoism: The existence of a political organisation, with social classes and elites controlling a territory, also implies the existence of self-interest, for maintaining their status, among these elites. Archaeologists consider El Argar a hierarchical and classist society (Lull/Estévez 1986; Arteaga 1992; Mederos Martín 1994; Lull/Risch 1996; Lull et al. 2009a; 2010b; 2011) with differentially ranked settlements in the territory (Molina/Cámara 2004; Contreras Cortés 2009–2010).

These hierarchical models are complemented by the identification of wealth accumulation among the so-called elite, high class or dominant class (Lull/Risch 1996; Lull et al. 2010b). Higher concentrations of protein sources (fauna) or grains in specific houses in the Argaric settlements are interpreted as evidence of restricted and differentiated access to the social production (Lull et al. 2010b).

Funerary practices are also analysed to support this perspective. Differences in the wealth of the grave goods among the population (including children) are interpreted as indicators of inherited status (Lull et al. 2010b) as well as a differentiated access to the funerary rituals (Aranda Jiménez/Esquivel Guerrero 2006); the absence of grave goods and the evidence of poor nutrition in one individual are read as signals of the segregation of foreign people (Buikstra et al. 1992; 1995).

Researchers also claim the existence of a closed system of circulation of metal goods in El Argar, exclusively among the elites (Lull/Risch 1996), as well as the restriction of determined weapons and adornments to the elite's graves only (Buikstra et al. 1992; 1995; Lull/Risch 1996). These interpretations are also linked to the concept of 'self-interest'.

Accumulation, restricted access to products and the way funerary rituals are performed are claimed to show a political framework where the social relationships are mostly based on coercion and violence by a so-called 'aristocracy' (Mederos-Martín 1994).

Anarchy: Invasions, raids and armies defending villages from foreign threats are the common place to which archaeologists go when explaining elevated-fortified settlements, weapons in grave goods and population replacements.

During the Bronze Age (and before), interaction and exchange indeed existed along the Iberian Peninsula and beyond (Carrillo García 2018), but interactions between El Argar and its neighbours are described mostly in terms that suggest the expansion of Argaric traits from its centre

(Lull/Risch 1996; Lull et al. 2009a; 2009b; 2011) through the search for raw materials and the acculturation of neighbouring regions (Ruiz Lara 1987; Aranda Jiménez et al. 2015). Such models for the expansion of El Argar territory are based on chronology (González Marcén 1993; 1994; Lull/Risch 1996) and findings with Argaric traits in 'foreign' territories (Escacena Carrasco/Berriatúa Hernández 1985; Lull/Risch 1996; Hernández Pérez 1997).

According to the authors, interaction indeed existed, but not without violence. These models are complemented by discussions on power expansion and the increase of the territory controlled and subject to the central elites (Lull/Risch 1996). This expansionism, as described by researchers focused on the Argaric phenomenon, seems to be guided by egoism and interest in violently controlling neighbouring regions. Like the perspective of the steppe people coming from the east, political relationships among groups along the Peninsula are read as if anarchy reigned in intercultural relationships.

Instead of showing networks of relationships, most studies suggest that Bronze Age interactions were between 'cultures' competing or trying to prevail against each other. El Argar is represented as an influencer, either as a model to be followed by its neighbours or a threat, from which they had to defend themselves (Lull et al. 2010a; 2010b). In that case, only military coercion could assure political power, violence being then the most effective way of controlling a population or a territory.

Power politics: 'Control' appears as one of the most used words when authors talk about interaction between groups and with their surrounding landscape. In El Argar, as pointed out above, the discourse that structures the discussion regarding social and political interactions is inclined to thinking of control as one of the main goals of these groups.

By being considered a territory, with elites appropriating the production for themselves, coercing the people for their own interests and expanding their frontiers to broaden the material base of their production, El Argar is basically the representation of power in the southern Iberian Peninsula.

In their efforts to evidence the existence of the state during the Bronze Age in the southern Iberian Peninsula, archaeologists present El Argar as a wealthy one. According to this perspective, El Argar expanded its influence along the southeast Iberian Peninsula, conforming a territory ruled by elites that also controlled the lives of thousands of people for almost a millennium.

Control is also expressed in the way archaeologists describe how people subsisted. Elements such as agriculture, metallurgy, animal husbandry or textile weaving are basically considered to make up part of the system of power relations between elites and producers, with centralised production and surplus as the key concepts for explaining such relationships (Lull 1997–1998; Lull et al. 2010a). Exploitation of both raw materials and people are considered to be the means of subsistence during this period.

After decades and many publications, all these elements have consolidated into a discourse about the Bronze Age in southeast Iberia that shares several features with the way states or empires have been described in the past. Most of the goals in archaeological and historical disciplines seem to be already predetermined by the Western subsistence paradigm, which has a scientific tradition and a theoretical framework that structures the ideas used for interpreting the Bronze Age in such a manner. There is a problematic situation, at least in the case of El Argar, when referring to the evidence that would support the claims made around its condition as state. This does not mean that there is a problem in the theory, or in the material record identified, but in the scientific procedures used to analyse and interpret it.

Archaeological interpretations also are products of their time. Sometimes archaeologists have to wonder whether the theoretical principles used for interpreting the material record are biased or are subject to the illusion of being objective, especially when opposite points of view exist or, even worse, the evidence is not enough to sustain what has been claimed. Thus, as signs of violence, hierarchisation or control are identified, there are counterparts questioning them as well.

Gilman critically evaluates the main aspects that define El Argar as a state. He points out several inconsistencies between the statements made and the empirical evidence supporting them.

First, he highlights the low number of metal objects (compared with other contemporary Bronze Age sites) from which archaeologists claim specialised production and unequal access to metal goods (Gilman 2013). Another criticism against the specialisation model is that Peñalosa, considered by Argaric researchers as a full-time mining settlement controlled by the Argaric elites from the centre of the territory (Lull et al. 2009a; 2009b), was not dedicated strictly to metal production. Calculations demonstrated that agricultural and domestic activities were also present on a level that was no different than other Argaric settlements (Antipina/Morales 2006, quoted by Gilman 2013).

A second element underlined by Gilman is the lack of statistical information supporting generalisations regarding social and ideological control of the population by elites. There is no statistical information showing standardised volume ratios in pottery (Gilman 2013), and the statistical significance regarding the distribution of faunal remains in large vs. small houses in Peñalosa is very low. Likewise, there is also not enough information to evidence class differences in health conditions and nutrition among the funerary contexts found so far in the Argaric territory (Buikstra et al. 1992; 1995; Brobeil/García Sánchez 1990; Díaz-Zorita Bonilla et al. 2011, quoted by Gilman 2013).

A third problem is the overestimated evidence when considering El Argar as a stratified society (Gilman 2013). The bioanthropological information coming from Argaric burials led to the formulation of hypotheses which were not developed properly but transformed directly into generalisations before gathering enough data to prove them.

Along with Gilman's observations, Aranda Jiménez et al. (2009) point to an issue that occurs with several archaeologists studying the Bronze Age in Europe. According to what was seen in the EAA sessions, they sometimes place the validated discourse before the evidence when speaking about Bronze Age societies. Indeed, in the case of violence in El Argar, the evidence exists, but it is, in Aranda's words, 'pronounced' rather than explained (Aranda Jiménez et al. 2009).

Again, the evidence is not enough to demonstrate the level of conflict that has been claimed (Aranda Jiménez et al. 2009). The number of weapons found is very low for confirming the existence of a 'warrior elite' (as Gilman himself did in 1976), and the defensive constructions are limited to a few settlements (Serrano Ariza 2012).

In the same way, with isotopic analyses of metal goods, Montero Ruiz and Murillo Barroso (2010) observe the inexistence of a centralised production of metallurgy, identifying non-intensive, non-specialised and more local-domestic productions spread across the southeast, without evidence of closed exchange circuits or restricted circulation in the region (Montero Ruiz/Murillo Barroso 2010). They conclude the need for more evidence and further analyses prior to any claims regarding the role of metallurgy in the intensification of social complexity in the region.

The issue of discrepancies between interpretation and evidence in southern Iberian archaeology has also been explored by Cámara and Molina. They criticise the existence of circular arguments (mainly from processualist approaches) that impede the recollection of new information and the exploration of new alternatives for reading the whole material record (Cámara/Molina 2016). They mention the existence of a theoretical frame that is already adopted prior to any analysis, impeding the collection of new empirical evidence, linked to the chronological and geographical context of the site, that could lead to alternative ideas regarding the same questions. Despite their focus on the Chalcolithic site of Marroquíes Bajos, they extend this problem to the study of all recent prehistory in the High Guadalquivir region (Cámara/Molina 2016).

Additional alternative models include criticism of the colonial model applied to the analysis of Argaric societies (Aranda Jiménez 2013). Aranda Jiménez is one of the first to identify the impact of the Western discourse on the interpretations made about Bronze Age societies. Analysing the funerary record, he identifies other ways of expressing that are alternative to the traditional idea of cultural uniformity and the standardised image that the so-called Argaric norm hypothesis provides (see chapter 2.2.2). The diversity and heterogeneity he identifies also question the existence of state political forms based on territorial control and ideological and physical coercion (Aranda Jiménez 2013). Parallel to these observations, several alternatives have been considered regarding interpretations of empirical evidence from El Argar.

Serrano Ariza, for example, studies the disposition of Argaric fortifications along its delimited territory during the Bronze Age. After criticising the lack of studies in this matter, he also points to the fact that, according to what the empirical evidence shows, there are no significant elements that could support the existence of a state-like organisation in El Argar. This observation is based on the disposition of the settlements with fortifications that shows neither a defensive vocation nor the existence of an Argaric border (Serrano Ariza 2012). Along with such fortified sites, he also identifies settlements close to them in places not so defendable and without any protection, even in regions considered crucial for the development of the state such as the settlements related to the metallurgical production (Serrano Ariza 2012).

Complementary to the ideas exposed by Serrano Ariza, Legarra Herrero criticises how territorial organisation analyses in El Argar have been more oriented to approaching the territory as a place for obtaining raw materials, rather than considering proper demographic questions and seeking to identify settlement patterns. He also criticises how the discussion about whether El Argar was a state or not overshadows more pertinent and interesting questions regarding the 'Argaric' culture (Legarra Herrero 2013).

Considering that there is no methodology designed to study the way people occupied this territory, Legarra Herrero proposes an alternative geo-politic model for understanding the territorial control in the Vera basin, and in doing so he mentions the possibility of identifying different settlement patterns in the same 'Argaric' territory with a fragmented but interconnected landscape (Legarra Herrero 2013). The results show a flexible and diverse territorial organisation that also expresses flexible and fluid social relationships, in opposition to the centralised models considered decades ago (e.g. Tarradell 1950; Nocete 1988 or Arteaga 1992; 2000).

Following the same idea, Bernabeu Aubán et al. also developed a methodology for understanding social complexity based on the study of 'complex systems'. Considering the grade of interaction between several components nested in groups (such as nuclear families, households or individuals belonging to structures traditionally characterised as bands, chiefdoms, cities or states), and departing from the empirical evidence provided by the sites' disposition, size and organisation, they analyse the social dynamics that led people to organising in different complex systems from the Neolithic to the Iron Age (Bernabeu Aubán et al. 2013).

They identify several socio-spatial networks immersed in different types of dynamics, from autonomous organisations to interdependent communities, evidencing diverse manifestations of complexity among the traditional stages. This shows that such stages (band, tribe, chiefdom or state) are neither discrete categories nor universal models applicable to every process of social change in prehistory. They tend to mask the different paths and combinations that social change has. This model refuses, from the beginning, the possibility of considering El Argar as the same type of state as any other complex society tagged as 'state' in human history (Bernabeu Aubán et al. 2013).

The three models mentioned above explore the same phenomena as traditional studies (e.g. social change, social complexity or settlement patterns) but departing from the empirical evidence and not from preconceived categories that bias the interpretations. Researchers that focus on proving the existence of ancient states, warfare scenarios or massive population replacements, on the contrary, often abandon this first level of interpretation, linked to the mere analysis of the empirical evidence.

This does not mean that the material record identified in the so-called 'Argaric territory' has not been properly studied. Again, the main issue is at the level of the interpretation. In the case of El Argar (which is the example referred here, but the same issues can also be found in the discussions regarding the Bronze Age of Central Europe or some Mediterranean regions), the amount of (very well characterised) material and identified sites has become enormous. After decades of research of such sites and materials, a scientific tradition has been established and has become the authority.

With a defined theoretical frame (mainly historical materialist), the assumptions made from the investigation of 'Argaric' contexts were oriented to participate in the discussions around the Bronze Age phenomenon in Central Europe and the Mediterranean. Such discussions have their own authorities and of course, most of these debates concentrate on understanding the origins of the state in this period. These often invoke Western subsistence approaches in the way terms and phenomena are read, considering again that one of the main characteristics of the Bronze Age is the increase in social differentiation and complexity as well as the beginning of the social, economic and political relations observed in today's states.

Such debates have been in the limelight since the beginning, and in the end, the explicative structure given to El Argar, was oriented to clarify ideas and questions around the problem of the state. At certain points, as Cámara and Molina (2016) point out for the Marroquíes Bajos site, the evidence started to present variations that contradict or move away from the first explanatory model proposed, but these variations got blurred by the number of assumptions already made over the decades (which structure the leading discourse); they became absorbed by them, and finally ignored. Parallel to this, the implications of having such powerful traditions and such a huge amount of energy and money invested in 'Argaric' research resulted in the concentration of attention on the southeast region, leaving the neighbouring regions (such as the Middle and Low Guadalquivir Valley) with lower amounts of material record, obscured and understudied (see chapter 2).

The rise of alternative points of view, and criticisms regarding the lack of evidence supporting the existence of the state in southeast Iberia, show that this authority is being questioned. This opens new possibilities for the archaeologists, who can today address contexts and questions, once thought to be already solved, under new perspectives.

The Western subsistence paradigm is implicit in the discussions about the origin of the state and masks something that most of us, as archaeologists, tend to silence: the fact that once we feel comfortable with our ideas, we are reluctant to change them. This becomes even more true when we become authorities and our ideas are already supported by many papers, books, documentaries and reports. Alternative points of view become renegade and are less likely to reach other colleagues, mainly because they act already inside the same scientific field, structured under the same parameters of communication and ruling paradigms.

In the end, the leading discourse is the one incorporated into video game scripts and sensationalist headlines that refer to a violent past and justify the predatory way humans are behaving now with the natural world. Recognising the existence of a bias would help not only to address the empirical evidence from a very first level of interpretation, but also to acknowledge the existence of other subsistence paradigms in the past.

Indeed, in the material record there is evidence of big social, economic and cultural changes between the 3rd and 2nd mill. BC, but such changes have been addressed since the beginning according to the parameters given by the Western subsistence approach and considered as dramatic shifts between categories or stages. This is the idea that lies behind scenarios such as collapse, revolution and drastic changes provoked by massive invasions or climatic changes. As Bernabeu Aubán et al. (2013) mention, it is necessary to address change in alternative ways, considering transitions that may include heterogeneity, coexistence and diversity.

The Western subsistence approach has implications on the way we, as archaeologists, but also as the public, read the material world both in the present and the past. Objects are considered to be part of a predatory consumption chain, landscapes are seen as mere sources of raw materials and people from the past are depicted as characters in a story without their own agency or worldview. Just as it happens today with our global market or with the rainforests and the Indigenous peoples protecting them from Western predatory behaviour.

A change of paradigm is needed. In the field of archaeological interpretation, this would imply addressing the past in an alternative manner, by reading landscape and materials in a different way: treating space and materials as something beyond consumable and controllable.

Archaeologists must always be aware of our intentions when presenting concepts and must recognise that the way people perceive and organise the material and immaterial aspects of their lives may differ. Not everybody shares the same language and way of perceiving the world. This cannot just be simply ignored.

Analysing the material record from a first level of interpretation and providing spatial models showing interactions rather than cultural borders would be the first step in addressing past scenarios in a way that, at least from archaeology, contributes to reading our material world in a different way, a way that may improve our relationship with the planet and with other peoples; this is something that has everything to do with our discipline.

1.4 Territories and Landscapes: Spatial Perceptions and Representations

One of the tools archaeologists have for expressing social and cultural processes are maps. Since the 19th cent., culture-historical approaches have utilised them as a way of representing a variety of phenomena such as territorial expansions, the location of several sites belonging to the same culture area, the distribution of a pottery type through a region or the tridimensional position of every material or structure excavated in an archaeological site (Eggert 2001). Maps are a way of expressing a fact that is undeniable: the presence of past human groups at the sites being studied. This presence is usually depicted by dots representing sites, arrows showing movements and arbitrary borders defining the reach of any cultural, social, economic or political phenomenon studied (Lightfoot/Martinez 1995). The use of maps comes from the Cartesian coordinate system with which we work as archaeologists when addressing space (Piazzini Suárez 2006). Maps cannot be avoided in archaeology nor in other disciplines; they have become almost a common language.

Over the last few decades, modernity and many of its products have been reviewed, criticised and problematised, including the Cartesian approach to space (Piazzini Suárez 2006). Both time and space in archaeology have been addressed from different theoretical approaches (Lara Galicia 2009). Despite having different perceptions and ways of thinking about space, in the end, all these approaches resort to cartographical representations of their study areas or their observed phenomena.

Post-processual archaeology has made two main contributions to this matter: the reflection on the intentionality behind theoretical approaches used in archaeological interpretation (Hodder 1986; 1991) and the rejection of functionalist and modernist ways of addressing space (Criado Boado 1993). It is possible to see the intentionality of the archaeologist in any cartographical representation of the past; any lines or dots drawn on the map, of course, must explain the main ideas of the researcher, but there are different kinds of ideas. For Bronze Age archaeology, for example, ideas regarding territorial control, warfare scenarios and centralised social organisations instil into maps a way of perceiving not just space, but nature, as something opposed to culture (Foucault 1978) and prone to domination, administration and subsequent predation. Criado Boado (1993) considers this to be a perception of nature as territory for the exercise of production and the capitalist system. Bronze Age cartographies are about territories and thus incorporate all the phenomena related to power control, and predation of nature via the exploitation of raw materials. Territorial maps have close ties with Western subsistence approaches. Since the 19th cent., the territoriality of human groups has been read as something based on both religious and economic means of subsistence (Lara Galicia 2009). This has led to envisioning the relationship between human groups and the space surrounding them as something influenced by the need to obtain the means for surviving (a functionalist perspective), and to cartographical representations that emphasise the process of exploitation of raw materials above any other phenomenon.

Culture-historical approaches have also contributed the concept of ‘culture areas’ to maps. This concept imbued cartographic representations with political borders. They became a useful tool for demarcating both catchment areas and the political and administrative space controlled by the ruling elites. But the locations of these borders depended mainly on the presence or absence of material traits in a geographical region. All the lines observed on any territorial map of the past are arbitrary; similar to the colonial division of entire continents, archaeologist set lines according to their interests (Lightfoot/Martinez 1995). This generates a problem when readers look at the maps. The divided space (Criado Boado 1993) replicates our own Western models of appropriating and using our surroundings, we are not always aware of how spatial representations of the past have influenced the way we read landscapes in the present.

As mentioned above, archaeologists tend to use Western subsistence approaches to explain phenomena from the past. Interpretations sometimes jump directly to a second level, which is already biased and oriented to maintain a discourse that sometimes does not have enough empirical evidence to support itself. One of these interpretations, embodied in the territorial map, shows the 'contextual subjective extrapolation' (Criado Boado 1993) of the archaeologist's Western values and paradigms when defining a culture area. This projection of values is expressed in discourses about processes of territorial expansion tied to events such as invasions, acculturations, centre-periphery relations (Lightfoot/Martinez 1995) or the extension of productive areas dedicated to agricultural and metallurgical activities. Such extrapolations, according to Criado Boado (1993), could be conscious or unconscious. In the end, maps showing a territorial expansion of borders from one period to another are mainly accompanied by ideas about violent events and conflictive scenarios that at least in the case of the Bronze Age in southeast Iberia have not been properly proven (Aranda Jiménez et al. 2009).

The 'territorial' perception of space is also tied to a 'utilitarianist' perception of the elements occupying it, with people divided into social classes; plant and animal species considered mere products linked to diet; minerals, water, wood and soil seen as raw materials for consumption, and violent events (linked with drastic climate changes or warfare scenarios) identified as the main triggers of social and cultural change. These perceptions end in the 'destructive attitudes' that Criado Boado (1993) mentions when referring to the four regularities observed in the interaction between thought, society and space over time. Destructive attitudes are evident in the way today's public perceives the past as just as violent, or even more violent than the modern world, as well as in the predatory attitude we take towards the planet. Certainly, violent and destructive events did occur in the past; but the criticism here is aimed at how the Western subsistence paradigm imposes its values in the interpretation of prehistoric events without first considering what the empirical evidence says. Cartographical representations are only one of several approaches involved. In the end, territorial maps end up being misused as elements for showing unverifiable scenarios to the public. One example of this is the way maps were used to show a supposed 100,000-year territorial war between Neanderthals and modern Humans (Longrich 2020).[4]

As mentioned in the previous section, if ideas about centralised territorial control and the existence of borders during the Bronze Age are being questioned (mainly because a lot of the empirical evidence is being overlooked), it is also necessary to question the cartographic representations derived from these ideas (see chapter 5). In this regard, 'Landscape Archaeology' has advocated researchers to consider alternative types of spatial perception and representation by generating awareness of the idea that people in the past most likely perceived their surrounding space differently than 'modern', 'Western' societies do.

'Landscape Archaeology' was first performed implicitly in several approaches with

4 November 2nd 2020, Nicholas R. Longrich published an article claiming that *Homo Sapiens* and *Homo Neanderthalensis* species were involved in a territorial war for the control of the hunting areas. This war was said to have lasted 100,000 years and to have ended with the 'victorious' sapiens dominating the territory and the extinction of the Neanderthals. This news became viral and was widely repeated on several news portals around the world. The cartographic representation of the warfare scenario is particularly remarkable as it divides 'Neanderthal and Archaic Human territories' with arbitrary borders (covering entire continents), arrows defining advances and crosses demarcating the contact points where offensive actions were supposedly performed.

different names and methodological perspectives (depending on the country), all oriented towards understanding different aspects of the interaction between humans and the physical elements surrounding them (David/Thomas 2016). Around the late 1980s, as mentioned above, post-processual approaches reflected on the way archaeologists addressed space and all the analytical categories and terms linked to it. Those reflections allowed archaeologists to consider some elements that had been ignored before and to incorporate new perspectives for understanding spatial relationships in the past.

One of the main perspective changes was in the way the concept of 'landscape' was approached. Rather than simply defining the physical (geographical, geomorphological, environmental, faunal etc.) surroundings of the archaeological sites (which were studied mainly under quantitative economic-ecologic-environmental approaches), this perspective shift gave landscapes a role beyond the physical (David/Thomas 2016). The 'Post-Processual turn' in several archaeological terminologies and approaches provoked archaeologists to integrate several socio-cultural categories asserting the relational and cognitive aspects of the human spatial experience within the term 'landscape'; elements that had previously been overshadowed by the physical ones. In this way landscapes could be defined as socio-cultural constructions (Criado Boado 1993; Nogué 2007) composed of three interconnected and interdependent elements: the spatial sensorial experiences of the human body (Cosgrove 1985; Tilley 1994; Hamilakis et al. 2002; Rainbird 2016), the spatial-interactions among and between human groups (Binford 1982; Deetz 1990) and the individual or group interactions with the physical (natural or artificial) elements surrounding them (Deetz 1990; Pauknerová et al. 2013). All these social practices, experiences and interactions are objectivised (Criado Boado 1993), being such objects accumulated over hundreds and thousands of years and leaving a record (Ingold 1993) that also integrates the landscapes we experience today (Taçon 1999).

'Landscape Archaeology' addresses these elements as sometimes separate, sometimes combined and, in the end, abandons 'territorial' perceptions. Instead, it seeks to recognise the diversity of perceptions (Ingold 2000) and spatial interactions existing in the past, based on the empirical evidence collected, which is a crucial methodological aspect of this approach. Instead of moving directly to the second level of interpretation, archaeologists address the empirical evidence while being continuously aware that any phenomenon identified was once ruled under its own language, its own worldview and its own subsistence paradigm.

An awareness of the existence of material and immaterial elements in the landscape can help researchers understand the possible values given to things and the principles orienting those values. It can also help to understand the way subsistence was tied to elements beyond the search for territorial control, the domestication of nature or the conflictive relationships that are key to the Western subsistence paradigm. According to this way of addressing landscapes from the past, the cartographical representations produced would depend on the elements of the landscape that the archaeologist is interested in showing. Such elements could be better expressed today thanks to new approaches such as Geographical Information Systems (GIS, see chapter 5.4). The use of GIS in archaeology (Conolly/Lake 2006) allows a combination of different types of spatial data to be used to analyse spatial phenomena from the past. Through GIS it is possible to show both the quantitative analyses of physical elements of the landscape (land cover, slope, elevation, visibility, distributions, concentrations etc.) and the potential social phenomena (interactions, networking, disaggregation, massive migrations or population replacement – when empirical evidence is significant and clearly shows them) expressed in the landscape.

Along with the perceptions and interpretations of the space, there are also the perceptions and interpretations of the elements interacting within it. As mentioned above, landscape is a useful category for addressing several social and cultural aspects that are present in any spatial interaction. The question of how to exactly address the elements composing landscapes from the past is still open.

1.5 Landscape as Resource, Landscapes of Resources

The material record left by humans, along with the geophysical and climatological frame of the archaeological context, are the first-hand evidence archaeologists can use to address landscapes from the past. Just as with any physical element surrounding or linked to peoples' lives, the archaeological material record is composed of 'things' (Hodder 2012). This term 'things' encompasses, according to Hodder, several attributes we (not only as archaeologists but in our daily lives) sometimes voluntary ignore in the objects we approach.

Just as we (voluntarily or involuntarily) ignore that we sometimes project our own subsistence paradigm onto interpretations of the past, we also forget that we tend to impose attributes to the archaeological material record, which possibly did not correspond to the attributes prehistoric people gave to the things in the past. One example could be our perception of the different materials used by Bronze Age people.

Several techniques allow archaeologists to identify distinct materials in Bronze Age contexts. The most common of these materials are metal objects, stone tools, pottery fragments and bones. This material record composes just a sample of the total amount of objects that people may have kept or used, a fact that is sometimes overlooked. The fact that objects from prehistoric contexts were probably produced under a different perception of the material world is also often neglected.

We archaeologists perceive such objects as data (or empirical evidence). We value data under the scientific parameters of our discipline and we present this data by organising it in a way that reveals patterns or tendencies that end up confirming or refuting our hypotheses or the hypotheses of our colleagues. Every archaeological material exposed or stored in museums and academic institutions, as well as the data, discussions and hypotheses obtained from it, configure a new set of meanings and perceptions for past materials (Vega Barbosa 2020). These new meanings are mainly provided by the interpretations of the archaeologists (Hodder 1988) and they may differ from the meanings given to objects when produced and used in the past. Both past and present sets of meanings and perceptions are different 'horizons of interpretation' (Gadamer [1960] 1994).

The term 'horizon of interpretation' refers to all the possible meanings that emerge from the individual's experience of an event (Gadamer [1960] 1994; Hirsh 2013). All meaning depends on both the physical characteristics of the sensorial experience and the interpretative framework of the observer. Such framework is situated (Hirsh 2013), which means that it is the product of several social and cultural processes occurring in the particular geographical and historical context of the individual. Logic and meaning in subsistence paradigms are structured by such horizons, which means that, depending on the paradigm we are situated within, the interpretations of the archaeological record (and the data) we produce will be understood in the same terms as the 'horizon of interpretation' that the public, the scientific community or any person engaged with archaeology share.

Considering the different examples of the way Bronze Age archaeologists address this period (mentioned in the former sections), it is possible to see how – when the archaeological record is treated as mere data – the relevance ends up in the interpretation given and not in what the empirical evidence says. Data serve the aim of supporting and providing evidence. Any archaeologist interested in supporting a theory related to violence and warfare, for example, is likely to approach the material record as a useful source of data for showing violence or warfare. If the same data is reviewed and used not to provide clear evidence of regional conflict or generalised violence, but to give an opposite or alternative interpretation, it becomes clear that the data was previously being selectively used to support predetermined intentions. This would not be problematic if we chose to ignore all the hermeneutic issues and to remain focused on accumulating more data to support our theoretical positions within the parameters already dominant in our scientific field. Indeed, most archaeologists tend to do just this.

If the Bronze Age ended up being represented as a warfare scenario, it is because of the way archaeologists interpreted the data, and not because the elements identified in the sites clearly show evidence of war. Examples of this can be seen in pottery used to prove territorial expansions; metal weapons in burial contexts used to claim that societies valued war and were involved in conflicts with their neighbours, and the borders used to show the territory of a culture. This situation is problematic for the study of the Bronze Age in several regions of Europe.

Archaeologists usually approach data in an economistic way, similar to the way people today approach most of material. For example, prehistoric mining studies focus mainly on the exploitation of copper minerals, on the economic aspects of the production of metal goods and on the circuit of its distribution or consumption. Likewise, faunal remains in archaeological contexts are generally analysed to produce data regarding the socio-economic aspects of diet and farming; pottery is typically linked to the study of their functional elements and the control and standardisation of their production (for example in the case of Argaric pottery; Aranda Jiménez 2010).

This method of approaching material is linked to our 'Western' lifestyle: we accumulate data as 'Western' people accumulate valuable things. It is true that big datasets provide useful information for understanding several phenomena related to our particular interest; but this method ignores the fact that the objects people used in the past were 'their things', and not their data. Despite the term 'thing' seeming ambiguous, Hodder uses it to make us aware that things were part of a person, who was connected to them in different ways (depending on the subsistence paradigm). 'Things' from the past were also connected to other 'things' (which may not always be present in the archaeological record) and they are also dynamic elements participating in interactions between people (Hodder 2011; 2012). Beyond 'things', also immaterial elements played a role in past people's lives. These immaterial things were linked to the material and composed their own 'horizon of interpretation'. Immaterial elements have been ignored, for example, by the historical materialist approach when studying phenomena such as conflict, territorial control or social differentiation in the 'Argaric territory' (Lull 1983; Arteaga 1992; Lull et al. 2009a; 2009b; 2009c; 2010a; 2010b; Arteaga 2000); as well as by the processualist approaches that seek for evidence of social hierarchy in the burial record (Buikstra et al. 1992; 1995). What if we did not ignore the material and immaterial elements participating in the lives of people from the past? How can we approach them if they are not merely data, or if they are not always present in the archaeological record?

There is an analytical category that would not only help us to recognise and give awareness to the material and immaterial elements of the past but would also help to show them to be active and dynamic participants of the social and cultural life of individuals and groups. Beyond mere raw materials, beyond data or ideological aspects, all these elements can be approached as resources (Scholz et al. 2017).

Resources are 'the means to create, sustain and alter social relations, units and identities within the framework of cultural ideas and practices' (Hardenberg et al. 2017). Resources acquire significance according to the values each human group has and according to their (individual or group) interests (Hardenberg 2021). Likewise, such interests are shaped by the knowledge, meanings and values accumulated historically (our horizon of interpretation) and framed by a subsistence paradigm. Resources are not elements that can be isolated and analysed separately (Hardenberg 2021). Their use and dynamics can be approached by identifying ResourceComplexes, which are networks of material and immaterial elements (things, persons, knowledge, practices) situated and interacting in particular temporal and spatial contexts (Teuber/Schweizer 2020). These networks (ResourceComplexes) and contexts change over time, and these changes are linked to several factors (environmental, social, cultural, politic, economic or a combination of these elements). In a diachronic perspective, ResourceComplexes after time compose ResourceAssemblages (Hardenberg 2021), which express all the processes and changes undergone by the material and immaterial elements that interconnect and compose the world we live today.

In the case of contexts from the past, not only the material record, but all the analytical categories used for interpreting it, can be addressed as resources. This term integrates people's intentionality as well as the immaterial aspects surrounding objects or social practices identified in the past (Teuber/Schweizer 2020). In this way, for example, the landscape (an element intended here to be shown as the spatial category for observing spatial interaction between different material and immaterial elements surrounding human groups) can also be addressed as a resource.

Landscapes are resources: All the spatial interactions between individuals and groups; all the perceptions and movements; all the 'things' made by humans and afterwards set down or disposed of; all the minerals, plants, water and stones used; and all the knowledge to use, create, modify and distribute 'things' in the surroundings are resources that were used with intentionality. Resources are also all the meanings and values influencing the productive, extractive or consumptive processes. All these resources shape and modify social and cultural relationships, not only in the past but also in today's world. Water, for example, is a resource that was not only used for consumption, just as copper was not only extracted to produce metal objects. Water and copper, the knowledge of its physical or metaphysical properties, as well as the values and practices around them, also are resources. All resources interacting together can compose a ResourceComplex, with networks of several material and immaterial elements that influence the social and cultural interactions between people.

Considering that landscape integrates all these elements within a spatial perspective, it can be considered a ResourceComplex. If the observer changes the scope and focuses on bigger elements, such as religious beliefs or political organisation, landscape can also be considered a resource by itself. Likewise, over time, landscapes can, under a diachronic perspective, also be addressed as ResourceAssemblages, if we intend to regard, for example, all the changes, interactions and relationships that occurred in a concrete region of interest over time.

In the case of archaeological research, approaching the material record and the spatial elements surrounding it (the landscape) as resources has two effects.

First, the information and data obtained will be perceived as elements which were part of a human life. Why is this important? Empathy could possibly be the main reason. The way the scientific field is currently organised cultivates arrogance and egoism among archaeologists. Awareness of the multiple aspects that objects from the past could have had, would allow us to look beyond and avoid seeing them as mere data. This would make the utilitarianist, pragmatic or egoist use of them less probable. Discussions around the information obtained can then be oriented in alternative ways, possibly far from our current representation of the past which justifies our own predatory and egoist behaviour.

Second, it would help to recognise our biases. If the material record was seen as part of a network of knowledge, values and interests surrounding its production, the archaeologists would think twice before arbitrarily assigning their own values and interests to it. Recognising that there are elements (specifically immaterial) which are impossible to know properly, but at the same time accepting their existence and influence, is crucial for avoiding interpretations elaborated from our prejudices and values (our subsistence paradigm).

It is important to note that the archaeological record is composed of the materials left by people in the past, and as such, it is impossible to fully understand the immaterial elements of their world. Ignorance about the immaterial aspects of past lives does not mean that archaeologists should neglect them. It is instead possible to try to identify some of these immaterial elements which may be linked to the objects recovered (see chapters 5 and 6).

This is why, as mentioned above, knowledge is another resource that can be approached from the past. Knowledge itself is imbedded in the objects created. Applying several archaeometrical techniques, for example, archaeologists can gather information regarding what people from the past knew about the physical or chemical properties of an object. At the same time, GIS models can show us how this knowledge may have moved across a landscape (see chapter 5.4). Other immaterial resources (not all of them) can also be identified from determined objects, all dependent on the areas and phenomena the archaeologist intends to explore or show.

All interpretations should be formulated from the empirical evidence, that is to say, the material record should be the starting point of the research. Hodder explores the different ways archaeometry can be combined with the study of social aspects of life in the past and the study of the materiality of 'things'. Such 'things' were not only used by people but had their own properties and their own interactions with other 'things' (Hodder 2012). Such properties and interactions can be approached by scientific techniques and the data obtained can be integrated into models that show these interactions between materials and with people. The focus then is on observing interactions and resource use in the past, approached by scientific techniques, and interpreted based on these interactions and uses identified. In the case of this research, the aim is to observe the use of the resource 'landscape' and the interactions between human groups along the Middle and Low Guadalquivir Valley.

In conclusion, prehistoric people kept and made their own 'things' (materials), which were produced under their own ways of approaching the material world and their own subsistence paradigm. This paradigm is structured under several principles, rules and values which are organised in a 'horizon of interpretation' known and shared with other members of the community. Material elements are also linked to immaterial ones, and both can be considered resources which were used as the means for shaping or modifying social and cultural relationships as experienced by the individual or the group. Such resources are situated within a 'landscape' which is at the same time a resource that integrates the spatial experiences and the spatial interactions of every person.

Once time passes, people die, and sites are abandoned. All the material and immaterial elements present on the landscape disaggregate and disintegrate, leaving incomplete traits to be identified and interpreted by the archaeologists. How are such elements interpreted? If they are addressed as data, they end up involved in the 'horizon of interpretation' of the scientific field of archaeology which is ruled by the parameters of the Western subsistence paradigm. If they are addressed as resources, these elements can bring new possibilities of perception that consider both material and immaterial aspects of people's lives.

Considering landscapes as resources, ResourceComplexes or even ResourceAssemblages, allows researchers to address the material record with more awareness of their research interests, their possible biases and the fact that they are departing from the empirical evidence when interpreting, while also helping them to avoid the imposition of the Western subsistence paradigm onto the ideas, representations and images today's people have of the past.

In the next chapters, this research will study the use of the resource landscape in the Middle and Low Guadalquivir Valley during the Full Bronze Age. This research incorporates several approaches, including typological analyses of pottery, use of GIS and the archaeometrical analyses of materials, all oriented towards elucidating interactions between several material and immaterial aspects of people's lives during the end of the 3rd and the beginning of the 2nd mill. BC.

2 The Middle and Low Guadalquivir Valley: Landscapes and Archaeologies

2.1 What Does it Mean Talking About 'Full Bronze Age' in the 'Middle and Low Guadalquivir Valley'?

Archaeologists always need spatial and chronologic references to communicate the finds that belong to a specific period. During the history of archaeological research, spatial references have been more flexible than chronologic references. Whereas research must always have an accurate and scientifically accepted sequence of dates and chronologies, the names of sites or study areas rely more on the intentions of the researcher.

Some sites are named after local toponyms, sometimes related to private properties, while others refer to the official or administrative names provided by the current governments. Names have a direct impact on the way people perceive places from the past and especially on the way these are delimited. The delimitation of sites and study areas is as flexible as their names are. Whereas site names refer most often to the properties they were found on, the study areas (comprising several sites) are sometimes adapted to a political territory, sometimes cover a geographical landscape or even beyond, a landscape thought by the archaeologist.

Awareness of how places are named sometimes gets lost (Jones 2015). Names can end up being taken for granted and their (imagined) limits can suffer the same fate. Recovering such awareness is useful for understanding the character behind every toponym given. For the Iberian Peninsula (a socially accepted toponym) during the period covering the transition between the 3rd and 2nd mill. BC (a scientifically accepted chronology), several identities and perceptions have modelled the landscape of the past.

Most of the archaeologists studying this period agree with giving current toponyms to the sites they publish. This is why several prehistoric sites are named after the property on which they were found. This naming convention is an effective solution for denoting an accurate location. This is how, for example, there is no controversy over names such as the 'Matarrubilla' dolmen or the 'Cobre las Cruces' site; the first corresponds to the name of the farmstead the megalithic site was found on and the second to the name of the copper mining-company owning the terrains where the Bronze Age settlement-necropolis was rescued.

On a regional scale, toponyms have a changing character. Different research histories result in different ways of perceiving the places named. What is the difference, for example, between the contemporaneous names 'Southwestern Bronze', 'Bronce Valenciano' (Valencian Bronze) and 'El Argar'?

The term 'Southwest' represents the geographic portion of the Peninsula where funerary contexts presenting Bronze Age materials with similar characteristics were identified, 'Valencia' is currently an Autonomous Community of Spain and 'El Argar' is the toponym of a site used to represent the whole culture area claimed by archaeologists. Despite representing different places (a geographic region, a political-administrative territory or a hypothetical one), culture-historical approaches were the theoretical framework of all these names. Although having different referents, what they have in common is that they were used to give an identity to places delimited as 'territories' by archaeologists.

'Southwestern', 'Valenciano' or 'Argaric' denote the presence of a cultural identity defining the character of the material culture associated with those territories. At the same time, such names give a sense of 'national demarcation' based on the cultural expressions identified. An example of this can be seen in how the 'Southwestern Bronze' or 'Bronce Valenciano' names appeared as opposites of the existing 'Argaric' term which was already widely used at the beginning of the 20th cent. as the name to associate any Bronze Age finding in any place on the Peninsula (see chapter 2.2.2).

The names 'Southwestern Bronze' and 'Bronce Valenciano' were used to show two autochthonous cultures that needed to be perceived as 'different' under the parameters of the culture-historical approach. Systematisation efforts proved a diversity in the cultural expressions that were beyond their mere identification as 'Argaric'. German archaeologists working in Portugal considered a geographic name adequate to represent this cultural area, whereas Spanish archaeologists used the 'Valencian' term to refer to the current political territory, adding the prehistoric expressions to the national history of the Valencian nation (Tarradell 1963). The creation of new names was necessary to express the complexity of this period (Almagro-Gorbea 1997); but the ideas and beliefs conveyed by the identification of these cultural areas were not properly taken into account.

The Bronze Age has been identified as a time of deep social and cultural transformations for human groups all over the European continent, the Mediterranean and the Near East (Kristiansen/Larsson 2005; Earle/Kristiansen 2010; Cruz Berrocal et al. 2013; Fibiger/Scheidel 2013). Such changes have been associated with the end of megalithism and the beginning of class societies (Lull et al. 2011). They have also been considered the origins of the current political organisation (based on the figure of the nation-state) and are thought to have led to the way we perceive lands today (as controlled territories). For the general and specialised public, describing Bronze Age societies as 'rising nations' was a useful strategy for depicting this period.

This is how the region named 'El Argar' ended up being perceived as a (state-like) controlled 'territory' because of archaeological interpretations about the people living there. This outcome was, at the end, the intention of the researchers. In contrast, there is a different perception of the 'Southwestern Bronze', 'Valencian Bronze', 'Bronze from La Mancha' (the so-called 'Motillas Culture') and other Bronze Age cultural areas identified on the Peninsula. Despite similar social and cultural changes having occurred in all of them, the description of their space, although still territorial, was aimed to showcase autochthonous cultural expressions rather than political entities like El Argar.

Such differences are important to show that it is not easy to refer to a study area if archaeologists are unaware of the intentions behind the use of a given toponym. During the influence of the culture-historical approach, 'territorial' perceptions of the space were the rule. This did not suppose any problem, considering that the norm was identifying and setting limits for the culture areas identified. But then, decades later, it is possible seeing how the borders set ended up provoking differences in the attention drawn to some areas delimited as well as differences in the investment of time, money and institutional support given to archaeological projects. It is clear that, from a critical point of view, what is in a name is relevant, especially if there is a 'gap' between the identified areas that never had a well-defined name or even a border. This is precisely the case in the Middle and Low Guadalquivir Valley, an understudied land, where only a small number of investigations was conducted (see chapter 2.2).

The name selected for the study area in this research is the 'Middle and Low Guadalquivir Valley'. This is a geographical frame that involves a river and the floodplains surrounding it, including the adjacent foothills and lower elevations. The decision was made considering two elements: First, the region where less research has been conducted coincides with the Middle and Low sectors of the Guadalquivir Valley (see chapter 2.2). Second, the interest of this research is to characterise the Bronze Age in this type of landscape. Using the word 'basin' instead of 'valley' could have served to include the mountains from which all the waters discharging into the Guadalquivir come. Although a study of these higher elevations is also necessary, such areas were not included in this phase of the project.

The Middle and Low Guadalquivir is composed of the following geographical (physical) landscapes, identified by the 'Junta de Andalucía' (2020):

Hilly countryside: This landscape is composed of undulated lands along the left margin of the Guadalquivir. It is located mainly in the southern region of today's province of Córdoba. These lands are mostly dedicated to cereal agriculture and include several medieval castles that took advantage of the elevation for their construction (e.g. Castillo de Aguilar, which contains Bronze Age layers; *fig. 1*).

Fig. 1. The view of the Guadalquivir Valley from the hilly countryside in Villaverde del Río, Seville.

Foothill countryside: This is a transitional landscape composed of the lands belonging to the countryside next to the elevations of both the Baetic System and the Sierra Morena mountains. These elevations are also next to the mouths of several streams discharging waters into the Guadalquivir River, which results in very productive soils. The foothill countryside has mainly sedimentary soils (such as marls, sands and limestones) and annual average temperatures around 16ºC (*fig. 2*).

Low and Middle Serranía: The Serranía landscape is composed of the lower elevations (60 to 400m.a.s.l.) of the Sierra Morena and Baetic System mountain ranges. This portion of the Sierra Morena covers part of today’s provinces of Córdoba, Seville and Huelva, while the Baetic portion covers the lower elevations of southern Córdoba (Junta de Andalucía 2020). These lands have been used for forestry agriculture (mainly olives and oranges) and for establishing *dehesas*, traditional landscapes originating in Medieval periods that utilise oak and acorn trees for open-air livestock farming. Serranía landscapes are composed mainly of plutonic and metamorphic rock of a Palaeozoic origin and include several mining areas (mainly copper and iron) which have been exploited since prehistoric times. The average temperatures are between 12ºC and 17ºC (*fig. 3*).

Valleys, floodplains and marshes: These landscapes are linked to the riverbanks of the Guadalquivir Valley as well as to the lands once flooded by the ancient *Lacus Ligustinus* (Arteaga et al. 2016). The valley and floodplain landscapes occupy part of today’s provinces of Seville and Córdoba. Marshes include portions of today’s provinces of Seville, Huelva and Cádiz. The lands next to the Guadalquivir River have been used in particular for extensive cereal agriculture, which has resulted in the rise of several towns in the area. These flat lands are composed of sedimentary soils (clays, sands and silts) which are products of the riverine and lacustrine dynamics. The average temperatures are between 17ºC and 19ºC (*fig. 4*).

Fig. 2. The agricultural use of the resource soil in the low Serranía today. These lands are rich of Roman and Chalcolithic remains from people that inhabited and used soil during those periods (see chapter 4; Sierra León site, Peñaflor, Seville).

Fig. 3. Foothill and hilly countryside are also lands suitable for pastures; farming activities have been developed here since millennia (farmstead in Lora del Río, Seville).

Fig. 4. The soil in the floodplain landscapes is rich in minerals that made these terrains suitable for extensive agriculture of cereals (cereal fields in Carmona, Seville).

Valleys seem to be optimal corridors for movement of people and resources. One of the intentions of this research is to show a landscape which was highly interconnected with other regions of southern Iberia, such as the High Guadalquivir, the Guadiana Valley, the Guadix, Baza and Almanzora Valleys, the Sierra Morena mountains and the so-called Meseta. This research focuses on the corridors and interconnections that can be identified within the valley landscapes (see chapter 5.4.1). This does not mean that mountains were natural limits or separated people from different regions; communication probably existed across them. However, the study area needed a starting point, a first delimitation which possibly, with the approach presented here (see chapter 5), can only be broadened.

This research could have used the terms ‘provinces of Seville and Córdoba’ or ‘Andalusia’ to define its study area. Indeed, most of the sites mentioned are located in such ‘territories’. Likewise, the sites database used for GIS analyses (see chapter 5) was obtained from the Heritage Institute of Andalusia (IAPH). At first glance, the results produced may seem geographically biased, but only if the term ‘Andalusia’ was brought into this perception. Data can be read in alternative ways, as no concept of ‘Andalusia’ existed during prehistory. Thus, the sites here selected for analyses, despite being within the limits of the current Autonomous Community of Andalusia, are not representing Andalusia in any way.

A shift in spatial perception is necessary and requires a change in the use of names, or at least an awareness of the intentions lying behind them. It is difficult to know how prehistoric landscapes were perceived; but people from the past and present have been observing the same geographical forms surrounding them. This is why geomorphological terms (such as valleys or mountains) are more accurate as names for defining past landscapes, regardless of the historical or modern names accompanying them (e.g. Guadalquivir or Sierra Morena), which are just necessary for communication purposes.

Maps are also important for communicating ideas or processes occurring in the past, but maps with arbitrary borders cannot become the official representation of a landscape from the past. Territorial maps are hypothetical models of political-administrative spaces, following the subsistence paradigm of present-day Western society. They do not represent the interactions between human groups or the interactions between them and their surrounding landscape, which are also relevant questions in archaeological research.

In the end, archaeologists cannot depend on territorial maps only to express past interactions cartographically. Geomorphological features, and their influence on human mobility, can also produce maps that express the use of landscapes by prehistoric people (see chapter 5.4.2). Such maps could represent a space observed, walked and experienced by focusing not only on showing the area controlled by elites or power entities, but on identifying agencies and movement possibilities for any person. Territorial maps need to first validate the existence of the groups controlling such territories, whereas alternative models can be based on the way any person interacted with the given geomorphological features which are expressed in measurable elements such as slope, terrain, visibility or walking distance (see chapter 5.4.2).

Alternative models for representing landscapes of the past are necessary to highlight alternative subsistence paradigms existing in past societies. The elements for comprehending (or imagining) landscapes from the past cannot be provided exclusively by the social and political parameters of modern Western societies; to do so denies the agency of human groups in the past and distorts our perceptions. By fitting past human groups into our modern worldview, we are justifying our current violent and destructive behaviour based on ideas that depict humans from the Bronze Age as classist, warlike and predatory. Scientific and systematic approaches can also help to generate spatial representations of past landscapes based on empirical evidence but oriented towards showing interactions rather than predatory consumption, control of land or power relationships.

Something different occurs with chronologies.[5] Although prehistoric people had their own ways of perceiving time and interacting with other elements of the landscape (such as the sky) for reading it – for example the Antequera dolmens during the Copper Age (Belmonte/Hoskin 2002; Hoskin 2009) or the mounds from Castillejo del Bonete during the Bronze Age (Benítez de Lugo Enrich/Esteban 2018) – they did not leave detailed records of events that tell about the processes and transformations occurring to them and the landscapes during prehistory. Creating such a record is a matter for the archaeologist.

Archaeology aims at organising events from the past systematically in a way that shows how human groups changed synchronically and diachronically over the millennia. This is only possible with the standardised parameters provided (in the case of current archaeological research) by radiocarbon dating. The perception or representation of time in the past can sometimes be evident in the material record but the succession of events or transformations during prehistory remains mainly based on the time-parameters constructed by our current societies.

Such time-parameters have been expressed in periodisation and local chronologies elaborated by archaeologists. The elaboration of periods is made according to common referents which allow comparisons of the same processes or successions of events between different regions; this is done not only on a peninsular scale but also on a continental and transcontinental one. For example, some of the first parameters used (before radiocarbon dating) were the technological changes observed in the material record.

During the first decades of the history of research (see chapter 2.2), empirical evidence of technological changes between the Chalcolithic and the Bronze Age was identified along the whole Iberian Peninsula, and these changes were used as

5 This section is not intended to be a review of periodisations, but just a reflection on the time-parameters used during the last decades for describing the Bronze Age in the study area. Only some of these periodisations are mentioned here, for details about all the chronologies made for Bronze Age Iberia see Mederos Martín 1995; Almagro-Gorbea 1997; Aranda Jiménez et al. 2015.

time-parameters which resulted in relative chronologies based on the presence or absence of a particular trait. One of these traits became a common referent, representing not only an entire culture area but also a whole period.

For the Iberian Peninsula, Almagro-Gorbea (1997) described the different periodisations suggested for the time span between the 3rd and the 2nd mill. BC. Archaeologists documented and named periods according to the material traits identified. Bronze was, of course, the trait used as main material referent; after finding differences in the expressions of the same bronze material along the Peninsula, other categories complementing the referent started to be implemented. Examples are 'Mediterranean Bronze' or 'Atlantic Bronze', motivated by the diffusionist ideas existing during the 1940s (Almagro-Gorbea 1997; see chapter 2.2).

Alongside the first systematic efforts to understand the processes occurring during the 2nd mill. BC), the subsequent divisions, 'Bronze I, II and III', established in 1949 (Almagro-Gorbea 1997), were introduced to generate a general chronologic frame for the whole Peninsula. Parallel to such efforts, independent perspectives provided new referents that started to generate confusions.

As an example of this confusion, in southern Iberia, during the 1950s, terms such as 'Eneolithic' (from the Latin word *aeneus* = copper/bronze) expressed the presence of mixed metal and lithic materials in archaeological contexts during this transitional period. During the 1960s, the distinction between Eneolithic and Chalcolithic was abandoned and both were merged with the Bell Beaker phenomenon into the category of 'Bronze I' (Almagro-Gorbea 1997). 'Bronze II' was used to refer to the 'Early' and 'Middle' Bronze Age, identified in other regions of Europe (Roberts et al. 2013), and 'Bronze III' was associated with the 'Final' Bronze Age and the rise of Tartessos (Blázquez Martínez 1995; Gómez Toscano 2016; Almagro-Gorbea 1997).

Social and cultural evolution linked to the evolution of the material record became a new time-parameter expressed in the referent of the Early, Middle and Final stages. Such stages coincided with those of cultural evolution at least until the Final period, when additional evidence of eastern migration processes was identified for southern Iberia (Blázquez Martínez 1995; Pellicer Catalán 2000). The arrival of radiocarbon chronology reorganised and adjusted the length of such stages during the following decades; but only in the regions with bigger research investments and, therefore, with bigger material records and stratigraphic sequences excavated.

The regions with more radiocarbon chronologies obtained more spatially restricted periodisations, for example the phases identified in Gatas (Castro et al. 1999). The referent of such local and absolute periodisation (the phases) expressed the systematic efforts to organise the events occurring not only in different cultural areas but in the site itself. Thanks to radiocarbon chronology, such phases were easily equated and could show parallel development for two different cultural groups. At least this is the case for the 'Argaric' and 'Southwestern' areas.

For example, the Argaric' periodisation evolved from the 'Argar A/Argar B stages' model of Blance (1964) to the 5-phases division established by González Marcén (1994), which was developed with a complete set of radiocarbon dates from several sites from southeast Iberia. In the Southwest, Schubart's 'Horizons' model (1974) evolved into the division of Mataloto et al. (2013) with the *Calcolítico-Campaniforme/Bronce Pleno/Bronce Final* (Chalcolithic-Bell Beaker/Full Bronze/Final Bronze) phases. These reorganisation efforts were linked to several questions which mainly focused on the continuity or replacement of populations between the Chalcolithic and Bronze Age periods (Lull et al. 2010b; Aranda Jiménez et al. 2015).

For the areas with low levels of research (e.g. the Middle and Low Guadalquivir), the lack of accurate information impeded any accurate periodisation. During the 1970s, for example, the Argar A/Argar B model was used as referent for the chronologies of Setefilla and Cerro del Berrueco. This was based on a few radiocarbon dates, which needed to be complemented by the identification of particular traits already dated into El Argar. Given the lack of organic material, on which to perform radiocarbon dating, chronologies for most of the sites in the Middle and Low Guadalquivir were still elaborated through the identification of particular traits observed in 'Argaric' or 'Southwestern' sites that had already been dated.

The Middle and Low Guadalquivir periodisation has largely been adapted to the developments of periodisation from neighbouring regions (Almagro-Gorbea 1997). This is another consequence of the low investment in research performed in this region. This did not impede addressing issues such as the replacement or continuity of populations between the 3rd and 2nd mill. BC or the presence of autochthonous expressions in the Middle and Low Guadalquivir. The lack of a good number of stratigraphic sequences with enough radiocarbon dates makes answering such questions difficult. Despite some efforts having provided the first results based on controlled chronological sequences (García Rivero/Escacena Carrasco 2015; Escacena Carrasco/García Rivero 2018), additional stratigraphic sequences in several sites along the region are necessary.

Is it possible to talk about any referent for the chronology of the Bronze Age in the Middle and Low Guadalquivir Valley? Considering the lack of empirical evidence which would be required to know the sequence in which events occurred, there is no agreement regarding which terms must be used. There will probably not be any agreement if the amount of radiocarbon dating performed in the region remains low. Future elaboration of accurate periodisations depends not only on the gathering of absolute dates from several sites that have not been dated yet, but also on the dating of newly found sites.

The decision to use the term Full Bronze Age[6] (*Bronce Pleno* in Spanish) for the present research is based on Bartelheim et al. (2021b), who reflect on the condition of the regional chronology and underline the difficulty of distinguishing between any Early or Middle phases or even between Bronze Age and Chalcolithic in the Middle and Low Guadalquivir Valley. Paradoxically, Chalcolithic and Final Bronze periods have plenty of dates and stratigraphies that allow for the organisation of the sequence of events during these time spans in this region. Additionally, it is not possible to use Argaric or Southwestern referents, considering that the Middle and Low Guadalquivir Valley contains both traits in the material record analysed (see chapters 5.2 and 5.3).

According to the few radiocarbon dates available for the study area (*fig. 5*), the Full Bronze Age expresses itself, in a general sense, during the transition between the 3rd and 2nd mill. BC (considering the possible coexistence between Bronze Age and Bell Beaker expressions observed at sites such as Monturque, Cerro del Berrueco or Cerro San Juan; see chapter 5.4.2) and into the first half of the 2nd mill. BC (2200–1550 calBC; Bartelheim et al. 2021b).

Some radiocarbon dates, such as the ones from Monturque (MON IX–X; López Palomo 1993), Setefilla (SET XIV; Aubet et al. 1983), Cerro de la Cabeza (Valencina UGRA 72; Castro Martínez et al. 1996) or Cerro del Berrueco (BER II–III) (*fig. 5*) were obtained many decades ago and their error margins are very high. Despite the necessity for obtaining new dates, the ones mentioned above were also included in this research because of the low number of dates available for the study area. Dates from sites such as Cobre las Cruces (CLC) or Cerro San Juan (CSJ) are the most recent and most accurate so far. The span of time for the Full Bronze Age considered in this research derives mainly from the information provided by these two sites.

The Full Bronze Age in the Middle and Low Guadalquivir Valley is a flexible concept. Space is represented here by several geographical landscapes that form a region with very productive soils and flatlands which allowed people to cover the long distances connecting southeast and southwest Iberia. The Guadalquivir River is the bonding element through the whole study area and is considered to be the primary route used by different human groups since prehistoric times. The streams flowing from the Sierra Morena and the Baetic System were also important for the access to mining resources as well as for interacting with groups living in the mountains or beyond.

All these landscapes, and the ways humans interacted with them, can be represented cartographically (see chapter 5.4) and can provide models that overcome the biased ones derived

6 From now on, all references to the 'Bronze Age' encountered in the text refer specifically to the concept and time span covered by the 'Full Bronze Age' term, unless otherwise specified.

from cultural-historical approaches. Although spatial models of sites-interaction along the Middle and Low Guadalquivir offer alternative ways of reading landscapes of the past, the opposite occurs with chronological periodisations. The lack of enough chronological information needs to be addressed in order to clarify several questions involving the events that occurred during the time span under study. The term Full Bronze Age seems to be, in a general sense, a good temporary solution to describe the period between 2200 and 1550 BC; but this term must be replaced with a more accurate periodisation once the amount of investigation and the number of absolute dates collected increases.

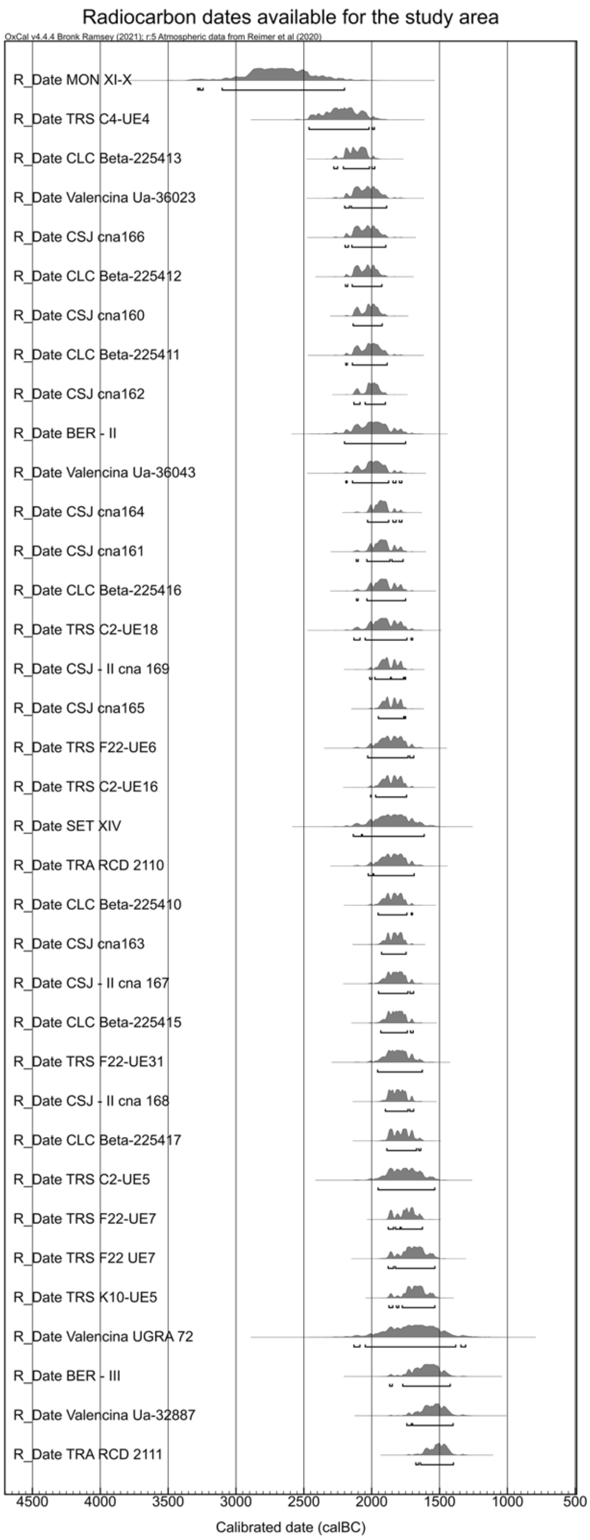

Fig. 5. Radiocarbon dates available for the study area.

2.2 State of the Full Bronze Age Research in the Middle and Low Guadalquivir Valley

For archaeologists dedicated to the study of prehistory in the southern Iberian Peninsula, defining the Full Bronze Age in the Middle and Low Guadalquivir Valley has resulted in a deferred matter. Today, there are more questions than answers regarding the end of the Chalcolithic, the evidence of its occupation during the Bronze Age and especially the regional characterisation of all the transformations that occurred during the first half of the 2nd mill. BC. These questions go beyond simply filling the gap that exists in the cartographic representations of Bronze Age population in southern Iberia.

When looking for words to describe the Full Bronze Age in the Middle and Low Guadalquivir Valley, archaeologists came up with expressions such as ‘dark stage’ (Caro Bellido 1989) or the ‘big unknown’ (Martín de la Cruz 1991). It is seen as a context with sparse and fragmented data (Martín de la Cruz 1989; Martín de la Cruz/Garrido Anguita 2015) or no data at all (Escacena Carrasco/García Rivero 2018). Compared to other regions in the High Guadalquivir, the southern Levante or the Alentejo, the Bronze Age in the Middle and Low Guadalquivir has a lack of answers.

This is a reflection on the possible reasons for such a cartographic ‘gap’. At the same time, it is a review about the investigations conducted in the Middle and Low Guadalquivir Valley regarding the Full Bronze Age,[7] highlighting some perspectives,

7 The following review is not about ‘Argaric’ research, but it will include some studies coming from the southeast in order to give theoretical and methodological context.

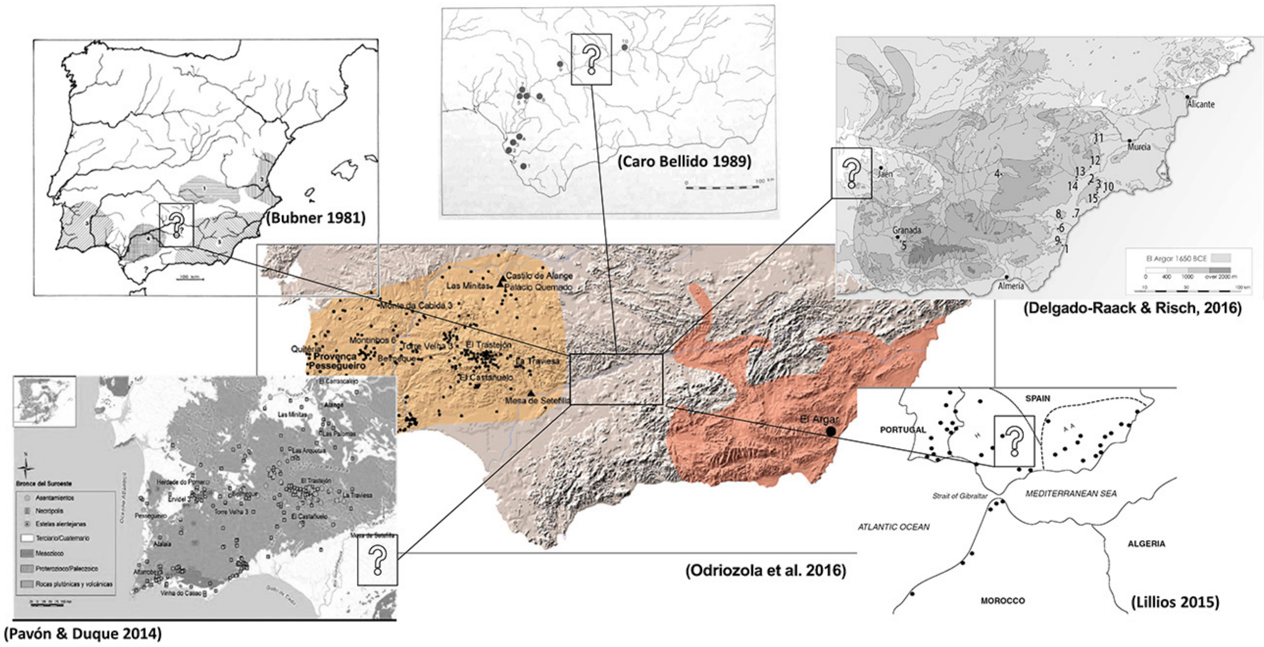

Fig. 6. Some cartographic representations of southern Iberia during the Bronze Age from the last 40 years. It is possible to identify the absence of information regarding the Middle and Low Guadalquivir (maps from: Bubner 1981; Caro Bellido 1989; Pavón-Soldevilla/Duque-Espino 2014; Lillios 2015 and Odriozola et al. 2016).

including recent information and mentioning alternative ways of addressing this matter. Knowing the Middle and Low Guadalquivir Full Bronze Age is, beyond 'filling the gap', a labour that seeks to give this region the role that it deserves, which is not just one of periphery or empty place.

2.2.1 Cartographic Representations of the Middle and Low Guadalquivir Valley

Nowadays, when looking for a cartographic representation of southern Iberia during the Bronze Age, people will find mostly maps showing the 'cores' or 'areas of influence' of what El Argar and Southwest Bronze supposedly were, whereas the Middle and Low Guadalquivir Valley remains empty (*fig. 6*). What are the main reasons for this gap? Was this region indeed less populated than the High Guadalquivir and the Alentejo? Or is this difference maybe just a matter of an unbalanced amount of research done in the region?

This is the dichotomy between the likely absence of evidence, mentioned before by authors such as Caro Bellido (1989) or Martín de la Cruz (1989), and the evidence of absence represented not only in maps, but also in different hiatuses in stratigraphic sequences dated to the beginning of the 2nd mill. BC. Some of these hiatuses are seen in sites such as Calle Alcazaba in Lebrija (Caro Bellido et al. 1987), Los Almiares in Castro del Río, Córdoba (Ruiz Lara 1987) and Torreparedones in Córdoba (López-Sáez et al. 2015). Some are from later – Middle Bronze Age – periods such as Cerro San Juán in Coria del Río (García Rivero/Escacena Carrasco 2015; Escacena Carrasco/García Rivero 2018), the VIII and IX strata of cut B in La Mesa del Gandúl in Alcalá de Guadaíra (Pellicer Catalán/Hurtado Pérez 1987), Cueva de la Murcielaguina in Priego de Córdoba (Vaquerizo-Gil 1987), traces of ancient fires in later moments of the Bronze Age in Setefilla (Aubet et al. 1983) and the Castle of Alcalá de Guadaíra (Pozo-Blázquez/Tabales-Rodríguez 1991). There are also evident hiatuses between the Chalcolithic and Late Bronze Age layers in El Carambolo (Fernández Flores/Rodríguez Azogue 2010).

Both the hiatuses and the difficulty of finding evidence of proper settlements in the Middle and Low Guadalquivir Valley grabbed the attention of the researchers. Archaeologists have wondered about the possible causes for these phenomena, especially considering that this region was previously densely populated. One example is Valencina de la Concepción, which occupied hundreds of hectares, had megalithic structures, collective burial pits and vast terrains used for cultural and economic activities among Chalcolithic people (Costa Caramé et al. 2010; García Sanjuán 2017; García Sanjuán et al. 2017).

These questions have been addressed in different ways during the last decades. What has defined this cartographic gap from the beginning, however, is the history of the archaeological research itself in southern Iberia. From the very first moment, both El Argar and the 'Southwest' (Schubart 1974) were defined as culture areas, and the efforts to delimit territories and point out the influences of these two cores set a standard for the way southern Iberia is represented spatially.

In order to prove that the history of the research was responsible for the current cartographic representations of the Bronze Age in southern Iberia, the current database of sites reported to the Heritage Institute of Andalusia as 'Bronze Age' was consulted. The database has almost 800 sites on record and includes all the sites reported both in systematic and in rescue research activities carried out over the last four decades.[8]

After checking the whole record, hundreds of sites were excluded. For example, sites reported as 'Late Bronze' or sites whose dates were assigned only based on a few materials collected in a surface survey were not included. All the records belonging to settlements, funerary sites or surface findings reported by archaeologists as 'Early' or 'Middle Bronze Age' were inserted into a Geographical Information System, which showed the distribution of all the sites according to the coordinates provided by the archaeologists.

When looking at the resulting map, it seems that the zone where investigations have been most profuse is the High Guadalquivir Valley (*fig. 7*). The area with the larger concentration of research overlaps the so-called 'Argaric territory', whereas the Middle and Low Guadalquivir have a very low density of research, which corresponds to the gap found in most of the maps created in the last decades (*fig. 7*). This implies that part of the cartographic gap found corresponds to a low investment of time and attention in the survey or excavation of Full Bronze Age sites; sites that are mainly located in the modern provinces of Córdoba and Seville.

In addition to this argument, there is also the criticism expressed by Martín de la Cruz (1989) regarding three factors considered to be the main reasons for the struggle when writing or talking about the Full Bronze Age in the Middle Guadalquivir: few stratigraphic sequences, a lot of uncontextualised findings and the lack of previous systematic work (Martín de la Cruz 1989).

Despite the low amount of research, the uncontextualised findings and the few (well dated) stratigraphic sequences, it does not mean that there were no researchers committed to studying this period in this region. In fact, nobody has claimed its depopulation or complete abandonment during the Full Bronze Age. The Middle and Low Guadalquivir Valley still offers material evidence for undertaking several kinds of analyses, despite having less sites and findings compared to the High Guadalquivir region, the Sierra Morena in Huelva or the southwestern Peninsula in Portugal. For example, there have been studies regarding the social and cultural transformations between the 3rd and 2nd mill. BC in this region.

Some of these studies address models of continuity or replacement of population (García Rivero/ Escacena Carrasco 2015; Escacena Carrasco/García Rivero 2018), while others assess changes in settlement patterns (Ruiz Lara 1987; Murillo Redondo 1990; Gavilán et al. 1997; Jiménez-Hernández 2004; Amores et al. 2014), funerary rituals (Hurtado Pérez/Amores 1984; Escacena Carrasco 1992–1993) and the likely impact of climate on them (Ramos Muñoz 1998; Bernáldez-Sánchez/Bernáldez-Sánchez 2000; Bellin et al. 2013; López-Sáez et al. 2015; Kölling et al. 2015).

Therefore, the supposed cartographic gap does not seem to be caused by any absence of effort to characterise the Middle and Low Guadalquivir Valley during the Full Bronze Age nor by the absence of evidence. The gap more likely corresponds to the culture-historical attitude that

8 The database was available after sending a solicitude to the Andalusian Heritage Institute (IAPH) and is composed of two excel files, the first with points and the second with polygons reported after several academic and not academic activities affecting archaeological heritage.

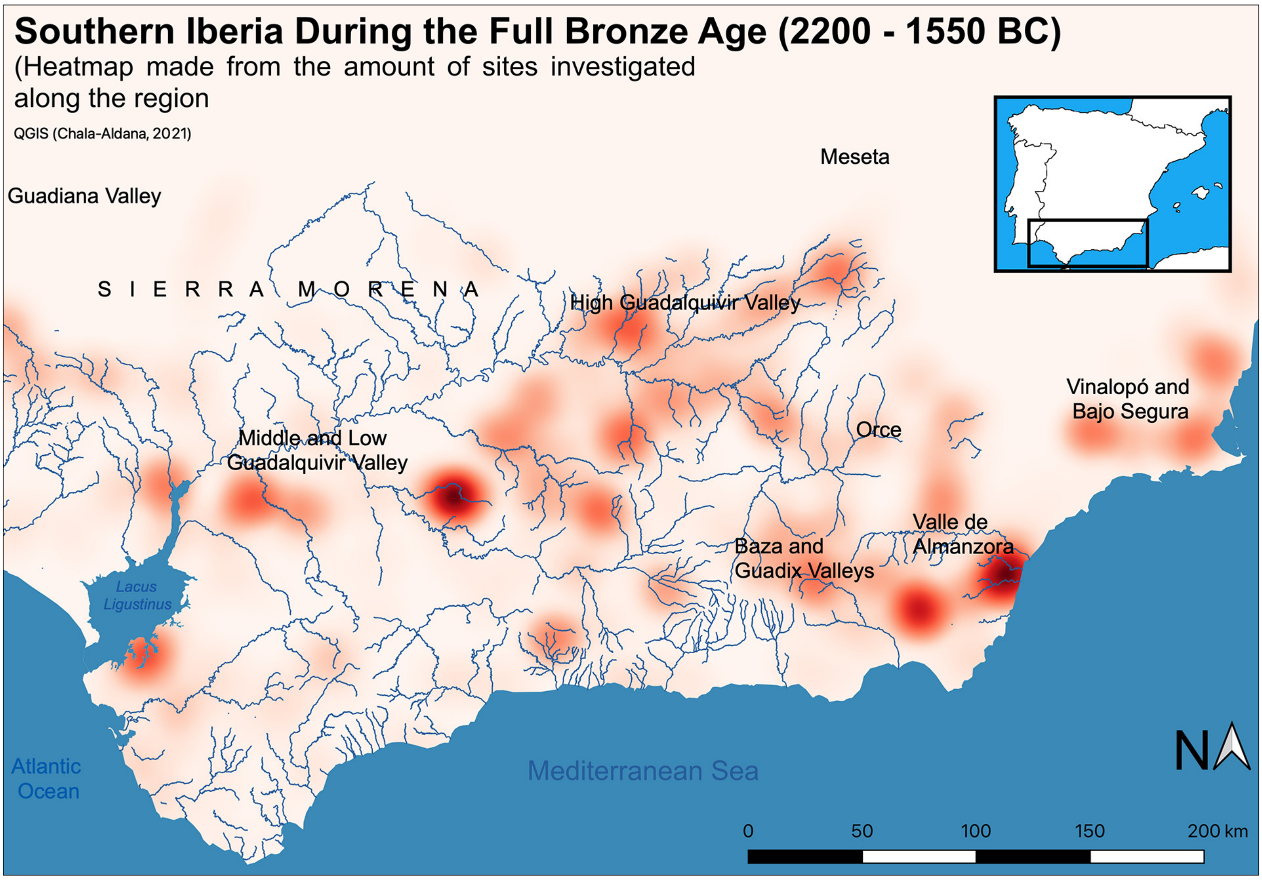

Fig. 7. Map of Andalusia showing the amount of research (surveys and excavations) reported as Early or Middle Bronze Age to the IAPH between 1985 and 2008. Amounts are represented by densities. Notice how there is a higher density (more research done) in the High Guadalquivir region.

still remains in archaeologists when generalising about social and territorial aspects during this period. This attitude stimulated in them the preference for studying and forging a research tradition focused only on the regions that counted with enough evidence. This bias prevented from seeking to understand the same phenomenon along the whole valley, instead leading to the creation of a vision of the past that includes gaps and limits where they do not exist.

To describe the state of the art on the Full Bronze Age in the Middle and Low Guadalquivir Valley, it is important to comprehend how the culture-historical approach, the developments of the 'Argaric' and 'Southwestern' research and other factors, such as the lack of typologies, chronologies and systematised information, contributed to the emergence of a gap that, as mentioned above, never really existed.

2.2.2 The Systematisation Phase and the 'Norma Argárica': Between Southeast and Southwest

Towards the end of the 19th cent., despite being an incipient discipline, archaeology already had a scientific tradition. Elements such as Thomsen's 'Three Ages' division (Stone, Bronze, Iron) had already become a standard for cataloguing and dating prehistoric findings and settlements in Europe, the Mediterranean and the Near East. Likewise, cultural evolutionism and nationalism were laying the foundations for studies of ancient ethnic identities, that later were labelled as the culture-historical approach (Trigger 2010). By that time, Enrique and Luis Siret published the first reports of their excavations and explorations along the peninsular Levante, presenting catalogues of materials and descriptions that would suppose an advance regarding the study of the Metal Ages (Siret/Siret [1890] 2006).

Given the social, scientific and cultural context when the Sirets published their findings, El Argar was immediately inserted in the culture-historical debates *en vogue* at the end of the 19th cent. The brothers were already considering different ways of interpreting the introduction of metallurgy in the Iberian Peninsula. They started describing El Argar as the product of colonisation processes coming from the eastern Mediterranean region (Siret/Siret [1890] 2006). Years later, they considered the origin of metallurgy to be a product of its introduction by the Phoenicians to the Peninsula, who were expulsed afterwards by Celtic people linked to the Hallstatt and La Tène cultures. According to the Sirets, the former were responsible for the expansion of metallurgy in the region (Siret [1907] 1994; Carrillo García 2018).

The most influential diffusionist interpretation was the one that linked El Argar to the eastern Mediterranean based on comparisons with ancient Bronze Age cities such as Hissarlik (Troy) and Mycenae (Déchelette 1910, quoted by Carrillo García 2018). There were also ideas about an autonomous origin (Schmidt 1915; Bosch Gimpera 1920, quoted by Carrillo García 2018).

As was the case with the connections suggested between the eastern Mediterranean and El Argar, diffusionism promoted cultural and territorial connections based on material similarities between neighbouring sites on the Iberian Peninsula. Therefore, sites in southern Iberia with material records, settlements or funerary patterns similar or identical to the ones of El Argar were immediately considered 'Argaric'. At the end of the 19th cent., El Argar began to be represented as a group expanding from its core until it reached southern Portugal and practically the whole Iberian Peninsula (Almagro-Gorbea 1997).

Parallel to the discussions in the southeast, Estacio da Veiga in 'Carta Arqueológica do Algarve' also characterised several sites in the southwest that were first catalogued as 'Idade do Cobre' (Copper Age; da Veiga 1889; 1891, quoted by Parreira 2014). These sites were necropolises and settlements with similar characteristics to those found by the Sirets. It did not take too much time to motivate a discussion regarding the possible links between the southwest and El Argar. Juan Vilanova supported this idea, whereas Estacio da Veiga considered the southwest to be a culture with its own identity (Parreira 2014).

The impact of El Argar drew the attention of several scholars, even from countries beyond the Iberian Peninsula. Before the 1950s, the main task for researchers had been documenting all the findings, but without big systematisation efforts and without publishing the sites and objects found (Arribas Palau 1976). The majority of the reports were focused mainly on the funerary aspects of the record (Arribas Palau 1976; Parreira 2014) and the identification of some similarities with other cultures beyond the Peninsula. Most of the record was sent to the collections of archaeological museums in Portugal and Spain.

Between the 1930s and the 1950s, several archaeologists, especially from Germany, worked together with Portuguese and Spanish archaeologists to characterise and define the cultural identity of the Bronze Age archaeological sites documented until that time. Culture-historical approaches aimed to interpret the whole region as part of El Argar and claimed that it was a culture originating in the eastern Mediterranean.

'Die Megalithgräber der Iberischen Halbinsel' by Vera and Georg Leisner in 1943 represented the beginning of several publications systematising and trying to give chronological and spatial coherence to the archaeological records of the Metal Ages (Arribas Palau 1976). The efforts for systematisation were also complemented by the integration of researchers in congresses and events. The 1st National Archaeology Congress (Congreso Nacional de Arqueología) in Almería (Spain) in 1949 was the scenario for the introduction of the first geographical delimitation of the 'Argaric territory' by Miquell Tarradell. This territory was based on the material record reported in southern Iberia and the Levante (Tarradell 1950).

One of the key concepts at that time was the 'Argaric influence' (Tarradell 1950). This largely justified the adscription of many sites with similarities in the funerary and the material record to the recently delimited 'Argaric territory'. Some first examples of the reach of the 'influence' concept were the works of Formosinho, Ferreira and Viana in the Baixo Alentejo (Viana et al. 1953) or the reports of Soler in the Spanish Levante (Soler 1949; 1953), which intended to relate these regions to this 'Argaric influence' area.

During the 1950s, the research focused on the regions of the Levante, Almería, Murcia and Granada in the southeast and the Alentejo and Algarve regions in the southwest. Martínez Santaolalla started the excavations in La Bastida de Totana, whereas Sangmeister, Schubart and Blance began to explore the regions of Vilanova do San Pedro and Zambujal. Viana reported more Bronze Age sites in the Alentejo, while García Sánchez and Schüle would do the same in several sites in the region of Granada (Arribas Palau 1976).

This distribution of the research is crucial for understanding the following developments. Archaeologists started a scientific tradition oriented towards the southwest and the southeast, bringing more researchers and more investment to explore and excavate the Bronze Age sites found in these areas and leaving the Middle and Low Guadalquivir areas more oriented to the research of the so-called Eneolithic, the Final Bronze Age, the Iron Age and the Roman periods.

It can be said that diffusionist interpretations regarding El Argar used two types of 'magnifiers': the big one (which is not going to be addressed in this text) focused on the origin of metallurgy in the Iberian Peninsula, linked to the European debates regarding its introduction via eastern Mediterranean or Central Europe; and the small one oriented towards the influences of El Argar on the rest of the Iberian Peninsula. Regarding the small-scale discussions, the more sites were found and reported, the more doubts arose about considering all the regions to be merely 'Argaric'.

One of the first researchers to address the abuse of the term 'Argaric' (Parreira 2014) was Beatrice Blance. During the 1960s, she identified several different areas and treated them as autochthonous, although the scientific community was still considering hypotheses linked to the idea of 'Argaric influences' along the Peninsula (Blance 1971; Parreira 2014). The work of Tarradell followed the same direction. After distinguishing the 'Argaric territory' from other regions (Tarradell 1950), he claimed the need for an effective systematisation of the material record and the generation of an Argaric typology which was missing at that time (Molina Muñoz 2015).

Tarradell separated El Argar from the Valencian Bronze (Bronce Valenciano) at the Segura Valley (Tarradell 1963) and later identified several Bronze Age culture areas on the Iberian Peninsula (Tarradell 1965). Such areas are considered to be expressions of influence rather than evidence of colonisation processes, despite showing elements similar to the ones found in the core of the 'Argaric territory' (Molina Muñoz 2015). Tarradell created one of the first cartographic representations distinguishing the southwest from the southeast, which showed a gap in the areas of the Middle and Low Guadalquivir Valley (Tarradell 1946). This gap was interpreted in terms of a lack of Bronze Age findings in that region. Although this model helped to delimit the western borders of El Argar (Tarradell 1950; 1965; Molina Muñoz 2015), it also defined the fate of the research in the region demarked as a gap.

Ribeiro (1965) and Tarradell (1946; 1965) distinguished between the 'Southwestern' funerary sites and the 'Argaric territory'. This distinction was supported by the differences in the material record. Ribeiro was one of the first to consider the southwest as an autonomous cultural entity (Ribeiro 1965; Parreira 2014). Such ideas motivated first Viana and afterwards Schubart to explore and excavate along the Alentejo, Algarve and parts of Extremadura and Huelva in order to find more sites related to these autonomous cultures (Viana 1959; Schubart 1964; 1965; Parreira 2014). The result of these systematic investigations was the consolidation of the term 'Bronze do Sudoeste' or 'Southwestern Bronze' (Schubart 1975).

At this point, the southwest and the southeast became the cores of two cultural areas and the only references against which to define the Bronze Age in southern Iberia. This meant that any further findings had to be compared to the sequences and materials obtained systematically from either of these two areas. Indeed, the main interest during the 1960s was to control the chronology and to distinguish the Bronze Age from the Bell Beaker, Chalcolithic and Tartessian periods. Stratigraphic sequences and absolute dating were crucial to this task.

Obtaining the first radiocarbon dates could be regarded as a ‘revolution’ (Jover Maestre/López Padilla 2004), particularly in terms of controlling the chronology and defining the way the Bronze Age phenomenon in southern Iberia would be interpreted. Based on the radiocarbon dates, the diffusionist ideas regarding Mediterranean colonisation processes during the Bronze Age started to lose ground (Carrillo García 2018). New research questions would occupy the scenario, such as the ones related to the transition between the Chalcolithic and the Bronze Age or the expansion of El Argar from its core to the limits set by Tarradell.

Schüle and Pellicer (1966) in the southeast, as well as Viana and Schubart in the southwest, contributed to the elaboration of the first systematic temporal sequences. Schubart (1971) identified ‘horizons’, which represented occupation phases expressed in the funerary practices. The so-called ‘Atalaia’ and ‘Ferradeira’ horizons were elaborated from the systematic study of funerary contexts along the Algarve, Alentejo and western Andalucia regions (Parreira 2014). Differences in the burial type, pottery and grave goods (and later radiocarbon dates) allowed the chronological distinction between Chalcolithic and Bronze contexts and allowed for the comparison with sequences elaborated for the southeast (Blance 1971; Parreira 2014).

In the meantime, in the region of Granada, Schüle (1967; 1969) differentiated the occupation phases of Cerro de la Virgen and Cerro del Real (Arribas Palau 1976). Such sequences, from the so-called Eneolithic to the Final Bronze Age layers, helped to confirm a continuity in the occupation of the region along different periods. This was not without debate, as Schüle still supported the diffusionist model for explaining the origin of metallurgy (Carrillo García 2018). It was assumed that regardless of its origin, El Argar was undergoing a subsequent expansion process, and such explanations about its expansion would be reinforced by a term: *norma argárica.*

The term appeared in the 1960s, following the principles of the ‘cultural norm’ approach (Molina Muñoz 2015), which departs from the materiality of the archaeological record to distinguish one culture from another, spatially and temporally (González Marcén et al. 1987). Even though the term ‘Argaric’ had been used since the Siret brothers to characterise the sites and contexts with particular traits belonging to this culture, it wasn’t until the 1960s that, associated with the term ‘norm’, it began to rule the archaeological research in southern Iberia.

The ‘Argaric norm’ was based on three already well characterised elements: the funerary practices, the settlement patterns and the homogeneity of the metal and ceramic goods (Lull 1983; González Marcén 1994; Molina Muñoz 2015). Such regularities first helped researchers to comprehend the uniformity of several material expressions during the Bronze Age, and second, they contributed to the identification of many sites in places where research had just been started. During the 1960s and 1970s, the amount of research increased and extended along the High Guadalquivir and the Sierra Nevada regions, resulting in the identification of a copious number of sites (Arribas Palau 1976).

The systematisation efforts and the increase in research done in the southeast helped to generate a perception of the ‘Argaric norm’ as a standard referent to define the character of every new site found and reported. Indeed, it helped to associate several sites along the southeast to the ‘Argaric territory’. It also contributed to the underestimation of other ways of thinking about the Bronze Age. This was even more visible during the 1980s, when new approaches changed the perception of the ‘Argaric norm’, which was almost considered an objective fact and a key term tied to the ideas of power and control.

This is the context around the end of the 1970s, when research increased in every corner of southern Iberia and involved new actors and new findings. Among those, the Bronze Age sites in the Middle and Low Guadalquivir Valley started to appear.

2.2.3 The Systematisation in the Middle and Low Guadalquivir: Between the Bell Beaker and Tartessos Cultures

At the end of the 1970s, the southeast had already established a tradition of archaeologists investigating and discussing the Bronze Age in the region. Researchers were even identifying and differentiating several expressions in the Levante and the Meseta areas and making comparisons between them in order to establish parallel chronologies and parallel (but linked) material developments. This is similar to what was done with the horizons of the Southwest Bronze. But archaeologists interested in the Middle and Low Guadalquivir Valley had to face other developments.

Tartessian findings from the 'El Carambolo' site, discovered in Seville in 1958, grabbed the attention of archaeologists. Several archaeological contexts containing burnished pottery (as the ones studied in Carmona 60 years ago by Bonsor; Pellicer Catalán 2006) were associated with the Final Bronze Age (called Pre-Colonial Tartessos; Ramos Millán 1981; Escacena Carrasco/Berriatúa Hernández 1985). Driven by the same interest for the Final Bronze Age, Pellicer Catalán started in 1969 to develop a chronology for the protohistoric sites in Carmona, which had been explored ten years earlier by German archaeologists from the 'Deutsches Archäologisches Institut' (DAI) (Pellicer Catalán 2006).

The Leisners were among the first German researchers to explore the possibility of differentiating several funerary sites from the Tartessians and classifying them into former periods (Leisner/Leisner 1965). Sangmeister elaborated a chronology based on the megalithic sites in the Low Guadalquivir, assigning them to a Copper Age that would be contemporaneous to the development of the Bell Beaker period, already identified in several sites in Carmona (Sangmeister 1966; Ramos Millán 1981).

Berdichewsky organised an inventory of funerary sites belonging to the so-called 'Bronze I Hispanic'. He also used diffusionist arguments to explain the origin of the funerary practices observed and to distinguish between two types of metallurgy in the record obtained: Bronze I and II; with II being contemporary to El Argar. He also established a typology of lithic materials (Berdichewsky 1964). The lack of stratigraphic control and chronologies made it impossible to include such sites in the systematic studies that were being conducted in the southeast.

During the 1970s, the systematic study of the site of Valencina de la Concepción (oriented during the former decades strictly towards the study of megalithism) provided the first stratigraphic sequence and the first typological study of materials for the region (Ramos Millán 1981). In 1971, Ruiz Mata identified pottery shapes which, from that moment on, were used as referents for identifying the Copper Age in the region and to help date its last phases with the arrival of Bell Beaker pottery (Ruiz Mata/Mederos Martín 2020). In Valencina, Ruiz Mata also identified polished and burnished pottery that were assigned to the end of the Copper Age, but he did not clarify whether they were contemporary or posterior to the Bell Beaker period (Ruiz Mata/Mederos Martín 2020).

Ruiz Mata's findings provided a new field of interest that oriented the systematic research done to date in the Middle and Low Guadalquivir Valley: the study of the transition from the Copper to the Bronze Age. Such interest developed from noticing that there was no other substrate below the Final Bronze Age layers other than that of the Bell Beaker period, at least in the areas studied at that moment, for example El Aljarafe or Los Alcores (Carmona) (Fernández Gómez et al. 1976). At the same time, the cist tombs identified in the southwest were present in regions where bell beakers were absent (Schubart 1965) – an idea that would change in recent years. The finding of cists in Chichina (Fernández Gómez et al. 1976) was considered an isolated case of 'Argaric or southwestern influence in the region' (Fernández Gómez et al. 1976, 379) in a context in which the continuity of a native population, contemporary to El Argar and the Ferradeira cultures, was the most common hypothesis.

As mentioned above, the focus of the archaeological studies at that time was on the Final Bronze Age sites found in Los Alcores (Carmona) and in Cerro Macareno (excavated since 1976; Pellicer Catalán 2006). The burnished pottery found in Valencina was first interpreted as evidence of a continuity of population in the Middle Guadalquivir region in the 2nd mill. BC, even considering this last phase of Valencina as the basis of the Final Bronze Age (Ruiz Mata/Mederos Martín 2020). At the same time, carinated Copper Age materials identified in Valencina were compared to the ones identified in the southwest for the Atalaia Horizon (Ramos Millán 1981). Ruiz Mata continued to explore the Bell Beaker phenomenon along the

Middle Guadalquivir Valley, identifying several sub-phases controlled chronologically in stratigraphic sequences (Ruiz Mata 1978–1979).

Ruiz Mata and Luzón Nogué elaborated another stratigraphic sequence at Colina de los Quemados in the city of Córdoba. They also identified burnished and polished material in the lowermost layer, which was considered to date back to the first half of the 2nd mill. BC. The findings were interpreted as remains of an 'autochthonous culture' prior to the Final Bronze Age. This interpretation was based on the lack of Argaric traits in the materials identified (Luzón Nogué/Ruiz Mata 1973).

Such interpretations were aligned with the culture-historical perspective: the presence or absence of certain traits was interpreted as the presence or absence of a certain culture. The Middle and Low Guadalquivir Valley was first considered to be a different culture area, which had its substrate in the Copper Age megalithic populations, was contemporary to the Bell Beaker phenomenon and continued parallel to both the southeast 'Argaric' and the southwest 'Ferradeira horizon' until the Final Bronze Age.

The end of the 1970s and the first half of the 1980s represent a breaking point for the study of the Bronze Age in the Middle and Low Guadalquivir. The systematic study of Setefilla (1973–1979; Aubet 1983), with the first report of an Argaric trait in a stratigraphic sequence from the Middle Guadalquivir Valley, followed by the report of Argaric traits in Cerro del Berrueco (Escacena Carrasco/Frutos Reyes 1981–1982), generated an impact in the way chronology and population of the region were being interpreted.

Both findings were reported in the same period as Lull was consolidating the idea of El Argar as an ancient state (Lull 1983). The 'Argaric norm' became integrated into a historical materialist discourse based on the idea of the consolidation of an elite that controlled a territory, defined a life-standard (represented in the material culture, the funerary and the settlement patterns) and expanded to reach the High Guadalquivir mountains as well as the Guadix Valley next to the Sierra Nevada. In the southeast, beyond the systematic research that brought hundreds of sites into the 'Argaric territory', the results were consolidating a school of thought that would lead the future research agenda regarding the Bronze Age in southern Iberia.

This is possibly the reason why both sites, Setefilla and Cerro del Berrueco, were immediately associated with the idea of an Argaric expansion to the west (Escacena Carrasco/Berriatúa Hernández 1985). As mentioned above, the concept of 'Argaric norm' had its origin in the culture-historical approaches which intended to distinguish the so-called 'Argaric' from the 'non-Argaric'. In that period, findings with Argaric traits were sufficient evidence for this identitary adscription.

It was not difficult to define the 'Argaric' in the southeast, thanks to the investment of research already made during almost 80 years. Despite the presence of Argaric traits in the region, the unequal (López Palomo 1993) investment of research realised in the Middle and Low Guadalquivir Valley presented a more complicated panorama. At first, the research conducted was not focused on studying the Bronze Age, but its previous (Martín de la Cruz 1989) and subsequent phases. When Bronze Age layers were identified, it was not clear if they were contemporary to the extensively studied Bell Beaker phenomenon (as the late Bell Beaker Acebuchal type reported by Harrison et al. 1976 and Ruiz Mata 1978–1979), or if they had their substrate in a native Chalcolithic population.

At the same time, other material and funerary expressions, different from the ones considered to be part of the 'Argaric norm', were also present in Bronze Age contexts. Hurtado Pérez and Amores (1984), as well as Pellicer Catalán/Hurtado Pérez (1987), identified the reuse of megalithic structures for inhumating people during the Bronze Age, especially in the necropolises of El Gandul and the Tholos de las Canteras. Ruiz Lara (1987) and Arteaga (1987) also reported, in the Campiña de Córdoba region and Porcuna (Jaén) respectively, a series of sites with similarities in the treatment of pottery, but with different burial expressions, interpreted as 'non-Argaric'.

Similar to Luzón Nogué and Ruiz Mata, Ruiz Lara also considered this region to have had an autochthonous population, with a continuity from the Chalcolithic period and a posterior process of acculturation from 'Argaric' peoples during the Bronze Age (Ruiz Lara 1987). This region, thanks

Site	Location	Type of Activity	Context	Year
Chichina	San Lúcar la Mayor (Seville)	Rescue activity	Funerary	1976
Salpensa	Utrera (Seville)	Mention of BA materials found	Funerary	1979
Cerro de la Encarnación	Villanueva del Río y Minas (Seville)	Systematic	Site identified (surface collection)	1979
Cerro del Arca	La Puebla del Río (Seville)	Rescue activity	Funerary	1980
Setefilla	Lora del Río (Seville)	Systematic	Settlement with funerary structures	1983
Cerro de Mesa Redonda	Villaverde del Río (Seville)	Systematic	Site identified (surface collection)	1983
La Pastora	Valencina de la Concepción (Seville)	Systematic	Funerary	1984
Tholos de las Canteras	Alcalá de Guadaíra (Seville)	Systematic	Funerary	1984
El Gandul	Alcalá de Guadaíra (Seville)	Systematic	Funerary	1984
Guta	Guta (Córdoba)	Systematic survey	Settlement	1985
Castillo de Monturque	Monturque (Córdoba)	Rescue activity	Settlement	1985
La Nava Grande	Morón de la Frontera (Seville)	Inventory	Funerary	1986
El Castillejo Arva	Alcolea del Río (Seville)	Inventory	Site identified (surface collection)	1986
Castillo de Almenara	Peñaflor (Seville)	Surface collection	Site identified (surface collection)	1986
Calle Alcazaba	Lebrija (Seville)	Systematic	Settlement	1986
El Gandul (Corte B Estrato IX)	Alcalá de Guadaíra (Seville)	Systematic	Funerary	1986
Castillo de Poley (Castillo de Aguilar)	Aguilar de la Frontera (Córdoba)	Systematic	Settlement	1987
El Laderón	Doña Mencia (Córdoba)	Systematic	Funerary	1987
Llanete de los Moros	Montoro (Córdoba)	Systematic	Settlement with funerary structures	1987
Pancorvo	Montellano (Seville)	Systematic	Material collected from particulars	1987
Necrópolis de Valdearenas	Iznájar (Córdoba)	Rescue activity	Funerary	1987
Cortijo Maria Luisa	Cantillana (Seville)	Rescue activity	Funerary	1988
El Carrasco	Puebla de los Infantes (Seville)	Inventory	Site identified (surface collection)	1988
Cerro de la Galiana	Cañete de las Torres (Córdoba)	Inventory	Site identified (surface collection)	1989

Table 1. List of the main sites reported as 'with Bronze Age occupation evidence' during the 1970s and 1980s.

to the increase of research done and the number of sites found, was even considered to be another cultural area named 'Bronce de las Campiñas' or 'Countryside Bronze' (Arteaga et al. 1987).

In Setefilla, Aubet considered something opposite to the idea of an Argaric expansion and instead interpreted the presence of Argaric objects as evidence of simple contacts with those populations, likely related to the exchange and introduction of metal goods within the region (Aubet et al. 1983). Following the idea of Aubet, López Palomo (1993), based on the stratigraphic sequence presented in Monturque, claimed the existence of an endogenous population with Chalcolithic roots different from the 'Argaric', who lived in the countryside of Córdoba during the Bronze Age (López Palomo 1993). A similar idea was considered for the first layers of the stratigraphic sequence in Llanete de los Moros (Martín de la Cruz 1987). Despite it not being conclusive in the characterisation of the first layers, two years later, Martín de la Cruz considered a continuity of Chalcolithic populations during the first half of the 2nd mill. BC in the region (Martín de la Cruz 1989).

During the 1980s, there was not enough information about the main Full Bronze Age settlements along the Guadalquivir Valley, nor were there enough sites providing stratigraphic sequences to generate an accurate comparison with the southeast and southwest regions (Martín de la Cruz 1989). The few sites reported systematically presented very different expressions in their material culture, settlement patterns or funerary traits. Such diversity became more evident once the archaeological reports of rescue activities started to grow exponentially.

The 'Anuario Arqueológico de Andalucía' (Andalusian Yearbook of Archaeological Research), published between 1985 and 2008, kept a record of the research activities developed in the frame of both systematic-academic projects and the rescue activities of infrastructure projects during this period. The local Andalusian government was aware of the responsibility to protect the vast archaeological record of the region, and therefore, it was mandatory for any research or rescue activity to report the findings, document their location and give ideas about the nature and the possible interpretations of the material record found. But there was no standard for presenting such reports and the quality of the findings was not the same. The number of sites reported increased, but with different types of information.

At the end of the 1980s, the transition from the Copper to the Bronze Age continued to be the only element that was studied systematically in the Middle and Low Guadalquivir. Some examples are the discussions led by Martín de la Cruz (1989) and Caro Bellido (1989). Both pointed out the situation of the Bell Beaker phenomenon extended along the Guadalquivir Valley and possibly contemporary to the Bronze Age populations present in both southeast and southwest Iberia. Both researchers claimed the continuity of a Chalcolithic population (expressed in the presence of Bell Beaker pottery along the region) interacting with 'Argaric' populations.

Caro Bellido also presented a new cartography of the region, introducing new sites that represented the Bronze Age in the Middle and Low Guadalquivir (Caro Bellido 1989). Despite only adding a few dots, it was the first time that the region was not represented as a gap in the maps. The diversity in the expressions found, the lack of enough stratigraphic sequences with radiocarbon dates and the incomplete information from some reports (Martín de la Cruz 1989) made both authors recognise that it would require more work to reach a consistent conclusion. Something that, to date, has not yet been achieved.

2.2.4 The Scientific Phase: Between Old and New Research Questions

Despite the increase in the amount of research done during the 1990s, the advances for characterising the Bronze Age in the Middle and Low Guadalquivir Valley slowed down. Paradoxically, the number of sites found augmented and new research techniques allowed new possibilities for analysis of new types of data, but archaeologists abandoned the objectives they were pursuing decades before.

Different paths or interests appeared among archaeologists once they were allowed to explore other research questions using new types of information. Southeast archaeologists accumulated more data oriented towards sustaining the idea of El Argar as an ancient state. Due to the increase of sites found along Jaén and Granada, providing plenty of new data, the focus was set on gathering enough evidence to support the hypothesis of a territory controlled by central elites via bureaucracy (Lull 1983). Historical materialism became the theoretical structure for all the analyses made, until today. Part of the evidence for Lull's statements were obtained from several large-scale, open area excavations; something completely different to the situation in the Middle Guadalquivir. New sites were reported in the provinces of Córdoba and Seville, but most of them in the frame of surface collection and rescue activities.

One of the few long-term research and excavation campaigns was developed in the Sierra Morena sites of El Trastejón and La Papúa (Hurtado Pérez 1991). The occupation of both sites was dated to between the 3rd and 2nd mill. BC, based on samples of charcoal obtained from the stratigraphic cuts made along the settlement (Hurtado Pérez et al. 2011). Another site found in the Sierra Morena was the cist necropolis of La Traviesa (García Sanjuán/Vargas Durán 1995). This site was reported in the frame of a rescue activity. As in the case of El Trastejón, the information obtained was treated systematically. The systematic study of both sites, conducted over almost a decade, provided one of the first models for explaining social stratification for the 'southwest' (García Sanjuán 1998; 1999; Hurtado Pérez et al. 2011).

Indeed, these sites shared several traits with the 'Southwestern' necropolises. As the three are situated halfway between the Guadiana and the Guadalquivir Valleys, they ended up being addressed by the researchers as part of the Southwestern Bronze area. This would be convenient for the reflection about social complexity. In contrast to the historical materialist approach used in the 'Argaric' study to address the origin of the state, García Sanjuán and Hurtado Pérez generated a model based on neomarxist and neoevolutionist precepts. Their model also included analytical categories such as the social relations of production; but they did not describe them in terms of classism and the existence of a state-like organisation (as in El Argar) but in terms of pre-classist societies (García Sanjuán/Hurtado Pérez 2011).

Based on the systematic treatment of all the evidence collected over the decades, the authors concluded that the Southwestern Bronze was not influenced by the same ecologic factors that favoured the raise of classist societies in El Argar (García Sanjuán 1999). Therefore, the level of hierarchisation present in the southwest was not the same as in the southeast.

Despite their differences, both southeast and southwest studies regarding the origin of social stratification went in the same direction: understanding the origin of the state in southern Iberia.

Another example of a long systematic research campaign developed in the Middle and Low Guadalquivir was the study of its palaeo-estuarine environment. Arteaga and Roos provided the first results of geoarchaeological analyses on sediments. Their results worked towards reconstructing the coastal line of the ancient *Lacus Ligustinus*. They also identified anthropic impacts on the soil and the vegetation within the sequences they obtained; this allowed them to consider several social and economic processes occurring during prehistory (Arteaga/Roos 1995). According to the preliminary results obtained, they identified a population nucleus for the 3rd mill. BC, present since the Neolithic, that was situated in the Aljarafe region. This nucleus would form a 'confluences knot' by the convergence of six historical routes that linked the Guadalquivir region with the Sierra Morena and with the countryside of Córdoba (Arteaga/Roos 1995). For the transition between Copper and Bronze Age, they identified a settlement process that formed several nuclei, with associated anthropic impacts which could have contributed to the formation of the ancient delta of the Guadalquivir mouth between Los Alcores and the Aljarafe (Arteaga/Roos 1995).

Just as Ruiz Lara, Arteaga also developed long systematic research campaigns in the countryside of Córdoba. Arteaga claimed the existence of a new culture area, 'Córdoba's Countryside Bronze' (in Spanish: 'Bronce de la Campiña Cordobesa'; Arteaga et al. 1987), based on the sites identified and analysed during one decade. This new area was included in some cartographical representations of the Bronze Age during the 1990s and covered part of the Middle Guadalquivir Valley (Contreras Cortés et al. 1997) or in other words, filled the gap. Decades after defining the ‘Bronce de las Campiñas y la Baja Andalucía’ (Contreras Cortés et al. 1997) the efforts for starting a tradition of investigation in order to characterise it, or at least to prove that it existed, decreased or were abandoned.

Pellicer Catalán also pointed to the lack of information in this region as a consequence of the absence of stratigraphic sequences in open-area excavations (Pellicer Catalán 1992). Up to that year, the only sites with sequences reported, were precisely the ones excavated at the end of the 1970s and during the 1980s (Carmona, Colina de los Quemados, Cerro Macareno, Setefilla, Cerro del Berrueco, Llanete de los Moros and Monturque; Pellicer Catalán 1992). All of them were only stratigraphic cuts and not open-area excavations, which could have provided more complete information.

This is why, until today, no further efforts were made for excavating a whole Bronze Age site in the Middle and Low Guadalquivir Valley. As already happened before, the open area excavations were focused on other study-periods, better represented in this region, for example the Final Bronze Age or the Copper Age megalithic sites.

Another criticism linked to the lack of sequences was the absence of radiocarbon dates. Whereas the chronologic control was guaranteed for almost every Bronze Age site in the southeast, the amount of absolute dating performed during this decade on the Middle and Low Guadalquivir was drastically reduced (Mederos Martín 1996). Discussions regarding the consistency of the radiocarbon dates obtained in some stratigraphic cuts in the Middle Guadalquivir were still present. Martín de la Cruz questioned the few dates obtained from Setefilla, claiming that its XIV stratum was likely younger than what the (not so reliable) radiocarbon dates showed (Martín de la Cruz 1989; Belén et al. 1992). The issue, despite decades of new developments in radiocarbon dating, has not been solved yet. Martín de la Cruz also questioned the antiquity of the I and II strata from Cerro del Berrueco (Martín de la Cruz 1989). Such criticisms are mainly expressions of the uncertainties existing during that time, especially due to the lack of datable contexts.

Most of the chronologic comparisons and the sequences have been (and still are) made with pottery typology; a referent that changes every time new data appears. The first systematic review of such chronologies brought up, as a result, the possibility of the existence of hiatuses prior to the Final Bronze Age layers in every sequence that existed in the Middle and Low Guadalquivir (Belén et al. 1992). Despite some of them belonging to the end of the 2nd mill. BC, the idea of a population crisis before the Final Bronze Age started to gain force.

Scientific techniques answered new questions as well. One of the most relevant for the Middle and Low Guadalquivir Valley was the study of the estuarine palaeoenvironment, as well as the study of organic materials from funerary contexts. Caro Bellido provided the first cartographic representations of the estuarine landscape and mentioned its relevance for the development of settlements and populations in the region during the Bronze Age (Caro Bellido 1989). Arteaga et al. performed the first geoarchaeological study of the sediments of the ancient lake. These studies, complemented with radiocarbon dates obtained from organic materials collected in the soil perforations, provided a model of the settlement process of the region during prehistory. They also provided a map of the Guadalquivir delta that existed near Coria during the Bronze Age (Arteaga et al. 1995).

Older questions, such as the transition between Copper and Bronze Age, were also addressed scientifically during this decade. Martín de la Cruz gathered all the radiocarbon dates available for defining a chronology, and compared several sites dated in southern Iberia. Based on the materials effectively dated, he agreed that a Chalcolithic substrate of the Bronze Age in the Middle and Low Guadalquivir Valley was represented in the materials and dates from Cerro del Berrueco and Setefilla (Martín de la Cruz 1991).

As mentioned above, one of the main issues still was the lack of radiocarbon dates for the region (Martín de la Cruz 1991; Mederos Martín 1996). Scientific approaches were also used to address this problem. Valdés (1995) studied the phosphates from sediments to provide evidence of the inhumation of bodies in Bronze Age cists. He described the problematic effects of the acidic soil on bone material; an issue that had already been considered as a cause for the lack of human remains in the cist necropolises of the southwest (Schubart 1965; Tavares et al. 1975; Del Amo 1993), as well as in La Traviesa (García Sanjuán/Vargas Durán 1995). Del Amo discussed the same problem of soil acidity in funerary contexts. But he considered the diversity in the funerary ritual as an important element which could also explain the absence of bone material in the cists (Del Amo 1993).

Metallurgy as an economic activity was also explored using evidence from chemical analyses (Montero Ruiz 1994) and systematic comparisons of metal goods found mainly in funerary contexts (Rodríguez Vinceiro et al. 1992). During the 1990s, archaeometallurgical prospections (Hunt Ortiz 1996; 1997; 1998) helped to identify new sites, as well as to characterise the mining activities during the Bronze Age, especially in the Sierra Morena region.

Archaeobotanical analyses of seeds, fruits and fibres from domestic contexts were also performed at the end of the 1980s (Rivera Núñez et al. 1988) and during the following decade (Navarro et al. 1998). These studies allowed researchers to identify the type of cereals and fruits consumed by prehistoric people in southern Iberia (including during the Bronze Age) (Rivera Núñez et al. 1988). These methods also gave insight about climate change in the past, thanks to the identification of the type of vegetation present at the time (Bocio et al. 1998; Navarro et al. 1998).

The same scientific approaches provided different answers for several research questions made in southern Iberia. These discrepancies seem to be mainly related to the different focuses that scientific traditions had established in the southeast and the Middle and Low Guadalquivir. The history of research in southern Iberia has been linked, at least in the southeast, to one big project which was committed to including El Argar in the scope of the studies of the origin of the state. Scientific research was oriented to describe the 'Argaric', not only as a culture with its own identity, or as a standard to characterise the Bronze Age in the region, but as evidence of the first manifestation of classist societies under the structure of a state (Lull 1983). The same approaches were being used along the Middle and Low Guadalquivir but without any long research program with institutional support. Therefore, the products and discussions originated from these studies were mainly based on the particular interests of every researcher.

'New Archaeology' theoretical approaches and up to date scientific techniques applied to the analysis of material record provided evidence that helped to identify cultural and social transformations during the Bronze Age. In this sense, bioanthropological approaches from the 'Archaeology of death' were applied in 'Argaric' funerary contexts for studying the manifestations of group hierarchisation in the funerary record (Buikstra et al. 1992).

It is necessary to distinguish between what the evidence shows and how this is interpreted. For example, in the southeast, more than 60 radiocarbon dates from funerary remains provided information for defining an 'Argaric time' (González Marcén 1994), that is to say, a chronology of the development of what was identified and delimited as 'Argaric'. Likewise, the analysis of grave goods and life conditions observed in bones were mainly linked to discussions supporting the theoretical structure provided by the historical materialist approach for claiming the existence of classes, elites, violence, coercion and a state. 'Argaric' research was focused on El Argar, whereas other projects with different (geographical and theoretical) background, intended to look at the Bronze Age phenomenon in a more general sense.

The debate about El Argar, as a model of a primary state, is still open. It has shaped the research questions of almost every investigation in the southeast and feeds a discourse that describes El Argar as a territory with its own identity and borders, almost acting as a circle: a virtuous circle for those who are committed to the idea of El Argar as a state, and a vicious one for those who do not. In a never-ending loop, the discourse grabs the attention and the investments to perform the investigations that will help to sustain itself. The 1990s would see the consolidation of El Argar as a field of study, generating its own path, regardless of what happened outside its limits.

Indeed, historical materialist statements coming from 'Argaric' research have always influenced the discourses about the Bronze Age in the Middle and Low Guadalquivir, but not *vice versa*. Discussions about the origin of the state in southern Iberia (occurring since the 1980s) motivated archaeologists to develop alternative points of view about the social and cultural changes and the role played by power.

Following the concept of 'social complexity' discussed by García Sanjuán (1999), Nocete reported about the 'territorial evolution' of southern Iberia. In a dissertation, Nocete proposed a model for studying the settlement evolution in the region. This model was linked to the idea of the increasing social complexity expressed in the settlement patterns observed in several Copper and Bronze Age sites (Nocete 2001). According to it, an initial classist society had already started during the 3rd mill. BC. This was thought to be represented in the huge territory of Valencina, which was considered as a pristine state (older than El Argar). From the point of view of Nocete, as this state was not able to sustain its own material contradictions, violence and coercion practices rose at the beginning of the 2nd mill. BC (Nocete 2001).

In this model, the Middle and Low Guadalquivir Valleys, which could be identified with today's Porcuna and Aljarafe respectively, were territorial nucleuses, which collapsed around 2300 BC, giving place to a new hierarchical system, with its centre in the High Guadalquivir (Nocete 2001; Nocete et al. 2010).

The research performed during the 2000s was the expression of a break between 'Argaric' research and the rest. Scientific approaches occupied more and more of the scope of the investigations, but as mentioned above, they were following different paths. Ancient DNA, anthracology, palynology, stable isotopes, archaeometry and GIS, came into use to diversify the type of information available at the time. But 'Argaric' research was already structured in a discourse and focused on understanding particular elements that had already been integrated into the 'Argaric' world. In the Middle and Low Guadalquivir, such techniques were also applied, but oriented under other analytical procedures.

García Rivero (2004) introduced the first ecological study of the Holocene sequence in a regional perspective. It was based on palynological and anthracological analyses, summed to faunal, climatological and geomorphological data available for the Peninsula. The relevance of such analyses was in addressing processes and transitions without any identitary ascription, considering human groups along with animals and plants as part of the ecological system and changes as part of mixed cultural-environmental processes. Contemporary, the same type of information (pollen, seeds, fauna, geology etc.) was studied in Peñalosa (Jaramillo Justinico 2005), but with the purpose of understanding the exploitation of raw materials (here named 'resources') in the frame of the economic activities identified for the 'Argaric' society, especially metallurgy.

Regarding metallurgy, surveying-activities performed in the 1990s helped to identify several traces of prehistoric mining in the Sierra Morena (Hunt Ortiz 1996; 1997; 1998; Merideth 1998). It was not until the 2000s that isotopic analyses and identification of minerals were used to help characterise details about the mining and metallurgy activities in several Bronze Age sites, mainly in the area of Zufre (Huelva) (Hunt Ortiz 2003). Hunt Ortiz also contributed with a systematic study of the mining and metallurgy activity during prehistory, again with a regional perspective, oriented towards understanding metallurgy as a social and cultural phenomenon as well as an economic activity regardless the cultural identities involved (Hunt Ortiz 2003).

Archaeometallurgical studies also helped understanding the impact of metallurgy on the social and cultural changes occurred during the Bronze Age. Costa Caramé and García Sanjuán (2009) placed metallurgy in the study of the transition between Copper and Bronze Age, in this case, in southwest Iberia. As mentioned above, Sierra Morena sites were included into the 'Southwestern Bronze Age' due to the similarity of the cist necropolises and materials identified (Hurtado Pérez 1991; Costa Caramé/García Sanjuán 2009). Metal grave goods were considered as expressions of the changing ideology of people during the Bronze Age, once again treating metal weapons as indicators of prestige among the group (Costa Caramé/García Sanjuán 2009).

A similar observation was made for the southeast necropolises (Buikstra et al. 1992) but in the end, these studies were more oriented towards explaining the emergence of a social class that controlled the metal production (Delgado Raack/Risch

2008). An example of such control was observed in the site of Peñalosa (Contreras Cortés 2000), which was considered to be the main producer of metal goods which were distributed to the centre of the 'Argaric' territory (Delgado Raack/Risch 2008).

As mentioned above, similar approaches answered similar questions but with different perspectives. Metallurgy in the southwest was addressed under the idea of studying Bronze Age social and cultural transformations as a phenomenon along the whole region. But 'Argaric' studies of metallurgy, beyond pointing to the same changes, were focused on identifying the structure of the metal production and its connection with power relationships in El Argar (Lull et al. 2009b; 2010b).

Continuing with examples of the application of scientific techniques, it is also worth remarking the use of GIS. This tool was applied for studying interactions between prehistoric sites in the Sierra Morena and classifying them according to several terrain costs, such as pendant or visibility (García Sanjuán 1999). It was also used for analysing the catchment of 'resource' areas, visibility and communication paths between prehistoric sites within the same geographical and investigative frame (García Sanjuán et al. 2009). Such studies brought spatial analysis into consideration; something never done before in other prehistoric (especially Bronze Age) sites of the region.

Parallel to the application of scientific techniques, one of the new advances in the history of the research in the Middle and Low Guadalquivir was the systematic review of the available information. With rescue activities increasing during the former decades, several new sites appeared. Some of them were only reported in the yearbook, without any other complementary study or inclusion in the ongoing studies in the region.

One of the efforts for reviewing the information from rescue activities was the systematisation of the 2nd mill. BC sequence in Los Alcores (Carmona) (Jiménez-Hernández 2004). Several stratigraphic cuts along the city brought researchers to consider the existence of a continuous sequence, with material links to both the 'Argaric' and the 'Southwestern' regions. The sequence provided enough material evidence to suggest that Carmona was a whole big settlement during the Bronze Age, but the number of urban, historical, and protohistoric layers above, makes the characterisation of the whole site difficult (Jiménez-Hernández 2004).

Another systematic review was performed by García Sanjuán (2005). He reviewed the funerary expressions observed in megalithic sites in the southwest, including sites from the Middle-Low Guadalquivir such as El Gandul, Las Canteras, Cueva del Vaquero and Valencina de la Concepción. The studies also reported recent information about new findings in megalithic sites, such as the inhumations found in El Gandul and Cueva del Vaquero, and Valencina de la Concepción (Arteaga Matute/Cruz-Auñón Briones 1999; Cruz-Auñón Briones/Arteaga Matute 2001). This review brought back the hypothesis of the reutilisation of megalithic sites during the Bronze Age, providing them a role in the changes that occurred during this period. Such reutilisation would be further evidence for the continuity of population during the transition period (García Sanjuán 2005).

For the Guadalquivir mouth, Ramos Muñoz et al. (2004–2005) reviewed the reports made for the Atlantic coast during the 3rd and 2nd mill. BC. This review analysed the transition and the sociocultural changes occurred between Copper and Bronze Age, as well as identified the raw materials (here called 'environment, geology and natural resources') that people used during these periods. The result of this review considered the existence of early classist societies that ruled and organised people in this region, establishing centre-periphery relations around the Low Guadalquivir (Ramos Muñoz et al. 2004–2005). Valencina is considered to have been the centre since the 3rd mill. BC. According to Ramos Muñoz et al., it continued being the core of this society until the Bronze Age, when decentralisation occurred. After this point, settlements controlled only the immediate surrounding territories through militarism and regulations on the access to land, ruled by the local elites (Ramos Muñoz et al. 2004–2005).

Reviews not only integrated new data into the analysis of settlement or funerary patterns. At the end of the decade, they started to question the 'Argaric norm' and the ways in which, evidence was, at a certain point, overvalued. For example, Aranda Jiménez et al. (2009) question the evidence of violence and the way it has been interpreted

Site	Location	Type of activity	Context	Year
Cuevas de las Laderas, Bermeja, La Detrita y Huerta Anguita	Priego de Córdoba (Córdoba)	Systematic	Funerary	1990
Arroyo del Sardinero	Baena (Córdoba)	Systematic	Site identified (surface collection)	1990
Solar de la Plaza de Santiago 1	Carmona (Seville)	Rescue activity	Settlement	1990
La Mesa	Fuente Tójar (Córdoba)	Systematic	Site identified (surface collection)	1990
El Esparragal	Priego de Córdoba (Córdoba)	Systematic	Site identified (surface collection)	1990
El Castillarejo	Priego de Córdoba (Córdoba)	Systematic	Site identified (surface collection)	1990
Necrópolis de Canama	Alcolea del Río (Seville)	Rescue activity	Funerary	1991
Castillo de Alcalá de Guadaíra	Alcalá de Guadaíra (Seville)	Rescue activity	Settlement	1991
El Pirulejo	Priego de Córdoba (Córdoba)	Systematic	Funerary	1991
Parque municipal de puebla del Río	Puebla del Río (Seville)	Rescue activity	Funerary	1992
Zóñar	Zóñar (Córdoba)	Rescue activity	Settlement	1992
Borbollón	Espejo (Córdoba)	Systematic	Site identified (surface collection)	1992
Castillo de Monturque	Monturque (Córdoba)	Systematic	Settlement	1993
La Traviesa	Almadén de la Plata (Seville)	Rescue activity	Funerary	1993
Los Cortijillos de la Sierra	Priego de Córdoba (Córdoba)	Rescue activity	Funerary	1993
Calle Juanito el Practicante No. 5	Carmona (Seville)	Rescue activity	Settlement	1995
Calle General Freire	Carmona (Seville)	Rescue activity	Settlement	1995
La Veleña	Cabra (Córdoba)	Systematic	Funerary	1996
Valencina de la Concepción (Cerro de la Cabeza)	Valencina de la Concepción (Seville)	Systematic	Site identified (surface collection)	1996
La Fuente del Río	Cabra (Córdoba)	Systematic	Settlement	1996
La Ranilla	Carmona (Seville)	Systematic	Site identified (surface collection)	1996
Cerro Barrero	Fuentes de Andalucía (Seville)	Systematic	Site identified (surface collection)	1999
Cueva De Los Mármoles	Priego de Córdoba (Córdoba)	Systematic	Settlement	1999
Montoto	Marchena (Seville)	Systematic	Site identified (surface collection)	2000
Solar de la Plaza de Santiago 6 Y 7	Carmona (Seville)	Rescue activity	Settlement	2000
Cueva del Vaquero	Alcalá de Guadaíra (Seville)	Systematic	Funerary	2000
Mesa Cordobesa	Peñaflor (Seville)	Systematic	Site identified (surface collection)	2002
Lomas del cortijo de la Ramira	Baena (Córdoba)	Systematic	Site identified (surface collection)	2003
Calle Torre del Oro	Carmona (Seville)	Rescue activity	Settlement	2004
Piedra resbaladiza	Villanueva del Río y Minas (Seville)	Systematic	Site identified (surface collection)	2004
El Olivar Alto	Utrera (Seville)	Systematic	Funerary	2006

Table 2. List of sites reported as 'with Bronze Age occupation evidence' during the 1990s and 2000s.

for the ‘Argaric society’. Data related with violent events do not necessarily confirm episodes of warfare or regional conflict. According to the observations made, evidence is usually closer to episodes of interpersonal conflict (Aranda Jiménez et al. 2009). The hypothesis of a monopoly of violence held by the elites, along with other statements such as the violent control of the territory and a conflictive relationship between Bronze Age groups did not have enough empirical support.

The results outlined above are symptomatic of the ‘Argaric’ research during the 2000s. The commitment to proving the existence of a state influenced the way the rest of the evidence was interpreted. It did not mean that the research procedures were not systematic, or the results shown were not real. The issue was in the way these were addressed. Interpretations, such as the ones made by Ramos Muñoz et al. (2004–2005) for the Low Guadalquivir Valley, are examples of such ‘Argaric’ influences, based more on supporting the theoretical structure that is fundamental to the discourse, rather than on what the evidence is able to show. ‘Argaric’ research seems to follow the rules of its own scientific tradition, regardless of the other developments in the investigation outside its territorial borders, although it continuously influences the discussions and the hypotheses made, for example, in the Middle and Low Guadalquivir.

This is why the Middle and Low Guadalquivir Valley remained between old and new questions. Archaeologists found themselves between older and modern approaches. They were still trying to characterise the social and cultural changes during the transition between Copper and Bronze Age, and trying to generate an accurate chronological sequence for the region (something that has been intended for decades), but at the same time, they started applying scientific techniques for answering new questions, which could help to better characterise phenomena such as social complexity (as in the case of the studies conducted along Bronze Age sites in the Sierra Morena).

Scientific research also continued providing new sets of data. These mainly helped to the study of the palaeoenvironment and of the use of several raw materials (commonly called ‘resources’ by archaeologists). In most of the publications, after the ‘results’ section, the discussions and the hypotheses stated vary, depending on the region and the scientific tradition in which archaeologists were situated.

2.2.5 The Phase of Uncertainties

During the last ten years, research in the Middle and Low Guadalquivir Valley has experienced a decrease in the number of sites reported, but not due to a decrease in research activities. The development of infrastructure projects in the cities during the last decades has promoted the introduction of regulations regarding the protection of the cultural heritage[9] and has increased the number of rescue activities. Such activities, according to the Andalusian regulations, need to be reported to the local administration. The Culture Administration is responsible for the publishing of the reports in the yearbook already mentioned in the previous sections. After more than 20 years of reports of both systematic and rescue activities, the Andalusian Yearbook of Archaeological Research stopped its publications in 2008, meaning that all the information collected in rescue activities occurred in the last decade has not been published yet, despite the fact that archaeologists must still submit their reports.

Systematic research presents and discusses its results in academic publications, while reports of rescue activities of the last ten years remain mostly stored in the offices of the Andalusian Culture Administration. Paradoxically, the most relevant publications regarding new research developed in the region – for the Bronze Age – are related to rescue activities; especially activities that achieve to publish their results in independent books or in academic journals.

For the Middle and Low Guadalquivir, one of the most relevant activities of the last decade was the rescue excavation of the first settlement with cist necropolis found in the Aljarafe region (Seville). The site of Cobre las Cruces represents the most complete Bronze Age site discovered in the region so far. The fact that it was found in the

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context of an expansion of a copper mine, implied a huge effort for characterising and analysing a site that was going to be completely destroyed. Hunt Ortiz published the findings of the two Bronze Age necropolises and part of the settlement linked to them (Hunt Ortiz 2012). The site presented several (historical and prehistoric) occupation phases, as many as any other site of the region, and the Bronze Age contexts here had something that was not possible to find in the cist necropolises of the Sierra Morena: preserved human bone remains. The bioanthropological study of the human remains, along with new radiocarbon dates (Hunt Ortiz et al. 2008), brought new information regarding inhumation practices and burial rituals. The material record coming from the burials also helped to characterise and give a proper chronology to particular pottery types present in the region.

Another site relevant for the study of the Bronze Age in the Middle and Low Guadalquivir is Cerro San Juan. This site is just a few kilometres south of Cobre las Cruces, along the same elevations that were once part of the western side of the *Lacus Ligustinus*. The emphasis of the researchers of Cerro San Juan (supported by a long-term academic research project) has been on presenting a very well controlled stratigraphic sequence, with radiocarbon dates that helped to distinguish changes in the material culture between the 3rd and the 2nd mill. BC. Something striking, according to the evidence presented, was the sedimentary rupture between the Bell Beaker and Early Bronze phases (García Rivero/Escacena Carrasco 2015). Such rupture (documented with radiocarbon dates) led archaeologists to consider a 'replacement model' (in opposition to the 'continuity model', which had been commonly claimed by researchers during the last decades; García Rivero/Escacena Carrasco 2015).

A possible problem regarding the model proposed for Cerro San Juan is that it was based on one stratigraphic cut and not an open excavation area. The sequence, Bell Beaker–Bronze, has been also observed along the Guadalquivir Valley (Escacena Carrasco/Berriatúa Hernández 1985; Serna González 1989; López Palomo 1993). Further research including open area excavations will help to get clarity about the proper social, cultural and environmental conditions of such a transition.

Another striking finding occurred in Carmona, where, recently, several funerary cists (with human remains) have been discovered (Vázquez Paz 2019, personal communication). Archaeologists provided the official reports for the yearbook; but they will remain unknown to the public until the Andalusian Government decides to retake the publications.

Another recent contribution regarding the study of the transition between Copper and Bronze Age and the continuity model is the radiocarbon chronology. García Sanjuán and Odriozola Lloret reviewed the absolute dates collected for the southwest, including dates from sites such as La Traviesa, El Trastejón, Valencina de la Concepción and Cobre las Cruces (García Sanjuán/Odriozola Lloret 2012). According to the dates compared, they identified the coexistence of sites that originated during the 3rd mill. BC with sites containing originally Bronze Age material that, of course, originated centuries after (García Sanjuán/Odriozola Lloret 2012). They corroborated such information with evidence found years before, namely the reutilisation of megalithic sites during the first phases of the Bronze Age (García Sanjuán 2005), as well as the model of coexistence of Copper–Bronze Age sites found in the southeast (García Sanjuán/Odriozola Lloret 2012).

Other research developments of the last decade have provided new data that are helping to solve more recent questions appeared with the increase in scientific research. The main question addresses the impact of the 4.2 ky BP climactic event on the changes that occurred between the 3rd and 2nd mill. BC.

The hypothesis of the collapse of several cultures along the Mediterranean region around 2200 BC, due to an extremely dry climate, was addressed in several ways. Based on palynological record, Fuentes et al. documented an increase in the aridity during the last 5000 years in the Sierra Nevada (Fuentes et al. 2007).

Cacho et al. reviewed the paleoclimatic reconstructions based on pollen sequences made along the Iberian Peninsula. For the Bronze Age, such reconstructions provided evidence of an increase in the aridity of the region, which could have resulted in the collapse of the 'Argaric' culture during the last half of the 2nd mill. BC (Cacho et al. 2010).

Kölling et al. studied the temperatures using the record of oxygen isotopes from shells from the sequences excavated in Gatas. According to the results, temperature records did not show a peak around 2200 BC and were gradually descending until 1200 BC. Despite the evidence of vegetation replacement (showed in the palynological record) for the same period, the results indicated that this change was not explained by the temperature (Kölling et al. 2015).

The most recent explorations regarding the impact of the 4.2 ky BP event on Bronze Age human groups, integrate some demographic dynamics analysis and paleoclimate studies. Blanco González et al. identified traces of human activity along time, calculating demographic dynamics during the transition between Copper and Bronze Age, based on calibrated radiocarbon datasets collected during the last decades, as well as palynological records of several Copper and Bronze Age sites along the Iberian Peninsula. The results showed a demographic collapse between the 3rd and 2nd mill. BC in the southwest and a population increase in the southeast for the same period (Blanco González et al. 2018).

Hinz et al., based on the results observed by Blanco González, studied the paleoclimate records, identifying short term dry phases, coincident with such population changes in both corners of southern Iberia (Hinz et al. 2019). They do not correlate the climate directly with the social and cultural changes that occurred during that period but agreed that there was a big population change that could have also been expressed in migrations of people from the southwest to the southeast (Lillios et al. 2016). The impact of climate on the social and cultural changes that occurred during the transition between Copper and Bronze Age is still under discussion; but without a doubt, archaeologists are more convinced than before of the role that climate had.

Another recent contribution for studying the palaeoenvironment of the Guadalquivir mouth and the ancient *Lacus Ligustinus* has been the geoarchaeological research developed since the 1990s about the reconstruction of the ancient coastal line (Arteaga et al. 2015). Although the project was mainly oriented towards studying the ancient gulf during Roman times, the geoarchaeological sequences obtained allowed the researchers to identify several anthropic modifications of the marshes since Neolithic times (Arteaga et al. 2015). Such anthropic modifications observed for the Copper-Bronze Age transition were interpreted under the perspective elaborated by Nocete (2001; Nocete et al. 2010; mentioned in chapter 2.2.4).

DNA analyses also contributed to the last development of the scientific research, especially regarding the analysis of continuity vs. replacement models existent for southern Iberia. Szécsényi-Nagy et al. studied the mtDNA from different datasets and periods of prehistory on the peninsula. Despite the few archaeogenetic data coming from Bronze Age sites, the genetic make-up showed the continuity of the mitochondrial DNA between Chalcolithic and Bronze Age populations (Szécsényi-Nagy et al. 2017). On the contrary, the Y-chromosome analysis, performed by Olalde et al., showed a 100% replacement of this marker by another population coming from the steppe (Olalde et al. 2019).

This last study had a big impact in the media. Reports depicted the Bronze Age as a violent period, with warfare being the main driver of population replacement (Ansede 2018). The main factor responsible for such a point of view is precisely the history of the research itself. Most of the discussions regarding social and cultural changes between Copper and Bronze Age have considered violence as one of the main triggers, added now to the climate change.

Recent contributions criticise the idea of interpreting the Bronze Age as a violent period characterised by intergroup conflicts (Aranda Jiménez et al. 2009). Among such criticism, other researchers also question the 'culture-historical' way of addressing the space (Legarra Herrero 2013), instead of thinking of new ways to interpret the use of the soil and the landscapes in the past. These new models go beyond the already known historical materialist approach used for explaining the control of land in the past. Such approaches developed a discourse that needed to include evidence of violence and controlled territories by elites, in order to maintain the line that has been originated since El Argar was considered a 'culture'. Bernabeu Aubán et al. suggest that prehistory could have been more variable regarding social

Site	Location	Type of activity	Context	Year
Jardín de Alá	Gerena/Salteras (Seville)	Rescue activity	Funerary	2012
Cobre las Cruces (SE-B)	Gerena/Salteras (Seville)	Rescue activity	Settlement with funerary structures	2012
Cobre las Cruces (SE-K)	Gerena/Salteras (Seville)	Rescue activity	Funerary	2012
Cerro San Juan	Coria del Río (Seville)	Rescue activity	Settlement	2015
Carmona	Carmona (Seville)	Rescue activity (not yet published)	Settlement with funerary structures	2019

Table 3. List of sites reported as 'with Bronze Age occupation evidence' during the 2010s.

organisation, but theories about the state (including the 'Argaric') tend to shadow other ways of considering the same issue in different places and moments of human history (Bernabeu Aubán et al. 2012).

Cámara Serrano and Molina González criticise the theoretical and methodological procedures for analysing prehistory in southern Iberia. They point to several issues that could resume the state of the research today.

First, processualist and post-processualist approaches seem to confuse the material record with the evidence. Material record becomes inaccessible for others once it has been analysed by the archaeologists. Furthermore, there is not any agreement regarding the way archaeologists must record the materials found. In the end, the materials reported serve to the specific interests of the researcher and not to the scientific community in general (Cámara Serrano/Molina González 2016). Unfortunately, archaeologists tend to pay less attention to the material record once the hypotheses claimed have become 'the rule' and after the archaeologist (or the team) has become a scientific authority. New materials excavated or collected are usually integrated into the already established discourse and directly interpreted as evidence of phenomena already identified, but new reviews of the material record available may find contradictory evidence, exposing the research teams and the methodological procedures followed.

A second problem is that there is no agreement in the way reports and empirical evidence are presented, regardless of whether they come from systematic approaches or rescue activities. As there is no common system for recording the materials found in several excavations, there is a break between rescue and systematic activities, which leads to discrepancies in the data. This shows a difference in the quality of the interpretations made between the types of research (Cámara Serrano/Molina González 2016).

An example of this is the 'interpretative jump' (Cámara Serrano/Molina González 2016) found in several rescue reports. Single sets of materials, found in archaeological contexts, are linked with theoretical positions without any methodological consideration. Unfortunately, such interpretations remain in the public, generating part of the confusion that exists today regarding themes such as the transition between the Copper and Bronze Ages. The same problem derives from the interpretations made by geneticists when discussing the replacement of male population during the Bronze Age.

The third and last problem addressed is the management of archaeology and heritage in Andalusia by the local government (Cámara Serrano/Molina González 2016). The Andalusian Yearbook of Archaeological Research is a clear example. Without a publication outlining the rescue activities since 2008, several findings still remain unknown, impeding the further development in the discussions and the interpretations that can be produced.

In the end, such problems have led to the current state of the research in the Middle and Low Guadalquivir Valley. The current period has been a time of uncertainties for the research, most of them originating in the lack of integration of the record and the way archaeologists have taken advantage of the findings presented for maintaining their own points of view. Such practices pull hundreds of new students into adopting predetermined perspectives, influenced by the scientific authorities ruling the place in which they study or do research.

2.2.6 Concluding Remarks on the State of the Research

The Middle and Low Guadalquivir Valley has always been in between. Not only geographically, but during the whole history of its research. The very first time the Bronze Age was identified on the Iberian Peninsula, a particular style of research (influenced by the culture-historical approaches and the Western Subsistence paradigm) was established (see chapter 1.1). This style has not changed much. The idea of 'culture area' is still very present to every archaeologist when analysing the Bronze Age. This has shaped every research development and every interpretation made.

The seeking for 'cultures' condemned the Middle and Low Guadalquivir to be always 'in between': first, between two 'cultures' identified in the southeast and the southwest; decades later, between those interested in studying the Chalcolithic substrate below the Bronze Age layers and those focused in studying the Tartessian period; finally, between old and new questions – the old ones related to the transition between the 3rd and 2nd mill. BC and the influence of El Argar, the new ones derived from the particular interests of the researchers taking advantage of recent scientific techniques. This in-between status has always influenced the research questions formulated for this region.

But what is this 'in between'? During the first decades of research, the efforts to identify a 'culture area' were permanent. Thereafter, the idea of an autochthonous and autonomous population, called the 'Countryside Bronze' appeared, but this did not last. The autonomy was then analysed from several theoretical perspectives, most of them linked to the discussion about whether El Argar was a state or not. Such discussion seemed to go in only one direction; there was no answer or possibility of dialogue from the southeast. All these twists resulted in several cartographic representations showing sometimes the region as part of the 'Southwestern Bronze', sometimes just as a gap; a gap that remains until today.

The last period, when the criticism of the methodological and interpretative procedures increased, brings us to consider the following question: What if the research questions regarding Bronze Age in southern Iberia were biased from the beginning?

Western subsistence paradigm has shaped the history of the archaeological research to date. 'Argaric' research can essentially be considered a product of such a way of viewing the world. National or cultural identity, borders and elites controlling and violently coercing people are some of the pictures that remain from such a paradigm. But is it possible to study the Bronze Age as a cultural phenomenon beyond any identitary adscription? Is it possible to think in other categories for explaining the material record found in southern Iberia during the Bronze Age?

In the meantime, the loop mentioned above threatens to continue its flow. Meaning that 'Argaric' research will probably provide new data supporting the discourse archaeologists have been developing for a century, whereas the Middle and Low Guadalquivir Bronze Age will likely remain unattended. Unless archaeologists decide to confront with the current problems listed above, they will never solve the big questions.

This goes beyond 'filling the gap'. It is a matter of understanding the past in another – different – way, which does not imply generating borders and identities invented by the archaeologists.

Part II: The SFB 1070-A02 Archaeological Project

3 The Project

The research presented here is part of project A 02 'Use of Resource Landscape and Socio-Cultural Change in the Iberian Peninsula' (second phase), which is one of the several projects integrating the collaborative research centre RessourcenKulturen at the University of Tübingen (Germany).

Project A 02 focuses on the conception and organisation of landscapes as ResourceAssemblages (Bartelheim et al. 2021a). Since the beginning of the first phase in 2012, the project has adopted an interdisciplinary approach. From a cultural anthropological perspective, several archaeological and ethnographical studies were performed mainly regarding landscape perception, use of resources and several specific sociocultural dynamics, interconnected under a diachronic perspective.

One of the main objectives was analysing the contrast between the favourable agricultural zones next to the southern coast and the arid inland mountains. According to the results of the first phase (whose archaeological component investigated the Chalcolithic period), there are clear regional differences, expressed in the settlement and production patterns observed between the southern littoral and the inland plateau (Escudero Carrillo et al. 2017). For this second phase, which investigates the Bronze Age, the focus was on the observed specialisation in the production, the sedentarism and the livestock-based economy. The geographical frame of the second phase of this interdisciplinary project were the Guadalquivir Valley and the Sierra Morena regions, where mobility and the adaptions to specific natural conditions were analysed.

Project A 02 in its second phase investigates landscapes as resources, the ResourceAssemblages they compose and their subsequent sociocultural dynamics with an interdisciplinary approach, from both archaeological and ethnographical perspectives. The task was achieved with interconnected studies, which used sources from prehistoric (the ones presented here in this research), historical and contemporaneous contexts.[10]

The archaeological component of project A 02 was oriented to characterising the Bronze Age in the Middle and Low Guadalquivir Valley. In neighbouring regions, such as the southeast Iberian Peninsula, the Bronze Age has been presented as a period with radical social and cultural changes. Such changes are expressed mainly in the transformations in the settlement patterns, the material record and the funerary practices observed. At the same time, the space in southeast Iberia has been interpreted as a 'territory', a term useful for describing sociocultural dynamics linked to power relationships, land control and use of violence for coercing people.

As mentioned in previous chapters, such interpretations may have a 'Subsistence Paradigm Bias', which distances archaeologists from the empirical evidence and integrates them around a discourse that structures all the research questions and the investigations conducted. Therefore, an alternative approach was considered for this research. Reading space as landscape (and not as territory) implies using methods and treating data, in a way that gives relevance to the characterisation of the material and immaterial resources that compose it. Departing from such elements identified, archaeological interpretation of social and cultural relationships between human groups may help to overcome models based on territorial perception of the space, which could be arbitrary and sometimes correspond to cultural-historical approaches, far from what empirical evidence shows.

A possible alternative approach for reading space as landscape and showing the material and immaterial resources composing it, consists in the

10 The diachronic analysis including prehistoric, historical and contemporaneous sources is presented in Bartelheim et al. 2021b.

use of Geographical Information Systems (GIS). These are useful tools for integrating and analysing spatial information linked to the material record identified (Conolly/Lake 2006). The spatial analyses generated from empirical evidence provides models of representation of the space that increase the fidelity of the interpretations made, avoiding arbitrary cartographic representations based on the mere presence or absence of traits. One of the main difficulties encountered in the Bronze Age archaeology of the Middle and Low Guadalquivir Valley is the lack of such empirical evidence, or at least, the lack of systematisation of the material record found and its analysis with a regional (not territorial) perspective.

Considering it necessary to look first for all evidence available, this project started by elaborating a state of the art of the archaeological research around the Bronze Age conducted along this region (see chapter 2.2). This review helped to gather all the information available and to identify the theoretical and methodological problems and weaknesses that have characterised the investigations on this period for the study area. The review was complemented with an analysis of the quality of the research performed throughout southern Iberia, made with the help of GIS. This GIS model of the distribution of the research helped to show that the lack of evidence in the Middle and Low Guadalquivir Valley was mainly due to the low amount of research (see chapter 2.2).

The fact of having only few Bronze Age sites compared with the southeast and southwest regions motivated the research team to develop four main activities. All four were oriented to analysing the region as a landscape, where human groups moved and interacted, reaching and using resources in order to create or modify social and cultural relationships.

The following is a small description of the activities performed, which will be described in the following chapters. For ease of reading, every activity is presented separately, with its own development, results and discussion, except the two activities in chapter 5, which have been interwoven.

– Archaeological survey along the Middle Guadalquivir (chapter 4): The research team started surveying a section of the Middle Guadalquivir Valley considered as potential for finding Bronze Age sites. The results of these surveys are presented in the next chapter.

– Elaboration of a pottery typology of the Middle and Low Guadalquivir Valley (chapter 5): The main goal of this typology was systematising the available information found during the elaboration of the state of the art, regarding the material record of the Bronze Age in the study area. The first step of such systematisation effort focused on pottery, which is the most common material found along all the sites. Pottery can be used as empirical evidence for the elaboration of spatial models that represent the interactions and the flow of resources between sites.

– GIS modelling of the interaction between Bronze Age sites along southern Iberia (chapter 5): Landscapes are composed by perceptions and interactions. Past perceptions are difficult to identify, but interactions are not. The link between the material record and their provenance, as well as the coincidences in the material record among different sites, are the foundations for the spatial modelling developed in this research. A GIS model representing the interactions between different Bronze Age sites along southern Iberia, based on their coincidences in the pottery used was elaborated.

– Diet and mobility analysis of the Bronze Age site of Cobre las Cruces (chapter 6): The research team had the opportunity of analysing the human remains of a Bronze Age settlement excavated almost one decade ago in the province of Seville. The necropolises of the site Cobre las Cruces provided the first evidence of diet and mobility among the human groups inhabiting the Low Guadalquivir.

4 Field Campaigns

4.1 Surveying of the Lands next to the Guadalquivir River (First Field Campaign, February–March 2018)

One of the first activities of project A 02 was to characterise the landscape of the Middle and the Low Guadalquivir Valley. It was necessary to walk the fields and identify the context where several populations had settled in the last millennia. The main objective was to look for a Full Bronze Age site, or at least to understand the possible reasons behind the low number of sites identified compared to neighbouring regions.

During the months of February and March 2018, the archaeological research team of project A 02[11] walked a section of the Middle Guadalquivir Valley. This survey passed through the present-day areas belonging to the towns of Peñaflor, Lora del Río, Alcolea del Río, Villanueva del Río y Minas, Carmona, Tocina and La Campana (see *map 1* and *2*). The study area had a total surface of 798km^2 and formed an irregular polygon that covered both sides of the valley and the lower elevations of the Sierra Morena (up to 400m.a.s.l.; see *map 1* and *2*). Inside this total area, a smaller area was delimited for intensive surveying. This intensive survey area covered 10.5km^2 and located between the valley and the lower elevations of the Sierra Morena portion of Lora del Río and Peñaflor (*map 3*).

All were surface surveys. The first phase consisted in a directed survey (Cerrato Casado 2011) focused on the floodplains of the Guadalquivir River and the first elevations of the Sierra (specifically hilltops with features such as good visual control of the surrounding landscape and accessibility). During intensive surveys, in places with high concentration of surface finds, the distance between people was between 5 to 10m and the goal was to map such concentrations and to select material for chronological characterisation.

11 Prof. Dr. Martin Bartelheim, Dr. Marta Diaz-Zorita Bonilla, Dobereiner Chala-Aldana, Javier Escudero-Carrillo and a group of field assistants from both the University of Tübingen and the University of Seville. The number of assistants fluctuated between 13 and 21, depending on the season.

The study area was composed of three main geographic (physic) landscapes (Junta de Andalucía 2020):

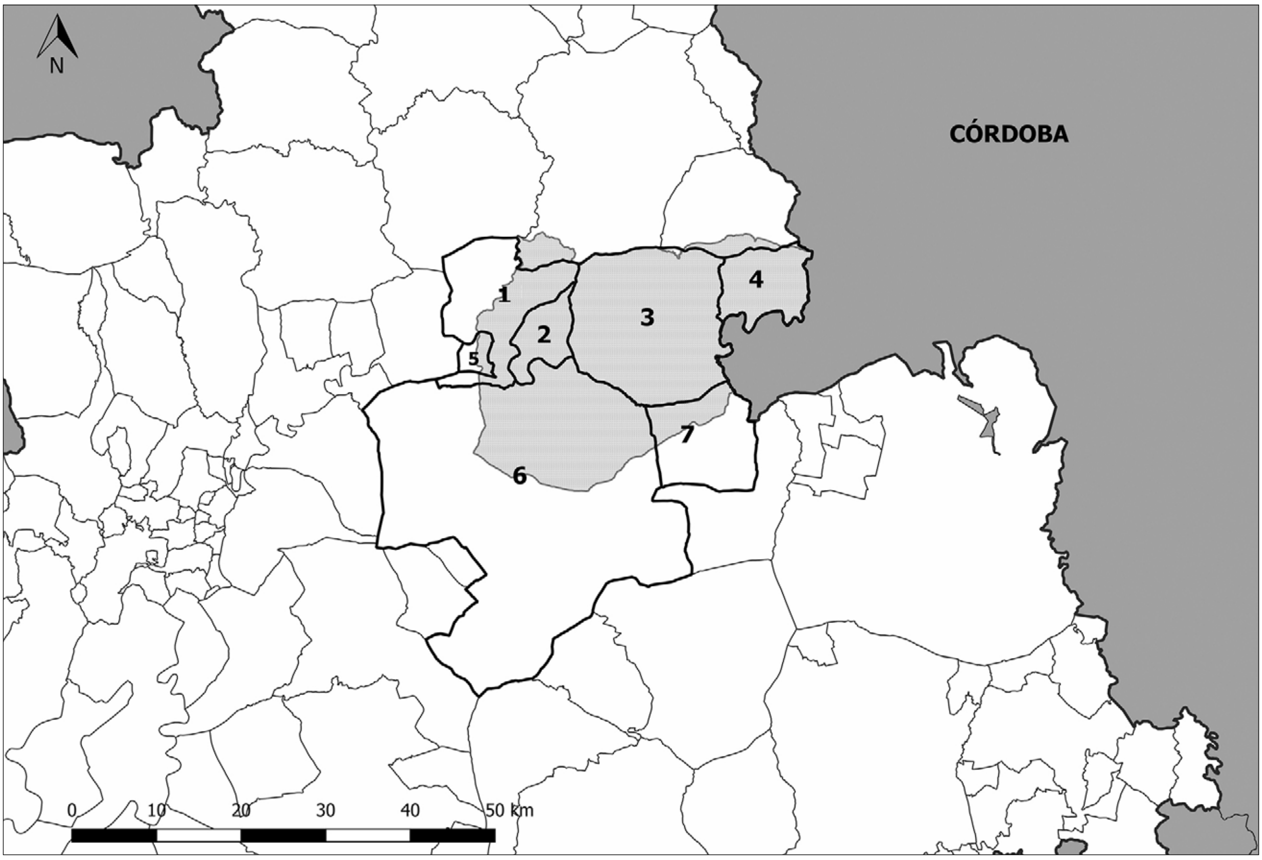
– **Gentle slope hills** with marsh, sand and gravel substrates next to the left riverbank of the Guadalquivir. Soils in this region are presently used mainly for dry farming.
– **Floodplains** and tabulated terraces with intensive cereal agriculture along the riversides.
– **Hills and mountains** with volcanic and plutonic substrate next to the right riverbank of the Guadalquivir, along the lower elevations of the Sierra Morena. In this area, *dehesa* landscape is predominant, as well as orange and olive forestry agriculture.

This is a completely human-modified landscape. The only zones that maintain ‘wild’ sectors are those above 200m.a.s.l. and those in private hunting grounds with a considerable presence of wild fauna. Some of these Sierra-forests were used for growing pine and eucalyptus, which, due to their fast-spreading nature, have replaced native vegetation in some places.

The geology of the survey area is composed mainly of tertiary and quaternary material in the foothill zone, with alluvial and colluvial fill sequences descending through the Guadalbácar riverside. Gravels, sands and reddish-yellowish matrix silts are present along the Guadalquivir River and greyish-blueish marshes at the foothills. Along the lower elevations of the Sierra Morena, there are Palaeozoic, Precambrian and Cambrian outcrops. West of these elevations, there are faults formed within schists, gneisses and amphibolite outcrops which have a SW-NE direction.

In the eastern section, along the lower elevations of the Sierra, there are sandstone and slate outcrops, which belong to the Torreárboles formation, lying on metabasites and gabbro diorites, in some sectors covered by tertiary conglomerates of calcareous matrix (calcarenites and limestones). Such conglomerates are interpreted by geologists as coastal facies (Instituto Geológico y Minero de España 1976).

The survey area contains several sites with archaeological and historical relevance. For

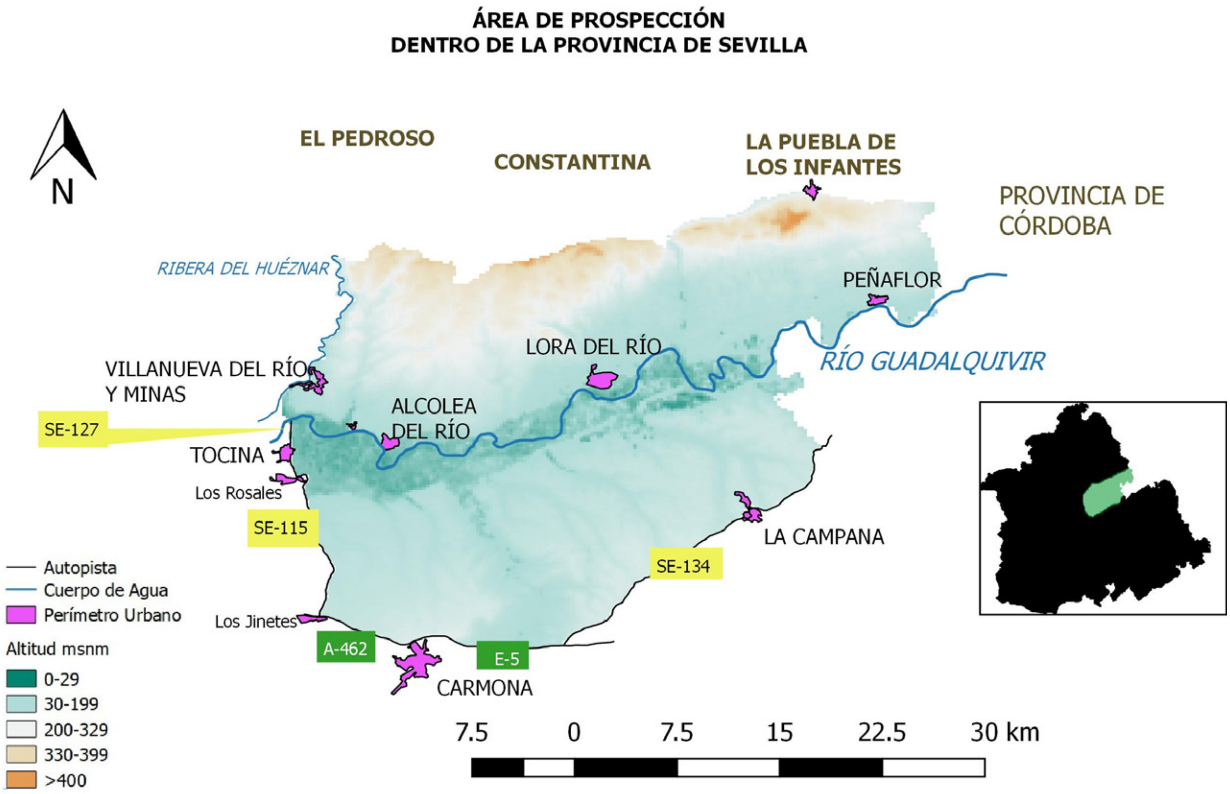


Map 1. Province of Seville and municipalities included in the surveys. 1. Villanueva del Río y Minas; 2. Alcolea del Río; 3. Lora del Río; 4. Peñaflor; 5. Tocina; 6. Carmona; 7. La Campana. Shadowed area represents the sectors surveyed (map by author).

mid-elevation settlements facing the valley it was a strategic position which took advantage of the Guadalquivir riverbanks and the terraces along the Sierra for agricultural, farming and mining activities.

Evidence of the recent prehistory inside the surveying area can be highlighted by sites such as Setefilla in Lora del Río, which is a multi-phase settlement with a sequence extending from the Bronze Age to the Medieval period (Aubet 1978; Aubet et al. 1983; Caro Bellido 1989). Opposite to the Sierra, in Los Alcores, there are also Chalcolithic sites such as Campo Real (Cruz-Auñón Briones/Jiménez Barrientos 1985), El Acebuchal (Lazarich González et al. 1995) and La Loma del Real Tesoro (Escudero Carrillo et al. 2017) as well as El Picacho and all the intramural Chalcolithic and Bronze Age sites identified in the urban area of Carmona (Conlin Hayes 2006). On the floodplains, south of the survey area, there is material evidence of Bronze Age settlements in sites such as the El Chaparral and Pozo de la Anea sites in La Campana (Ponsich 1979) and the Mesa Cordobesa and Cerro Pino sites in Peñaflor (Ferrer Albelda et al. 2005).

Indeed, archaeological evidence for the Bronze Age is not as numerous as that found for Chalcolithic periods along the Guadalquivir Valley. This motivated the research team to identify and characterise possible new Bronze Age finds in this zone. The morphological analysis and the chronological association of the material from all the identified sites was performed by Jacobo Vázquez Paz (see chapter 4.1.1). The results presented here were reported to the Culture Administration of the 'Junta de Andalusia' and an article was submitted for the yearbook (among the regulations, writing an article for the yearbook is mandatory). As mentioned in the previous chapter, despite hundreds of articles written during the last decade by many archaeologists reporting new findings in Andalusia, the yearbook has not been published again.



Map 2. Details of the surveyed area (map by author).

Identified Sites[12]

Fuente del Águila

(Central point: X: 286626 E; Y: 4180577 N): this site is located in the NW corner of the town of Peñaflor, on the 'Fuente del Águila' farmstead. It occupies the left riverbank of the 'Arroyo del Término' stream on agricultural lands in the Sierra foothills. The land is uniform, with gentle slopes and elevations between 160 and 180m.a.s.l. The dispersion of material covers an area of 33.9ha.

The site has Chalcolithic, Roman and Medieval surface material spread all over the terrain.

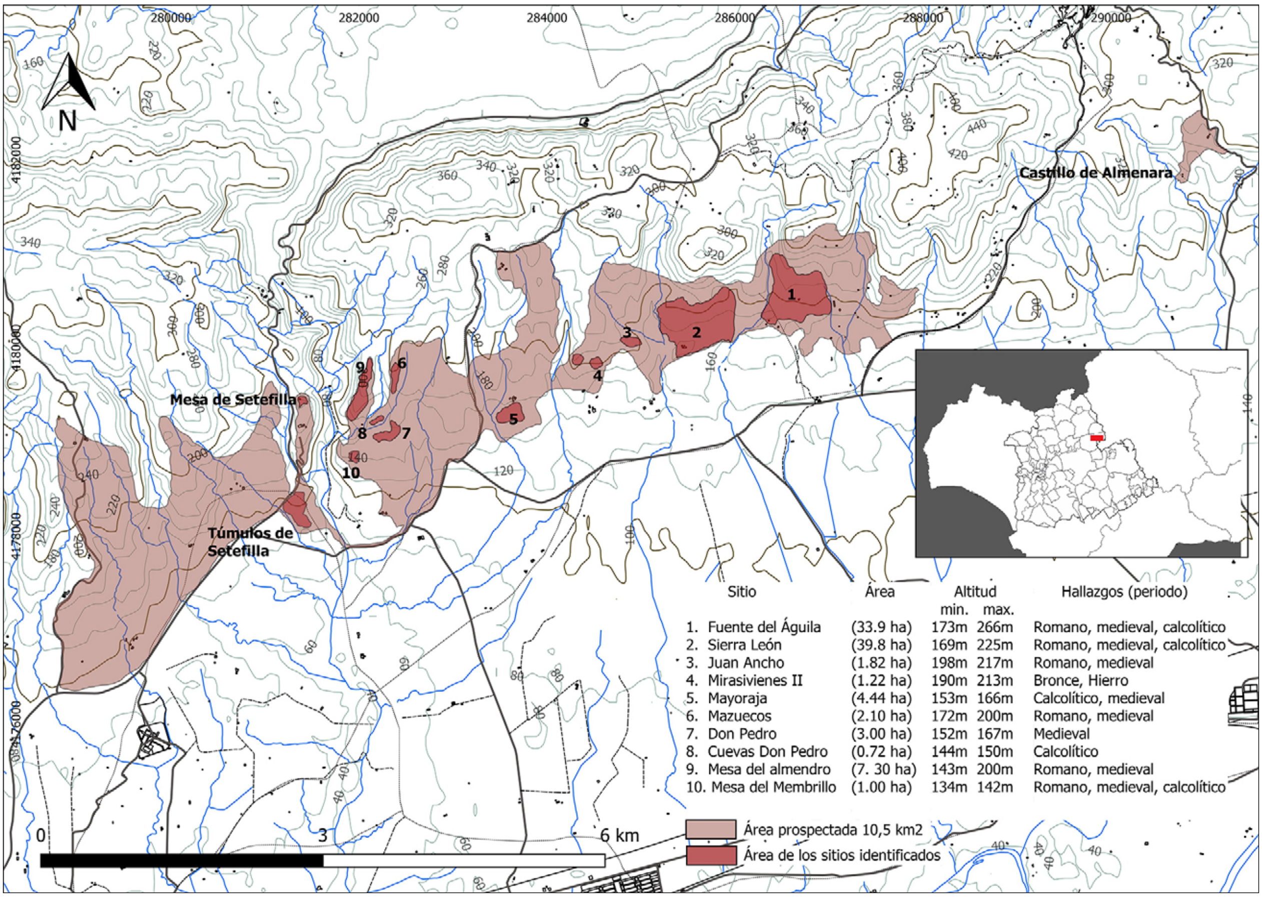
A total of 103 pottery fragments were studied to define the periods present at this site. The pottery is mostly hand-made and is composed of 15 rims, two bases, one handle and 85 wall sherds. Among the rims, an almond-like plate rim (*fig. 19 n. 26*) and an ellipsoidal bowl rim (*fig. 19 n. 33*) were identified as prehistoric. Other pieces represent later periods, such as divergent bowls (*fig. 19 n. 21–23*, *25*, *27*, *31*), a handle (*fig. 19 n. 32*) and a lid rim (*fig. 19 n. 24*).

There is an area, next to the 'Camino de Quiebraollas' path and inside the farmstead limits, with another accumulation of surface material. In this area, 39 pottery fragments were documented. According to several hand-made sherds, with medium grain size inclusions and a small eroded globular vessel rim (*fig. 21 n. 78*), the site dates into the Copper Age.

Sierra León

(Central point: X: 285614 E; Y: 4180274 N): this site is in the NE corner of the town of Lora del Río, on the 'Sierra León' farmstead. Similar to Fuente del Águila, this site is also composed of agricultural fields in the foothill, but on the right, rather than the left riverbank of the 'Arroyo del Término' stream as well as the left riverbank of the 'Arroyo de las Pilas' stream. Moving north towards the survey area, the slope increases, the vegetation becomes thicker and there is no surface material. The area with archaeological material is

12 For the location of all sites see map 3.



Map 3. Intensive surveying area and sites identified (map by author).

concentrated in the gentle, open slope-land south of the Sierra. The dispersion of material covers an area of 39.8ha.

The site provided material belonging to several periods, mainly recent prehistory and Roman.

A total of 24 pottery fragments and one lithic fragment were studied to define the periods present at this site. The pottery is composed of four rims and 20 sherds with very small size, which made chronological association difficult. Thus, dating happened according to the type offabric observed in the sherds and on a rim belonging to a harsh textured pot (*fig. 18 n. 4*). This rim was everted and its profile is common to domestic forms from Iron Age I–II, but is also seen in the Early Middle Ages (7th–9th cent. AD).

Two of the three remaining rims belong to a jar (*fig. 18 n. 2–3*) of a fabric associated with the same period. The last rim belongs to a bowl (*fig. 18 n. 1*), that can be associated with the Copper-Bronze Ages. No accurate association was possible with the sherds. It has not been possible to determine whether the lithic flake dates back to the Copper or the Bronze Age.

According to the findings, the site is composed of materials from the 6th to 9th cent. AD and was part of a small rural settlement. But it is important to note that there is evidence of a previous facies from around the 3rd mill. BC.

Juan Ancho

(Central point: X: 284890 E; Y: 4180068 N): This site is located in the NW corner of the town of Lora del Río, in the lower elevations of the Mesa de Lora, a prominent formation in an elongated hill that goes parallel to the right riverbank of the 'Arroyo de las Pilas' stream and just before its entrance into the Guadalquivir Valley. The dispersion of material covers an area of 1.82ha.

This site presents a large concentration of surface material belonging to the Roman period on the hilltop as well as on the low terrace next to the stream. Although no material was analysed, the presence of this Roman site is reported.

Mirasiviene II

(Central point: X: 284523 E; Y: 4179839 N): This site is located 300m west of the Juan Ancho site, on the Mirasiviene or Mirasivienes farmstead (both toponyms are used in official maps and papers related to the site (Díaz Guadamino 2011). The site is composed of two small hills that make up part of the Mesa de la Lora formation. Their height does not exceed 200m.a.s.l. The average slope is 11% and on both summits concentrations of stone slabs and pottery fragments with dispersion radii of around 1.22ha can be found.

The western hill was documented by Marta Díaz Guardamino (2011) who reported a Middle–Late Bronze Age site as well as a stone stela with a warrior carved on it. The decision was made to survey the eastern hill to determine the origin of the pottery.

This is a site with material evidence belonging to both recent prehistory and protohistory.

A total of 92 pottery fragments were analysed to establish a chronology. They correspond partially to hand-made wares from recent prehistory and partially to Iron I elements with engobe and wheel painting. There are several rims with shapes related to a storage function (*fig. 21 n. 63–67*) that could be associated with recent prehistory, possibly the Bronze Age. The rest of the material, specifically a rim and a plate base (*fig. 21 n. 57* and *70*), is composed of wheel-made pottery and pieces with red engobe from the 1st mill. BC (Iron I).

Fig. 8. Lithics from Mirasivienes II.

Three pieces of lithic debitage were also collected from Mirasiviene II (*fig. 8*). Their date is linked to the most ancient pottery collected, in the recent prehistory.

Mayoraja

(Central point: X: 283612 E; Y: 4179298 N): This site is located in the town of Lora del Río, 750m west of Mirasiviene and 50m in front of the farmhouse. It is situated on a uniform terrain at the foothills, which descend gently to the stream that divides the Mirasiviene and Mayoraja farmsteads (without toponym). This stream is cut in the west by the 'Arroyo de Juan' stream, forming a small set of limestone caves which have been used from Roman times to the last century as quarries, according to its owner. The dispersion of material covers an area of 4.44ha.

At this site 56 pottery fragments and one lithic fragment were studied for chronological definition (*fig. 9*). The pottery is composed of six rims, five bottoms and 35 sherds; the material is heavily eroded making a chronological association difficult. There are two rims that could be associated with recent prehistory (*fig. 18 n. 5–6*); they belong to a small globular vase with a sharp rim (*fig. 18 n. 5*) and a hand-made bowl. It is not possible to determine whether they belong to the Copper or the Bronze Age because these are types present in both periods. There is also a lid rim (*fig. 18 n. 7*) with a finer grain size matrix assigned to Early Middle Age periods (5th–9th cent. AD).

Fig. 9. Lithics from Cortijo Mayoraja.

The rest of the material is pottery with finer grain matrixes and visible temper that shows a harsh texture, making it difficult to date them.

A lithic flake was collected (*fig. 9*) that should belong to recent prehistory, but it was not possible to determine whether it belonged to the Copper or the Bronze Age.

According to the material collected, it is difficult to define a chronology; some evidence points to an occupation from at least the Copper Age until the Middle Ages.

Mazuecos

(Central point: X: 282381 E; Y: 4179689 N): This site is located close to the town of Lora del Río, on a plateau-like hill, 1.10km west of the Mayoraja site. The flat surface of the hill summit is elongated and oriented in a NE–SW direction. The NE corner of the plateau reaches 201m.a.s.l. and descends towards the SW, with an average slope of 8.7%, until it reaches an altitude of 173m.a.sl., where the concentration of finds ends. Along the whole western edge of the hill, the slope increases abruptly due to the cut produced by a stream (without toponym), which discharges into the Guadalbácar River and rounds the hill on its western side. The dispersion of material covers an area of 2.1ha.

This is a site with mainly Roman, but also some Medieval material.

Mazuecos presents a significative number of pottery fragments (*fig. 21 n. 46–55*), with several rims, lids, pot/jar handles, *orzas*, vessels etc., as well as an abundance of sherds. The types, as well as the matrixes and clay treatments identified, mainly correspond to Late Roman pottery (4^{th}–7^{th} cent. AD). A metal slag was also documented (*fig. 10*).

Fig. 10. Slag fragment from Mazuecos.

The eastern side of the site presents a small amount of highly eroded pottery for chronological association; however, according to the kinds of clay used, their treatment and a pot handle, the material could belong to an early Medieval period.

Don Pedro

(Central point: X: 282311 E; Y: 4179089 N): This site is located close to the town of Lora del Río, on the Don Pedro farmstead, 300m south of Mazuecos and on the same pendant that descends to the Guadalquivir Valley. It presents an elevation between 154 and 163m.a.s.l.; but the terrain is not uniform. There are several natural bumps with surface pottery on them. The dispersion of material covers an area of 3ha.

40 pottery fragments were studied for chronological purposes. Of these, one rim, three bases and 36 sherds were identified. The rim corresponds to a small globular vessel with a shape and matrix that resembles recent prehistoric types (*fig. 19 n. 17*). The sherds are of similar manufacture as the rim. Among these sherds, there are also matrixes associated with wares of Iron I–II.

According to this material, the site was occupied during recent prehistory, probably during the Copper Age (because of the globular vase) and the Iron I–II period.

Cuevas de Don Pedro

(Central point: X: 282190 E; Y: 4179231 N): This site is 78m NW of the Don Pedro site, inside the same farmstead. It was differentiated from Don Pedro because of the shape of the terrain, which is composed of an outcrop that has several caves inside. The concentration of material is not inside the caves, but on the slope in front of their entrance, which is thought to be the riverbank of an already dry stream. This pendant presents a series of mounds with surface material spread all over them, the dispersion covers an area of 0.72ha.

A total of 127 pottery and 3 lithic (*fig. 11*) fragments were studied to define the chronology of this site. The pottery is composed of 14 rims and 113 sherds. There is a large collection of handmade pottery belonging to recent prehistory, with a significative number of forms such as plates, bowls and globular vessels; some of these quite large in size. Among this material, there are also some pottery fragments belonging to wheel-made Roman productions.

Among the recent prehistoric forms, there is an almond-shape plate rim that corresponds to Copper Age (3^{rd} mill. BC) typologies (*fig. 18 n. 9*). There is also a hemispheric bowl with sharpened rim (*fig. 18 n. 10*), a form frequently seen in the Chalcolithic. Other forms identified include a simple rounded-shape plate rim (*fig. 18 n. 8*) and globular vessels (*fig. 18 n. 11*, *13*, *15*, *16*). The rest

Fig. 11. Lithic fragments from Cuevas de Don Pedro.

of the material belongs to different wares such as smoothed surface sherds and visible tempers, similar to those identified for the Copper Age, and a wheel-made grey-matrix pot, which provides evidence for the Roman occupation of the site, probably between the 2nd and 1st cent. BC.

A total of three lithic flakes (debitage) were identified (*fig. 11*). Considering the amount of prehistoric material at the site, these lithic fragments can be associated with this period. According to the material identified, the site was occupied during recent prehistory (Copper Age) and had a second phase of occupation during the Roman periods (2nd and 1st cent. BC).

4.1.1 Characterisation of Sites Already Reported in Previous Studies

During the survey campaign, the research team also recognised some sites that, despite being already reported by other researchers, are linked to the ones mentioned above.

Mesa del Almendro 'West Don Pedro'
(Central point: X: 282018 E; Y: 4179510 N): This site is located in the town of Lora del Río, next to the hill where Mazuecos lies, and is separated from it by a stream (without toponym) that cuts Mazuecos on its western side. West of Mesa del Almendro lies the canyon of the Guadalbácar River that separates the site from Mesa de Setefilla. The site was reported by Jorge Bonsor (1931), studied again by Michel Ponsich (1979) and inventoried as an archaeological site in 1986 (Moreno Menayo 1986). The site was declared a monument in 1985 and an archaeological protected area in 2002. The dispersion of material covers an area of 7.3ha.

This site has mainly pre-Roman and Roman material (already described in previous reports); according to the study of material collected there, it was also possible to identify material belonging to recent prehistory. The prehistoric material consisted of 34 pottery fragments, which were studied for chronological association. The material is composed of hand-made rims and sherds that belong to plates, bowls and storage vessels from recent prehistory, as well as some sherds belonging to the Iron I–II periods.

Among the prehistoric material, there is an almond-shaped plate rim with a smoothed surface (*fig. 22 n. 98*), included in the repertories of the Copper Age (3rd mill. BC). Along with the plates, several rounded-rim hemispheric bowls, belonging to the Chalcolithic period, were identified (*fig. 22 n. 91*). Storage vessels with rounded rims (*fig. 22 n. 90, 92–93*) as well as ellipsoidal bowls (*fig. 22 n. 94*) were also identified.

The rest of the material is composed of hand-made sherds with smoothed surfaces resembling Copper Age material. There are also a wheel-made jar rim (*fig. 22 n. 96*), a candlestick bowl (*fig. 22 n. 95*) and a painted sherd that indicate occupation of the site during the Iron I–II periods.

Only one lithic artefact was collected (*fig. 12*). According to its shape and to the marks of a handle that had been added to it (*fig. 13*), it is possible that it served as a mining hammer. The chronology of such a tool, considering that mining has been a continuous activity in the region, and according to the prehistoric pottery associated with it, can be related to both Copper Age and Iron Age periods.

Fig. 12. Hammer fragment from Mesa del Almendro (West Don Pedro).

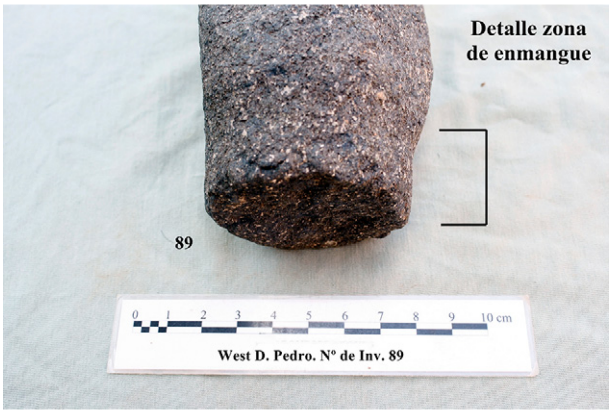


Fig. 13. Detail of the handle mark in the hammer from Mesa del Almendro (West Don Pedro).

Fig. 14. Lithic fragments from Setefilla burial mounds.

Mesa del Membrillo

(Central point: X: 281947 E; Y: 4178848 N): This site is situated 300m south of Mesa del Almendro, on a plateau-like hill shaped by the Guadalbácar River and a stream (without toponym) that discharges its waters into the river. The site was reported by Bonsor (1931) as well as Ponsich (1979) and Moreno Menayo (1986). The dispersion of surface material covers an area of 1ha; according to the reports, the site extends further south, with predominantly Roman material.

A total of nine partially eroded sherds were collected. Their matrixes and shapes resemble prehistoric material, but no chronological association was possible. The site makes up part of a complex known as 'Cortijo del Membrillo', which contains several structures belonging to the Roman period.

Setefilla burial mounds

(Central point: X: 281345 E; Y: 4178286 N): This site, 7km north of the town of Lora del Río, consists of several Final Bronze Age burial mounds. It is situated 900m south of Setefilla Castle, a site where material from the same period was reported (Aubet et al. 1983). The burial mound site was linked to the one found under the castle ruins, which had the same chronology and made part of the same settlement-cemetery complex in the hills of Setefilla, El Almendro and El Membrillo during prehistoric, protohistoric and Roman periods. The necropolis was identified by Bonsor and Thouvenot in 1928 (Bonsor/Thouvenot 1928), Aubet began a systematic study in 1975 (Aubet 1975; 1978; Aubet et al. 1983). The Mesa de Setefilla was declared a monument in 1985 and designated a protected archaeological area in 2002.

In the burial mounds, 31 pottery and six lithic fragments were collected, belonging to the same period already reported. Most of this material are hand-made pottery sherds; one belongs to a wheel-made piece (*fig. 22 n. 88*) with no possible chronological association. In addition, two rims (*fig. 22 n. 86–87*) and the six lithics (*fig. 14*) mentioned above were identified. One of the rims corresponds to a broad-rim ellipsoidal bowl from the Final Bronze Age.

The lithics consist of one nucleus, two chips and three debitage flakes from the occupation period of the site, possibly prehistoric.

La Ranilla

(Central point: X: 270053 E; Y: 4153698 N; not mapped): This site is located in the town of Carmona, 3.7km north of its urban area. It is a mound on the edge of the El Alcor formation. It has a flat area behind it, with surface material dispersed across an area of 1ha. The site was reported by Amores Carredano in 1982 and inventoried as an archaeological site in 1986 (Moreno Menayo 1986).

This site has a significative number of collected material, with 81 pottery and 20 lithic fragments (*fig. 15*). Among the pottery, several rims and sherds have been associated with two different periods; a hand-made set with a smoothed surface corresponds to recent prehistory and a set of wheel-made rims and sherds belongs to the Roman period.

Among the hand-made rims, there are several belonging to globular vessels (*fig. 20 n. 37*) and

Fig. 15. Lithic fragments from La Ranilla.

Fig. 16. Lithic fragments from Pozo de la Anea.

to hemispheric bowls with edged rims (*fig. 20 n. 38–39, 41*). According to the matrixes and the textures, the material was associated with the Chalcolithic period. More recent material was also identified. For example, Roman pots, bowls and plates (*fig. 20 n. 34–36*) as well as a handle (*fig. 20 n. 40*) from the 1st–2nd cent. AD. The rest of the material, composed of sherds, belongs to these two identified periods.

Compared to the rest of the sites surveyed, a significant amount of lithic material was collected in La Ranilla. Amongst these are 20 pieces (*fig. 15*), all of them with chopping marks, that are quartzite flakes. Their chronological association links them to the oldest pottery found in the site and thus places them in recent prehistory.

Pozo de la Anea

(Central point: X: 287288 E; Y: 4161495 N; not mapped): This site is in the town of La Campana, 1.3km east from its urban area. It is a small Bronze Age burial mound located in an agricultural field next to the road between La Campana and La Palma del Río. The site was reported by Ponsich in 1979 and inventoried by Moreno Menayo in 1986.

A total of 32 pottery fragments, twelve lithic fragments (*fig. 16*) and two metal slags (*fig. 17*) were collected. The pottery consisted of shapes such as plates (*fig. 21 n. 72–73*), pots (*fig. 21 n. 71* and *77*) and bowls (*fig. 21 n. 76*) with matrixes and clay treatments that date the site to the 4th–1st cent. BC and 1st cent. AD.

Fig. 17. Slag fragments from Pozo de la Anea.

Among the sherds, there are fragments with a fabric and surface texture that, despite being eroded, allowed to date them into recent prehistory. Fragments of small to medium size storage vessels with rounded-everted rims (*fig. 19 n. 18–20*) as well as several sherds of the same manufacture are related to the Bronze Age. Lithic nuclei and flakes (*fig. 16*) are also associated with this period.

The Middle Guadalquivir is one of the least studied zones in the history of Bronze Age archaeological research in southern Iberia (see chapter 2). One of the goals of this phase of project A 02 was to identify Bronze Age sites in the survey area. The lower elevations of the Sierra Morena and Los Alcores were selected based on the pattern observed for most of the Bronze Age sites in the High Guadalquivir. This pattern consists of settlements on hilltops next to water sources and with sizes no bigger than 1ha, as is seen in the Mesa de Setefilla site.

The settling of this area started at least 6000 years ago during the Copper Age. Sites such as Fuente del Águila, Sierra León, Mayoraja and Cuevas de Don Pedro suggest that floodplains and riverbanks between the Sierra and the Guadalquivir Rivers could have been the most suitable places for agriculture and farming activities. The proximity to the Sierra provided the settlements with access to mining resources in prehistoric mining areas identified in Villanueva del Río y Minas or Lora del Río (Pérez Macías 2013). This settlement pattern continues along the whole valley, as evident from the location of sites such as Loma del Real Tesoro, Valencina de la Concepción and the Chalcolithic sites in Doñana.

The amount of Chalcolithic surface pottery mixed with Roman and Medieval material in sites such as Fuente del Águila, Sierra León, Mayoraja and Mesa del Almendro is also remarkable. These multiphase occupation findings provide evidence for good soil quality during these periods, while the sites' locations next to the water indicate their suitability for growing cereals and farming livestock. It is not surprising that such a mix of material was present, considering the continuous occupation of this region for over 6000 years.

What about the Bronze Age sites then? If the focus was only on the survey information obtained, this would suggest a reduction of both sites' and populations' sizes during the transition between the Copper and Bronze Age; a hypothesis that has been considered by several researchers along the Middle Guadalquivir (Caro Bellido 1989; Martín de la Cruz 1989; 1991; Martín de la Cruz/Garrido Anguita 2015; Escacena Carrasco/García Rivero 2018).

The presence in the surveying area of sites such as Setefilla as well as the multiple finds related to the Bronze Age in Los Alcores (Pozo de la Anea, La Ranilla, Plaza de Santiago or Calle Torre del Oro; Belén et al. 2000; Román Rodríguez 2004) are evidence that the zone was also populated during the Bronze Age. There seems to be a change in the settlement pattern that requires a deeper examination. A first hypothesis, based on the sites identified, would be the movement of people from the floodplains and riverbanks to the lower elevations of the Sierra. The hilltops, where Bronze Age settlements were established, were not so distant from each other (such as the distance observed between Setefilla and Mirasivienes) and provided more visibility of the valley and the neighbouring settlements.

Considering the condition of the Bronze Age material identified in multiphasic sites such as Setefilla, or its location below several historical layers in the town of Carmona, the lack of Bronze Age surface material in the survey area could be explained by the continuous use of the same place for establishing settlements during the Iron age as well as the Roman and Medieval periods.

A way of exploring such a possibility was to find a multiphasic site that would allow to excavate and identify the Bronze Age in the study area, similar to what has been done for other multiphasic sites such as Monturque, Cerro San Juan, Setefilla or Carmona.

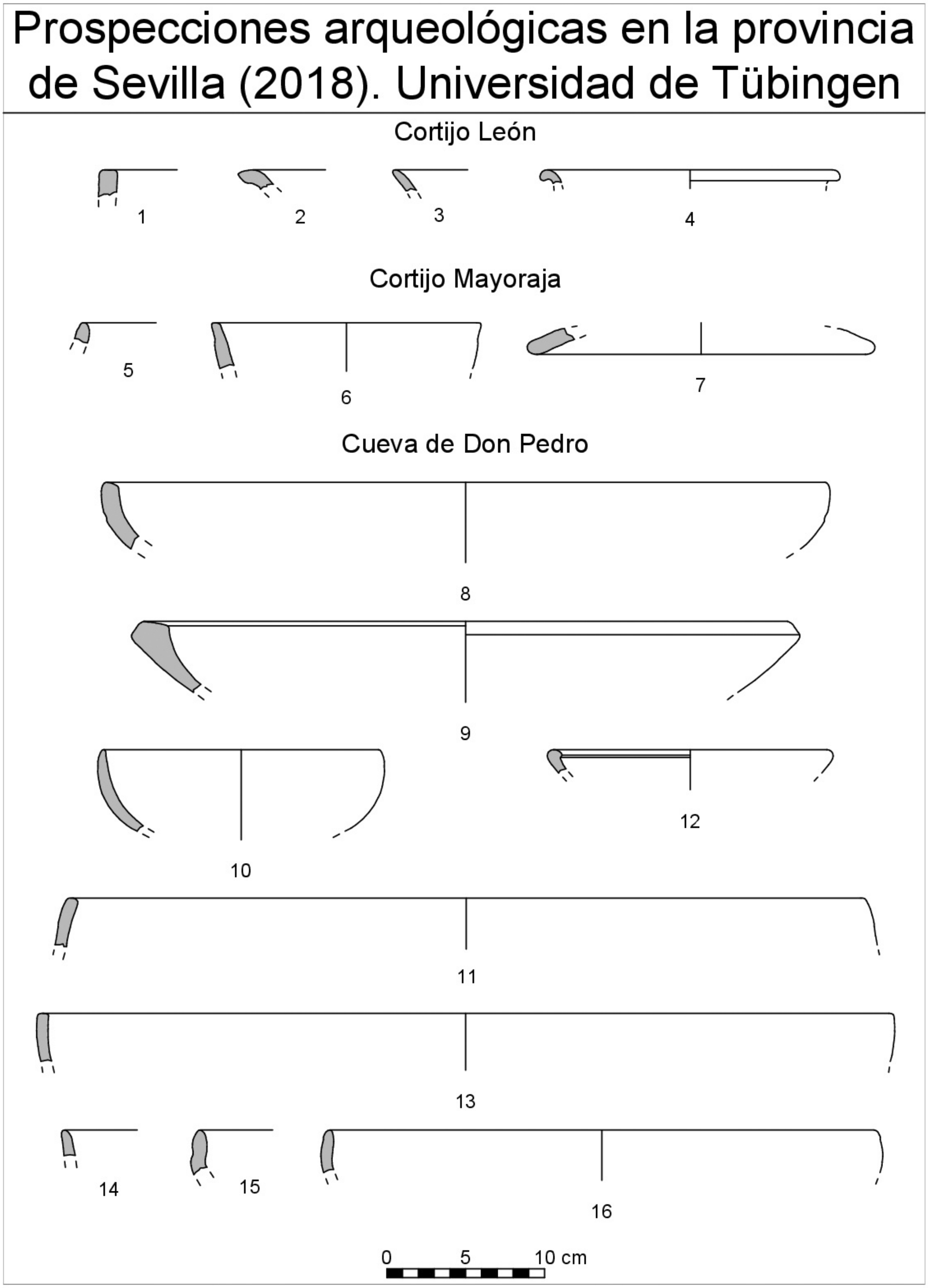


Fig. 18. Diagnostic pottery identified in Sierra León (Cortijo León), Mayoraja and Cuevas de Don Pedro sites (drawings elaborated for this project by Jacobo Vásquez Paz).

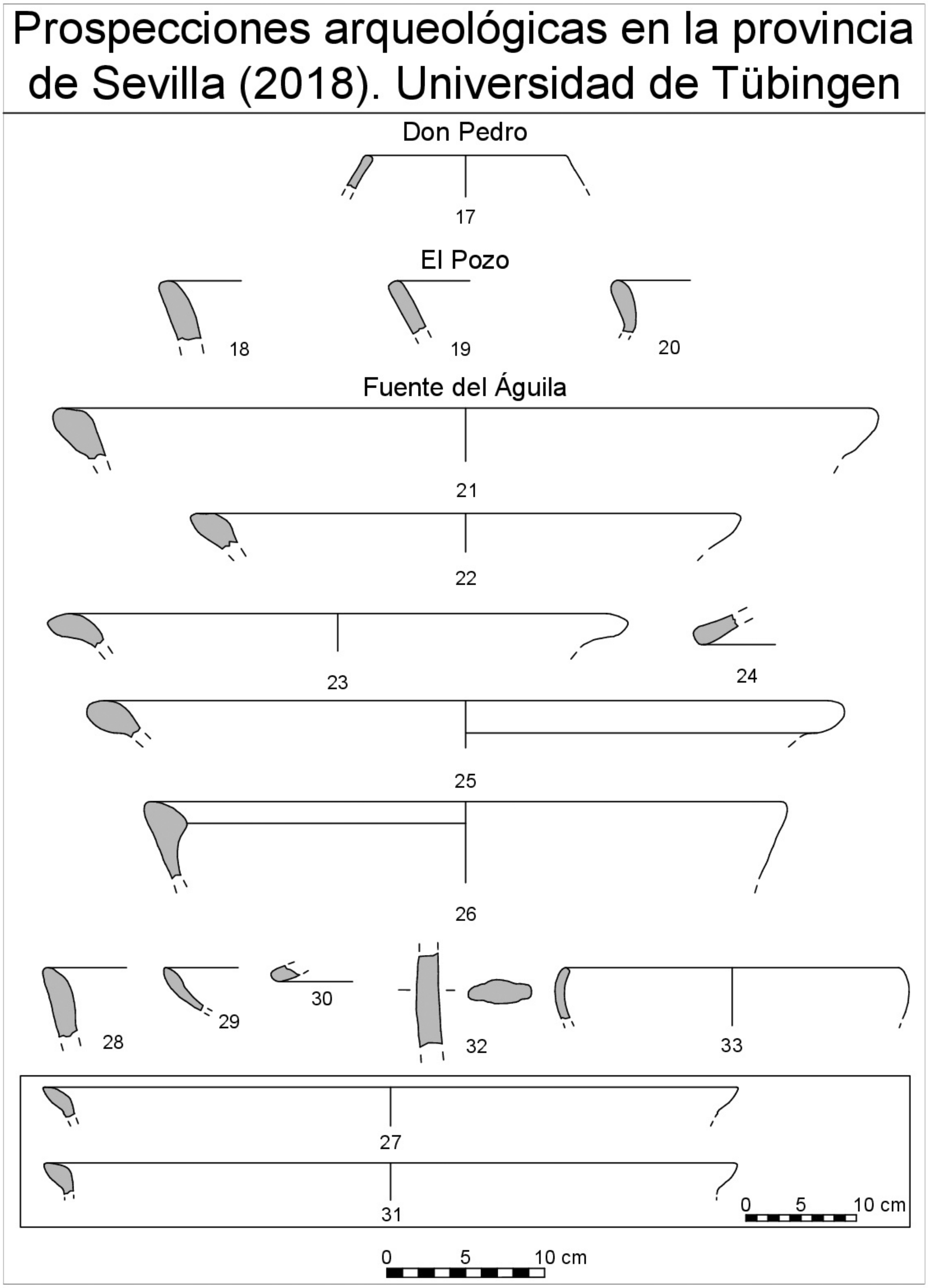


Fig. 19. Diagnostic pottery identified in Don Pedro, Pozo de la Anea (El Pozo) and Fuente del Águila sites (drawings elaborated for this project by Jacobo Vásquez Paz).

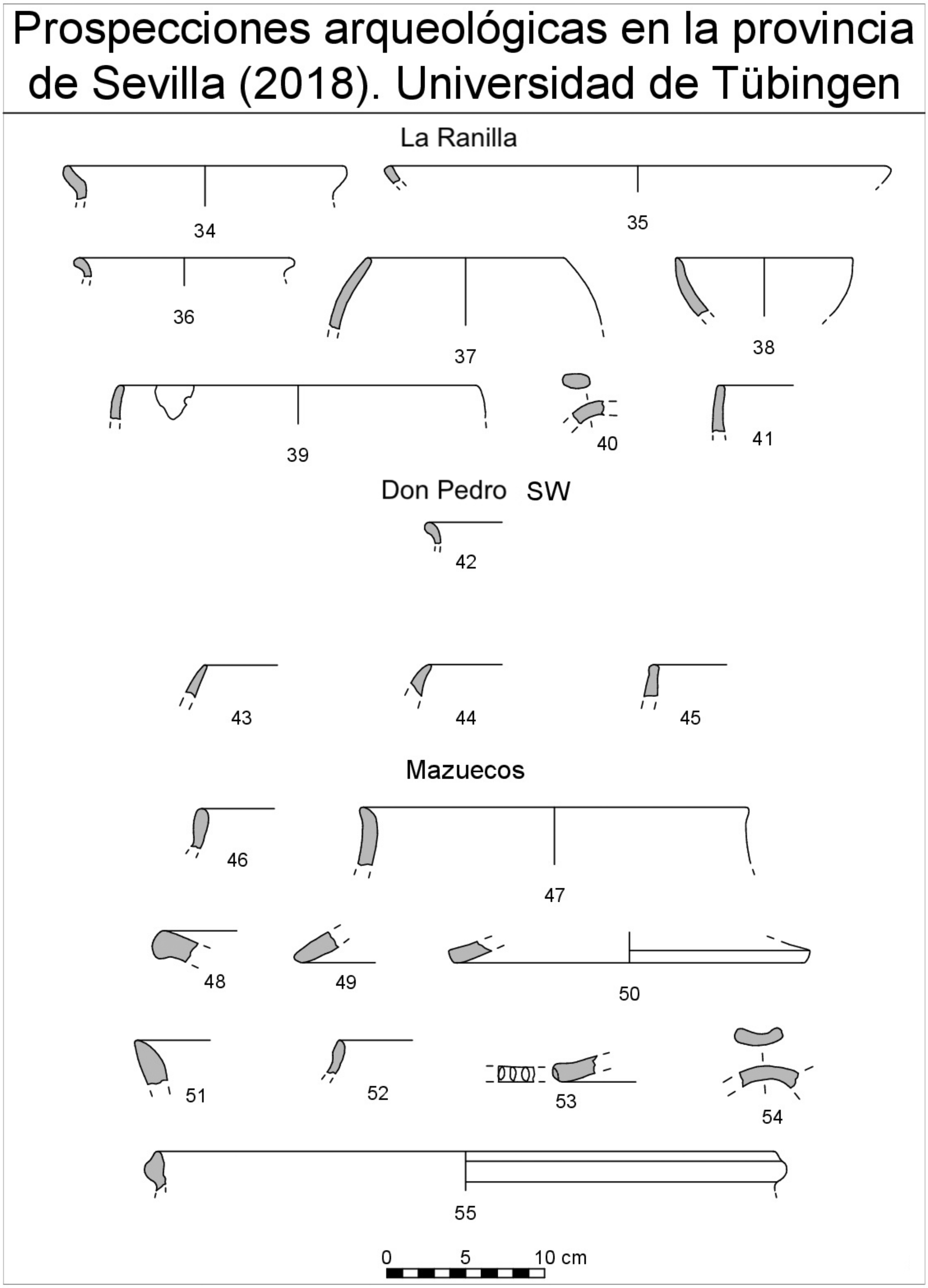


Fig. 20. Diagnostic pottery identified in La Ranilla, Don Pedro and Mazuecos sites (drawings elaborated for this project by Jacobo Vásquez Paz).

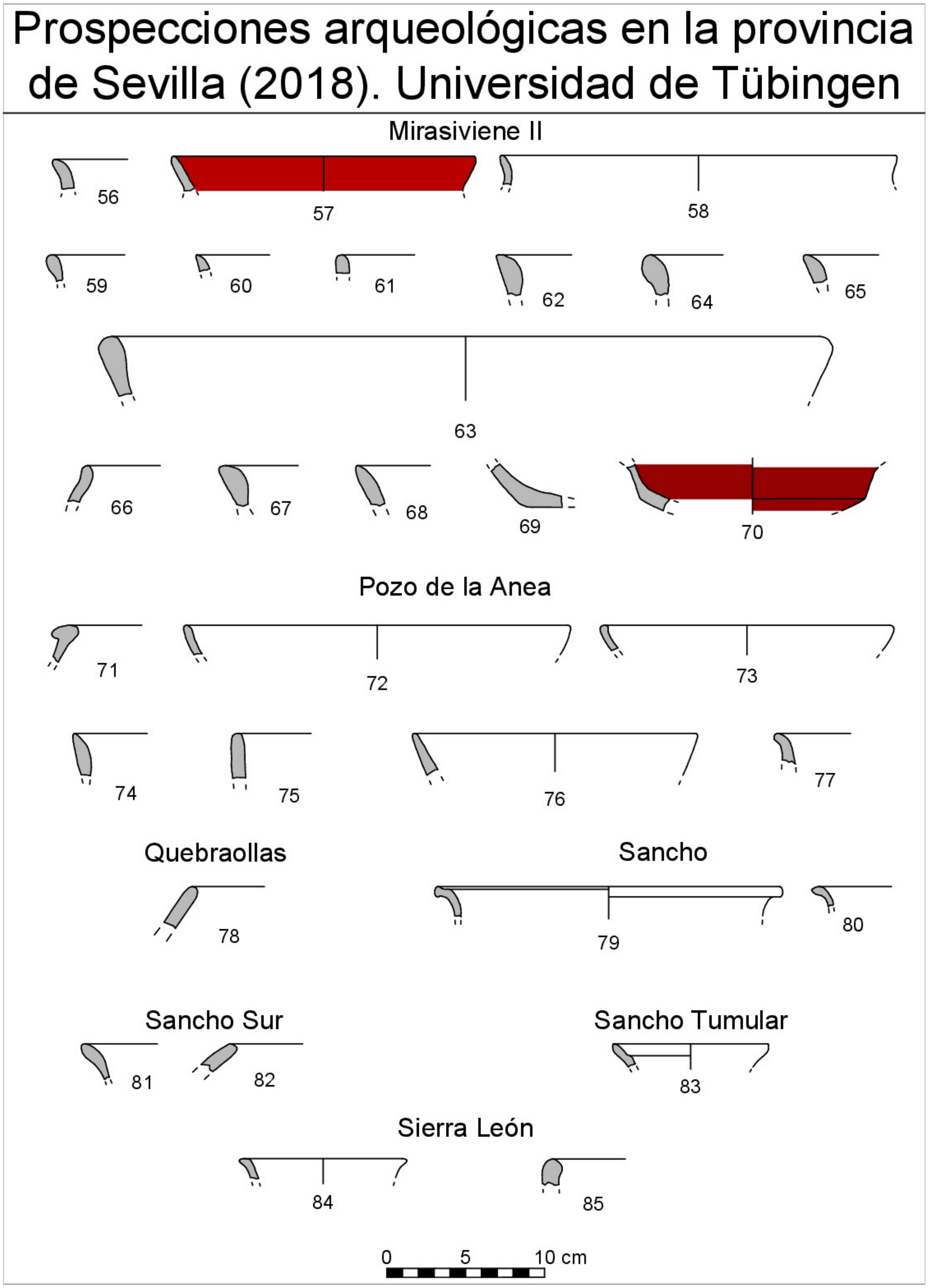


Fig. 21. Diagnostic pottery found in Mirasiviene II, Pozo de la Anea, Quebraollas (Fuente del Águila), Sancho (Cuevas de Don Pedro) and Sierra León (drawings elaborated for this project by Jacobo Vásquez Paz).

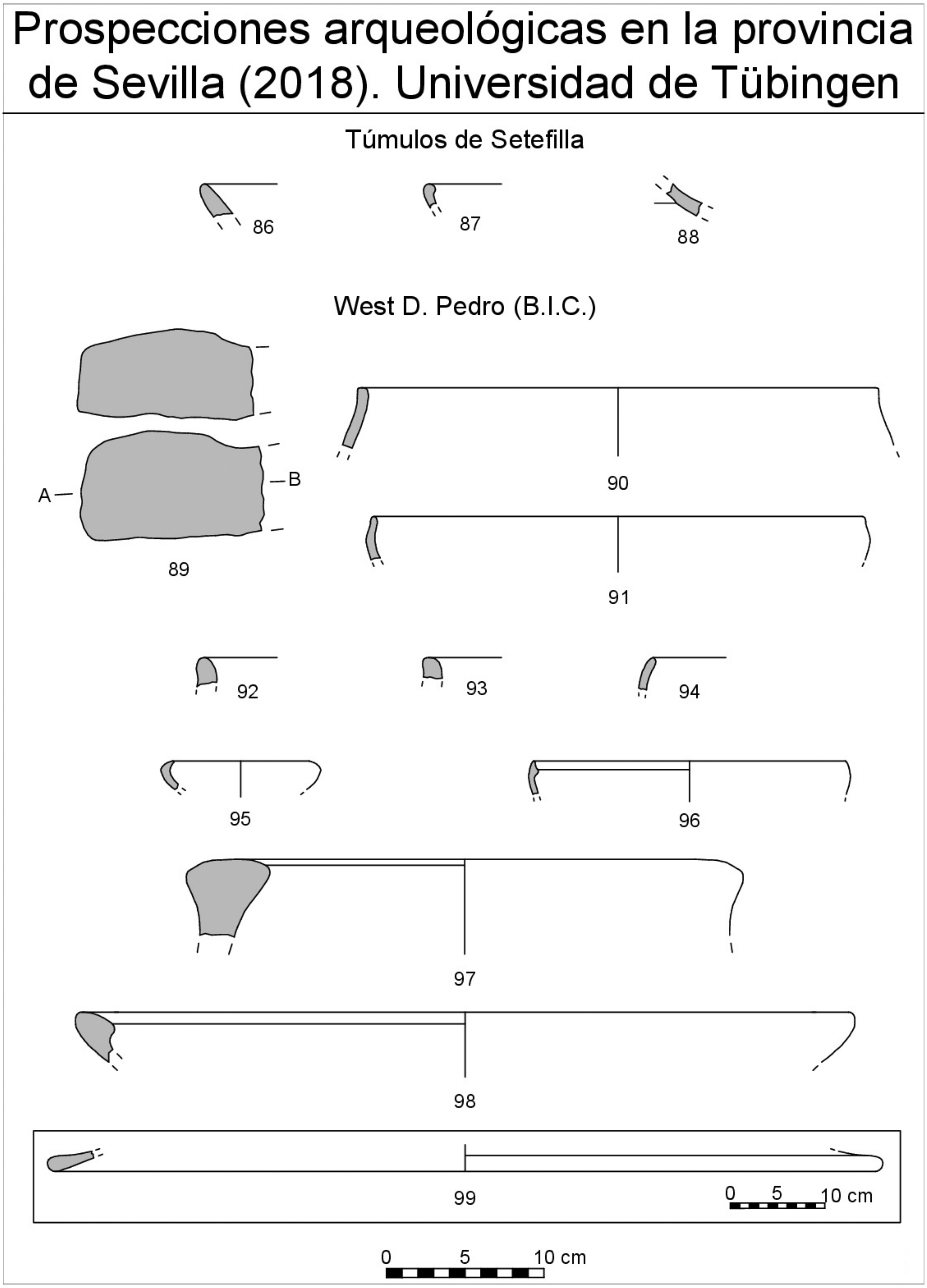


Fig. 22. Diagnostic pottery identified in Setefilla burial mounds and Mesa del Almendro (West Don Pedro) (drawings elaborated for this project by Jacobo Vásquez Paz).

4.2 Exploration of the Mesa Redonda Site (Second Field Campaign, March–April 2019)

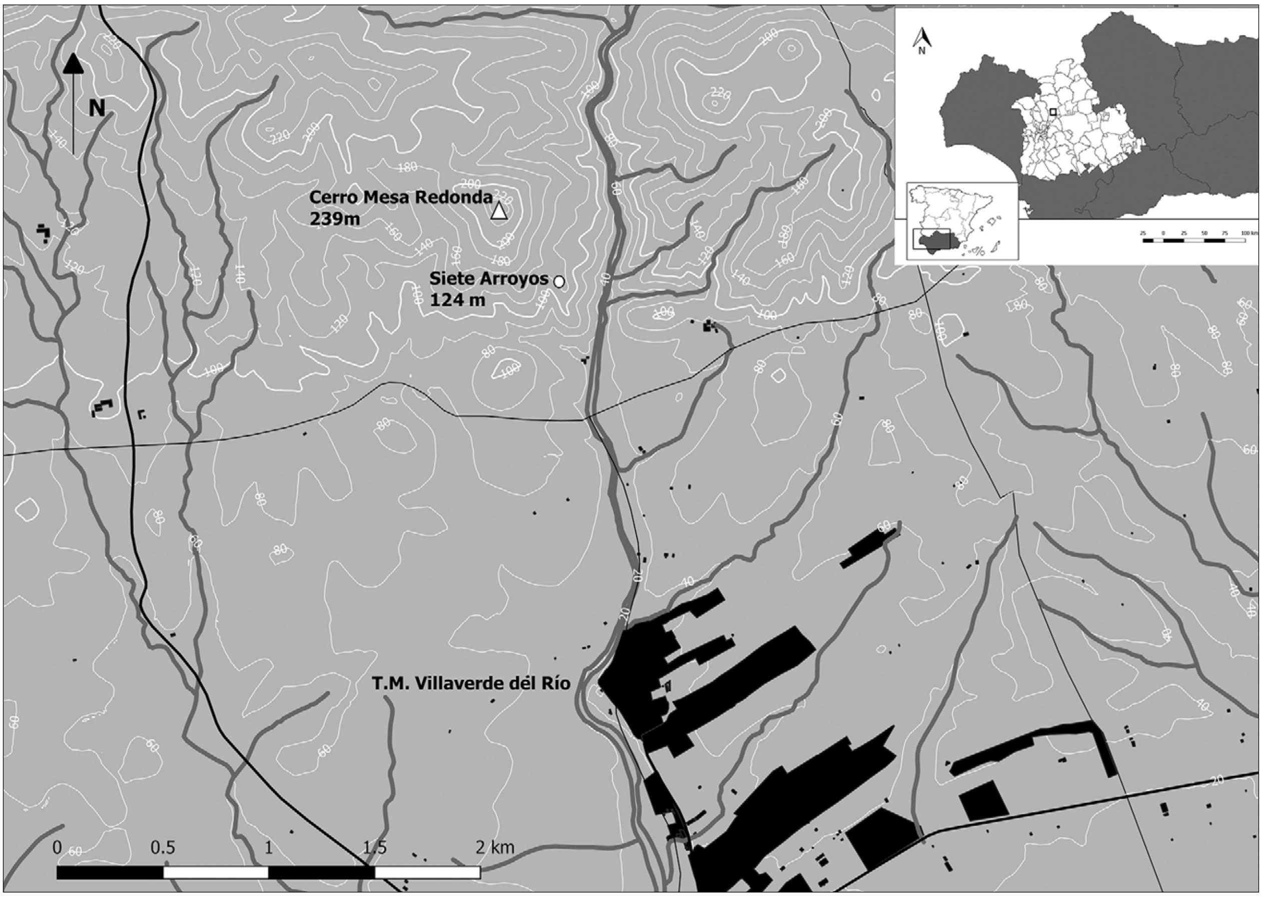
Months after the first field campaign, Dr. Aurelio Perez Macías informed the research team about Bronze Age material he had identified during the archaeological survey of prehistoric mining sites in the Sierra Morena (Perez Macías 2018, personal communication). One of the sites mentioned was Mesa Redonda, which, after our first visit, was considered suitable for the research goals.

The site of Mesa Redonda is located in the area belonging to the town of Villaverde del Río, 2km north of its urban area. It is situated in the lower elevations of the Sierra, on the right riverbank of the 'Siete Arroyos' stream and the left bank of the 'Arroyo Oromana' (*map 4*). The cut made by the stream shows the complex geology of the hill. Under the hill itself, there is a limit between two zones. The first, observed along the southern face of the hill, is composed of slate outcrops that emerge from the tertiary and quaternary sedimentary material of the Guadalquivir Valley. The second, along the northern face, presents outcrops of granitic rocks with plutonic origin (Instituto Geológico y Minero de España 1976).

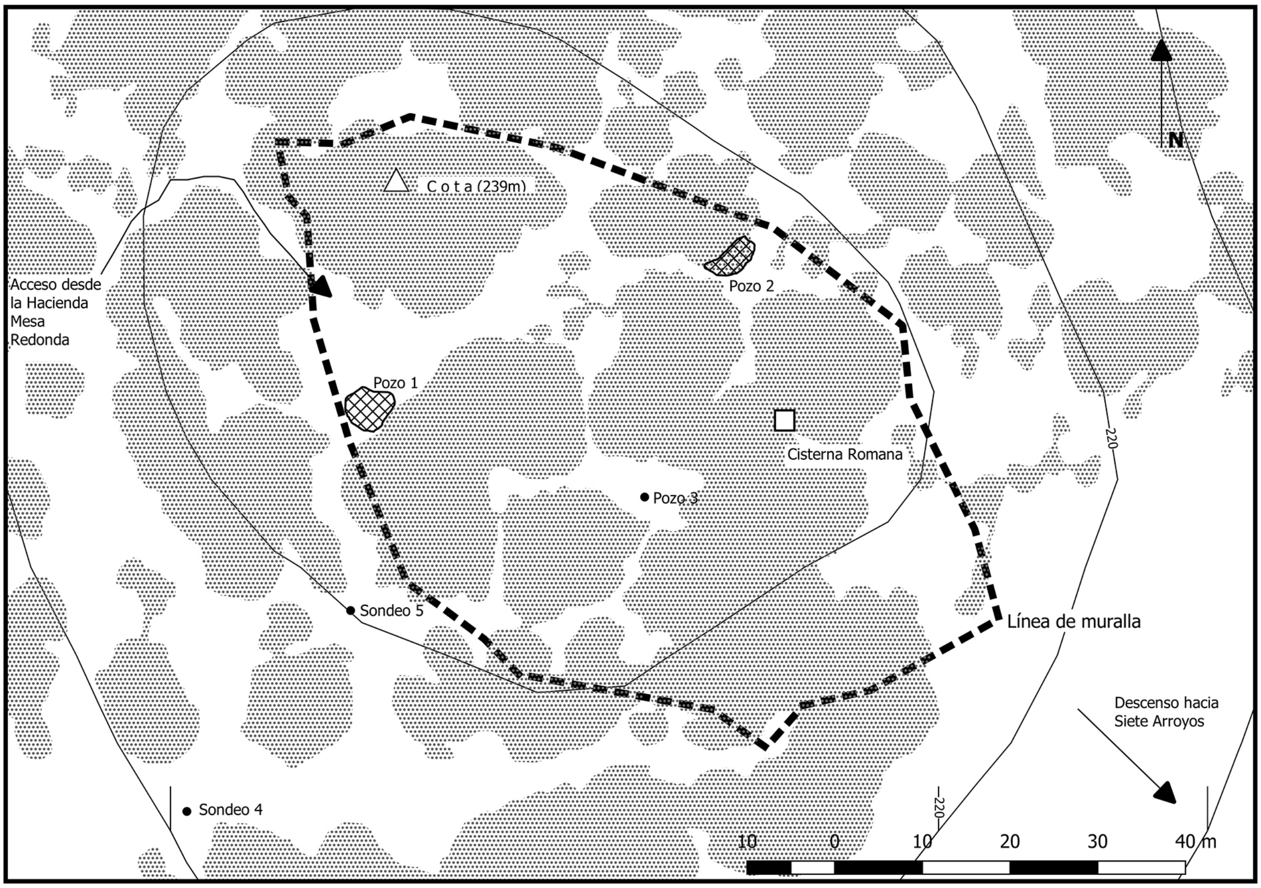
Today, Mesa Redonda belongs to a farmstead with lands that have been mainly dedicated to open-air livestock farming. This implies that soils have not been removed or shovelled and that the material record from ancient periods, if present, should not have been damaged.

Mesa Redonda is the closest hill next to the urban area of Villaverde. Its geomorphology is different from the one of the surrounding elevations. It has very steep slopes, reaching almost 40% on both its southern side and its western side, just below the summit. It has a conic morphology at the top, especially in the uppermost 10m. It has an elevation of 239m.a.s.l. and the summit is flattened and has evidence of stone structures (as walls) surrounding it. A Roman cistern inside the flat area was also identified (*map 5*).

The first systematic research of the site was conducted by Elisabeth Huntingford at the end of the 1970s (Huntingford 1983); but some years



Map 4. Location of Mesa Redonda and Siete Arroyos sites (map by author).



Map 5. Mesa Redonda summit. Shadowed areas correspond to dense vegetation (map by author).

earlier, the site had been looted and much of the material collected ended up in a private collection (Colección MARSAL). Decades later, this collection was returned to the Heritage Institute of Andalusia. Among the material returned to the authorities, several prehistoric and Roman metal objects were identified (Huntingford 2019, personal communication). Huntingford's main interest was to characterise the Attic material present in one of the four test pit layers she had excavated; but several Bronze Age structures and materials were also reported. Huntingford documented an ancient wall in Stratum III of cut n. 2, which relates to the Full Bronze Age, similar to the context reported by Aubet in Setefilla (Huntingford 1983; Aubet et al. 1983).

The main goal of the second field campaign was to identify Bronze Age material and structures west of the survey area covered during the first field campaign. This approach followed the hypothesis of the existence of more multiphasic sites placed in the first Sierra hilltops, assuming that the sites shared the same conditions as the ones already observed for Setefilla or Monturque. The first step was to perform an intensive and systematic survey[13] (Cerrato Casado 2011) at the summit and the terraces surrounding it, which allowed to identify surface material from different periods, mainly Medieval and Roman. Some sectors of the hill, with high concentrations of prehistoric surface material, were then selected for opening test trenches. The purpose of these test trenches was to identify, apart from the surface material, possible structures associated with the prehistoric wall.

In the terraces surrounding the hilltop, two test trenches were opened. The first was 2m x 5m and was located on the SW terrace, 20m from the summit. The second was 2m x 7m and situated against the western hill slope. The second was opened to expose the surrounding wall and to identify the

13 Distance between people was 5m in a grid that systematically covered the hilltop and the surrounding slopes.

Fig. 23. Sight from Mesa Redonda with the Guadalquivir Valley behind.

material associated with it (*fig. 27, 28*). Two (intramural) test trenches, which were excavated in 1978 by Huntingford, were also cleaned in order to inspect their condition and to try to reach their deepest layers, as these had never been reached (Huntingford 1983).

These are the UTM coordinates of the test trenches that were opened (*map 5*):
Test trench no. 1: X: 244701 E, Y: 4168417 N (Huntingford in 1978)
Test trench no. 2: X: 244742 E, Y: 4168434 N (Huntingford in 1978)
Test trench no. 3: X: 244680 E, Y: 4168372 N (new)
Test trench no. 4: X: 244698 E, Y: 4168395 N (new)

Mesa Redonda was selected because of its location on a hill isolated from other elevations. Such a condition provided good visibility of the site from both the valley below and from the summit itself. The view from the top covers the whole Guadalquivir Valley and reaches the Subbetic system, which is more than 100km further south. Likewise, the hill seems to be an optimal defensive place from all the flanks: it is difficult to access through the slopes and it is separated from other elevations by two streams, which makes it a suitable place for settling (*fig. 23*). Local materials, such as the granitic rock, were optimal for constructing the walls surrounding the summit.

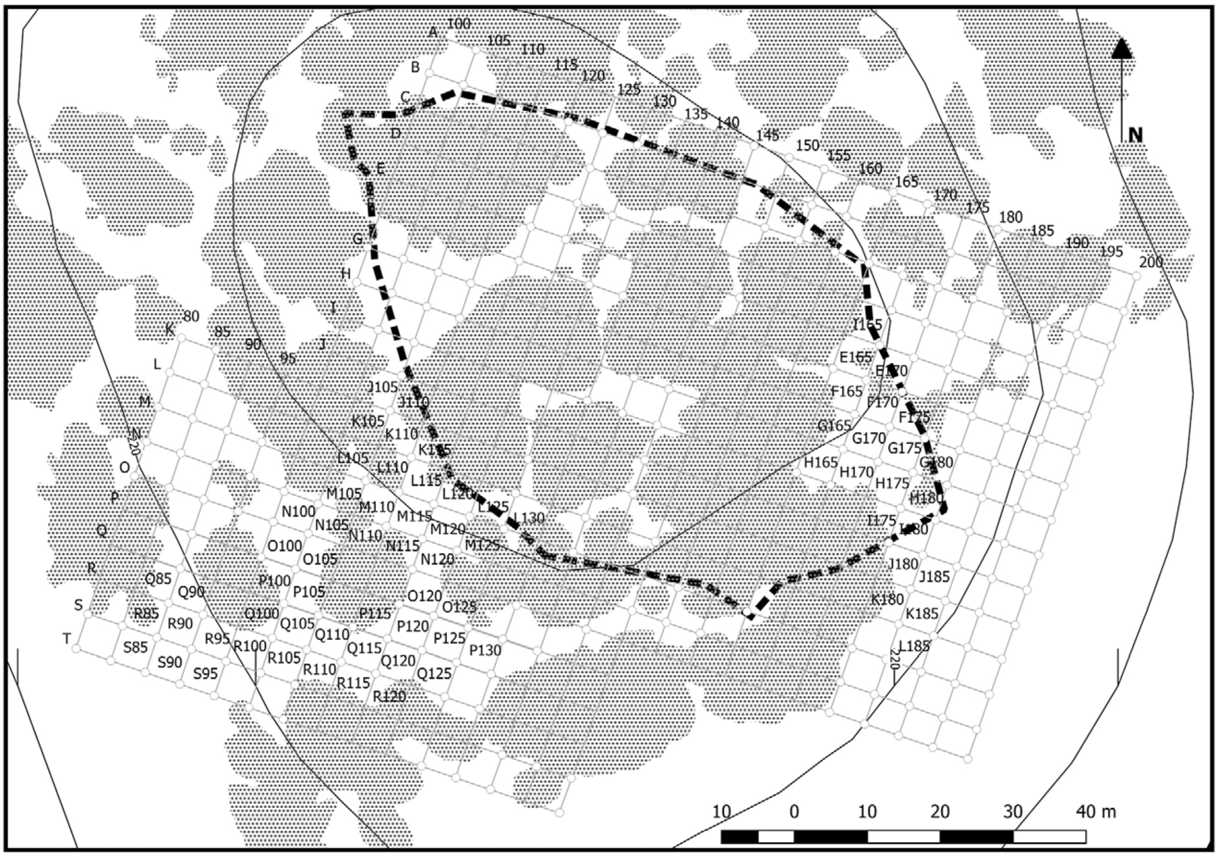
4.2.1 Intensive Surveying of the Terraces Surrounding the Summit of Mesa Redonda (March/April 2019–September 2019)

During the spring campaign, a 5m x 5m grid oriented towards NE-SE (following the orientation of the exposed wall) was defined. A letter and a number were assigned to each grid, so that each grid had its corresponding nomenclature in a stake placed in the upper-left corner (*map 6*). A total of 76 grids were suitable for survey; the rest were not surveyed because of the dense vegetation.

A few prehistoric pottery was collected, all of them mixed with Roman, protohistoric and Medieval material. Most of this pottery was very eroded as they were all surface material. The most relevant were:

- A *Mamelón* piece (a protruding piece of clay added to the body and used as a handle) in grid S-85. This shape is typical of the Full Bronze Age (*fig. 24*).
- Several rims from hand-made hemispheric bowls, with medium grain size matrixes, in grids N-110, N-115, N-120 (*fig. 24*).

Parallel to the collection of surface material, the wall surrounding the summit was mapped (*map 6*). Most of the stone structures exposed on the surface were covered with small grasses and shrubs.



Map 6. Intensive survey grid for Mesa Redonda summit. Dashed line is the line formed by the stone wall.

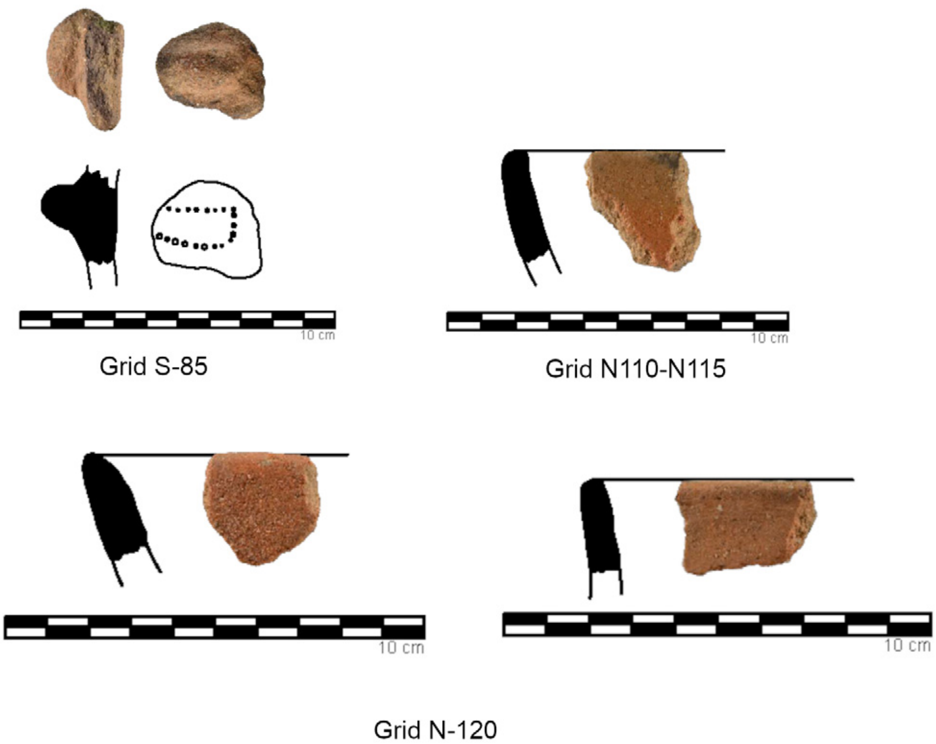


Fig. 24. Surface prehistoric ceramic fragments collected in the west slope of Mesa Redonda.

They formed elongated structures surrounding not only the summit but also several terraces below it. Despite part of the wall-line being below the soil, the final polygon was obtained by joining all the transects mapped with the GPS.

In September 2019, some terraces beyond the grid were also surveyed. The first recognition of the site (during spring) allowed to observe that Mesa Redonda was composed not only of the walls and material surrounding the summit. Several terraces halfway between the valley and the summit also had accumulations of material, indicating that this site was probably much more complex.

A group of terraces facing southeast, 530m from the summit and closer to the 'Siete Arroyos' stream, were identified. The terraces had an average elevation of 124m.a.s.l. (*map 4*). They had an enormous concentration of prehistoric material (mainly hand-made burnished and smoothed pottery) with a dispersion of 0.27ha all over the terrace.

Considering such concentrations of material, and the fact that they were not that mixed with pottery from other periods, the team decided to distinguish the site from the Mesa Redonda complex and give it a new name: 'Siete Arroyos', given its close proximity to the neighbouring stream. This is a terrace with better access from the valley than the Mesa Redonda summit; likewise, this site is closer to the water source at the stream, drawing attention to the need to develop further research.

4.2.2 Cleaning of the 1978 Test Trenches (March–April 2019)

The main goal of the cleaning was to observe the profiles reported by Huntingford (1983) and to detail the chronostratigraphic elements that could be useful for associating the material found both in the surface survey and in the newly opened test trenches.

One of the first challenges was the excavation of the filling layer. The volume of fill removed to expose the ancient profiles was very large, and during excavation, the team had to be careful of the possible collapse of the profiles, given the depths reached by Huntingford for each test trench (4.98m in the first and 5.57m in the second; Huntingford 1983) and the lack of conservation measures after the 1970s excavation. Parts of the profiles were exposed for almost 40 years and the soil surrounding the walls was very loose. A second challenge was the mix of materials from different periods inside the fill. This impeded an efficient chronological association of the strata and the structures exposed.

The following are some of the details of the test trench interventions.

Test trench 1
Perimeter: 20.8m
Area: 30.7m^2
Length N-S axis: 6.4m
Length E-W axis: 5.8m
As a result of the many years that had elapsed since excavation, the shape of the test trench had become irregular. Despite of this, it was possible to expose part of the profiles, which were partially tilted, giving the test trench a 'V-shape'. Vegetation completely covered the surface and only the southern profile was exposed (*fig. 26*). The rest of the test trench was partially filled and, years later, part of the fill was removed and spread across the NW corner of the summit.

The characteristics of the fill were those of a place without intervention in the last 40 years. The surface layer and the first metre of fill were composed of organic soil, produced by the weed growth, mixed with sand-silty soils belonging to the geologic-pedologic context of the site. The fill was also composed of several plutonic rocks disposed in an irregular way, some of them with volumes greater than 50cm^3 and weights up to 100kg. Likely, these rocks were once part of the wall that

Fig. 25. Diagnostic prehistoric ceramic fragment collected from test pit 1.

Fig. 26. Detail of test pit 1 after removing the vegetation and cleaning the fill.

is still covered and is situated just 3m west of one of the borders of the test trench.

There was a large quantity of pottery from different periods (Bronze, Iron, Roman, Medieval) in the fill which was mixed with garbage from the year 2001. It is very likely that looters have intervened in this test trench and are responsible for its current condition.

Only one diagnostic prehistoric find was identified from the fill, a burnished V-shape bowl rim (*fig. 25*).

Test trench 2
Perimeter: 16.8m
Area: 19.8 m^2
Length N-S axis: 4.5m
Length E-W axis: 5.1m
After decades, this trench also developed an irregular shape, especially in the NW corner, which became rounded. The N profile was completely exposed while the other three were coated by vegetation and not completely covered by the fill. It was possible to observe part of a 1m wide stone wall (*fig. 27–28*).

Again, the characteristics of the fill correspond to a mix of materials from different periods (Bronze, Iron, Roman and Medieval). It was also composed of several rocks which have fallen from the walls identified in the E and S profiles. Such rocks had lower volumes and weights than the ones found in test trench 1 (10–20cm^3). Coincidentally, there was also garbage from 2001, indicating the presence of looters in this place.

After removing the fill, it was possible to identify three strata in the eastern profile:

– I: A wall made of seven lines of medium size/volume rocks (10–20cm^3). The width of the wall was around 80cm and it had a depth of approximately 1m.
– II: Below this wall, following the profile, there was a layer of sandy soil, approximately 80cm long.
– III: A new wall, 1m long and slightly tilted towards the south (*fig. 28*).

Fig. 27. Detail of test pit 2 after removing the vegetation and cleaning the fill. Part of the east wall is visible.

Fig. 28. Detail of the east wall. The south wall is perpendicular, and part of the stones were already into the fill.

Strata identified in the southern profile:

- I: A 1m long fill layer composed of sand-clayish soil, mixed with ceramic material from different periods (mainly Medieval and Roman).
- II: Below the fill, there was a wall made of five lines of rocks, with volumes between 10 and $20cm^3$. This wall was approximately 80cm (vertical length) and 80cm (width). It was situated perpendicular to the sandy layer of Stratum II in the N profile. The wall was interrupted at a depth of 1.50m. It is possible that the rest of the structure collapsed, explaining the presence of the rocks in the fill extracted between the E and S profiles.

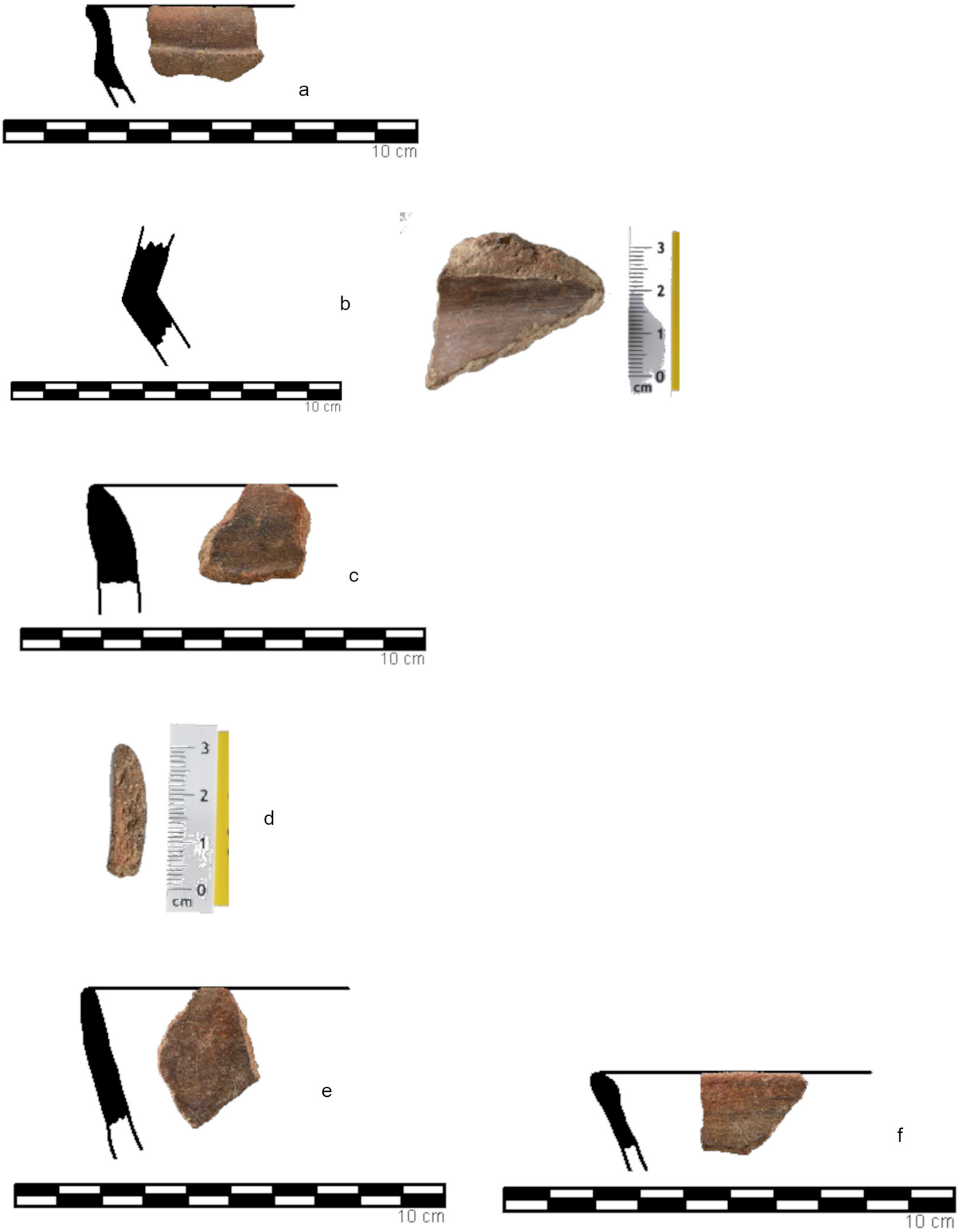


Fig. 29. Diagnostic prehistoric ceramic fragment collected from test pit 2.

The following diagnostic prehistoric materials were collected from the fill:
- Two mid-carinated bowl sherds with smoothed surfaces and medium grain size matrixes (*fig. 29a–b*).
- One hemispheric, sharpened-rim bowl with a smoothed surface and a medium grain size matrix (*fig. 29c*).
- One hemispheric rounded-rim bowl with a smoothed surface and a medium grain size matrix (*fig. 29d*).
- One U-shaped bowl rim with a smoothed surface and a medium grain size matrix (*fig. 29e*).
- One V-shaped bowl rim with a smoothed surface and a medium grain size matrix (*fig. 29f*).

4.2.3 New Test Trenches Opened (March–April 2019)

Test trench 3

Dimensions: 2m x 5m

The place selected for opening this trench was a terrace that surrounded the summit (at 200m.a.s.l.). It was opened at the terrace border, keeping half of the rectangle on the flat area and the rest on the slope. From the first 10cm, diverse prehistoric, Roman and Medieval surface material was collected, as well as charcoal pieces, which were likely the product of fires in the forest during previous decades.

The team was able to differentiate some levels; but after reaching a depth of 170cm, the test trench was closed. The trench was opened in a place with a huge concentration of rocks, with volumes of almost 50cm^3. These were probably part of the collapsed wall surrounding the summit (*fig. 30*), as it was possible to identify different collapse episodes covering Medieval, Roman and Bronze Age occupations of this terrace. No intact stratigraphy or structure could be identified due to the mix of rocks and archaeological material. It is possible that most of the surrounding terraces just below the summit (similar to this one) are covered by rocks coming from the collapsed wall. Despite the condition of the terraces, some prehistoric material could be identified:
- One ellipsoidal rounded-rim bowl with a smoothed surface and a medium grain size matrix (*fig. 31a*).
- One hemispheric rounded-rim bowl with a smoothed surface and a medium grain size matrix (*fig. 31b–c*).

Test trench 4

Dimension: 2m x 7m

This test trench exposed the outer side of the western wall. The goal was to comprehend the stratigraphy of the wall surrounding the summit, while avoiding the limitations imposed by the fill covering the 1978 test trenches.

The first levels were composed of mixed materials from all the periods identified in Mesa Redonda (prehistoric, protohistoric, Roman and Medieval). Three different walls (*fig. 32–33*) and a possible fourth collapsed wall (*fig. 32–33*) were documented. Medieval material was associated with the two upper walls, whereas the third was surrounded by protohistoric material.

According to Huntingford, the lowest wall was built during at the very beginning of the Final Bronze Age, followed by a remodelling of the construction during the 5th and 4th cent. BC, which added two successive walls with different directions. Huntingford does not identify any other construction above the upper wall, dismissing any Roman occupation on this side of Mesa Redonda. This is in contrast to the eastern side of the site, which presents several Roman and Medieval modifications to the structures (Huntingford 1983).

Looting seems to have been the main reason for such a mix of materials on the summit. Despite not reaching the bottom of the 1978 test trenches, our investigations allowed us to identify the existence of prehistoric material coming from the bottom. As Huntingford supposed the existence of layers older than the lowest wall (dated by its material to the Final Bronze Age), the research team considered an alternative approach to explore the depth of this site.

Without properly identifying the chronology of the structures and excavating a sector that has not been altered by looters, collapse of walls or by former excavations, it is not possible to show

Fig. 30. Detail of the east (background) and south profiles of test pit 4. Most of the fill was composed of stones fallen from the summit to the terrace.

Fig. 31. Diagnostic prehistoric ceramic fragment collected from test pit 3.

Fig. 32. Detail of the cleaning of the west slope just below the Mesa Redonda summit. Several stones that made part of a wall are spread across it.

Fig. 33. Detail of the cleaning of the west slope just below the Mesa Redonda summit. Several stones that made part of a wall are spread across it.

a proper stratigraphy of the test trenches and the whole site. The main aim for the upcoming campaigns will be to define such stratigraphy.

4.3 Geomagnetic and Geoelectric Survey of the Mesa Redonda Summit and the Siete Arroyos Terrace (Third Field Campaign, September 2019)

During the second field campaign (March–April 2019), a geo-radar analysis was performed along the Mesa Redonda summit as well . The main goal was to obtain images of the structures lying between 0 and 2m deep, with the use of a geomagnetic radar.

Geomagnetic radar is a useful approach for identifying structures in terrains with low quantities of gravels or with soils carrying material that has electric properties different from their surrounding sediments. Given the large amount of rock dispersed across the summit and the collapsed rock along the slope, this technique did not provide positive results regarding the identification and characterisation of the structures.

A complementary technique implemented was the geoelectric radar. During the third field campaign, in September 2019, both the summit of Mesa Redonda and the terrace of Siete Arroyos were surveyed using this technique. This was useful not for the identification of structures, but to define the depth of the cultural layers at the top of the summit. For Mesa Redonda, the diagrams obtained from the radar show a depth of almost 10m at the western side of the summit and a depth of 6m at the eastern side. Below these depths lies a bedrock (*fig. 34–35*). For the site of Siete Arroyos, the bedrock lies just 2m below the surface.

Considering the depths of sites such as Cerro San Juan, Setefilla or Monturque (all of them with

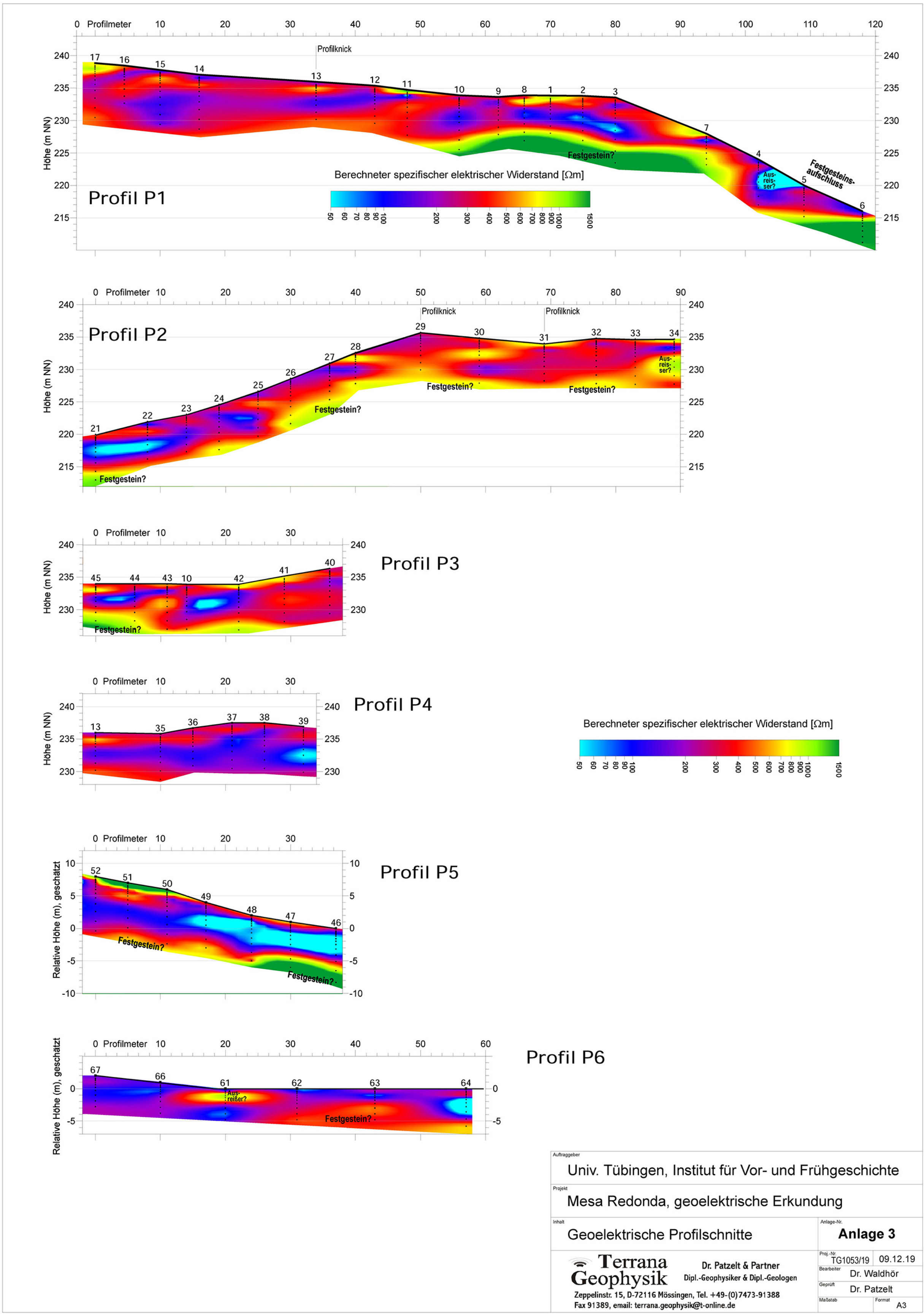


Fig. 34. Results of the geoelectric radar and depths identified. In P1 the bedrock (in green) is 6m deep. Depth of the cultural layer increases direction west (diagrams elaborated for this research by Terrana Geophysik).

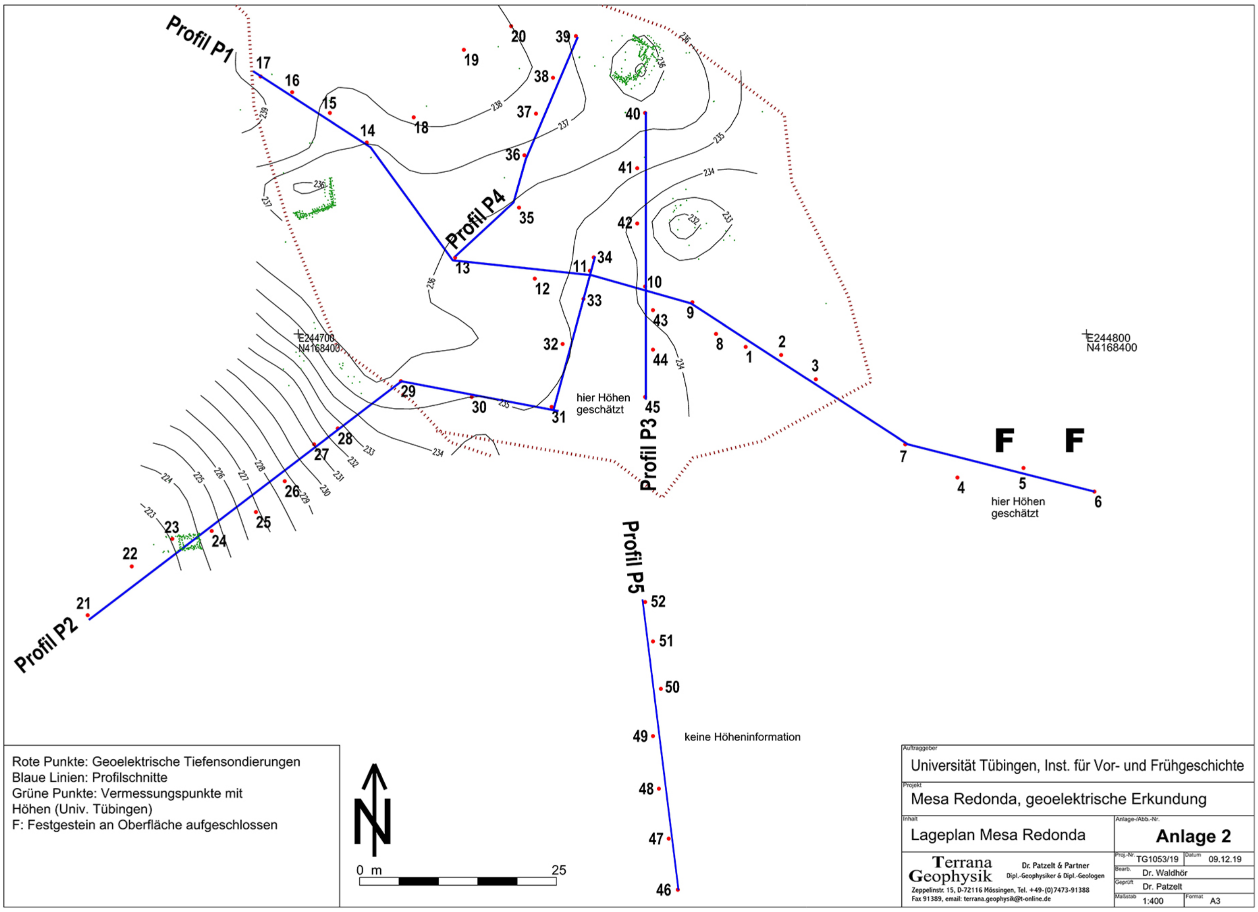


Fig. 35. Transects followed by the geoelectric radar along the summit (picture elaborated for this research by Terrana Geophysik).

almost 10m of cultural layers), it became evident that below the lowest stratum reached by Huntingford, there should be more cultural layers. Because of the few prehistoric pieces identified on the surface and in the test trenches, it is reasonable to assume the presence of Full Bronze Age layers in the site.

Complementary information from museums and private collections was consulted to support this assumption.

4.4 Consultation of Material From the Archaeological Museum of Seville and the Archaeological Collection of Ricardo Marsal Monzón (September 2019)

The research team visited the Archaeological Museum of Seville to consult the stored material excavated by Huntingford and to visually compare it with the material excavated by Aubet in Setefilla. Both sets of materials were stored next to each other in the museum's cellar.

Due to active renovations at the Archaeological Museum, it was not allowed to obtain samples of the material for drawing and performing proper analyses that would provide accurate comparisons on a morphological or elemental level. After checking several boxes of material excavated in 1979 (mainly pottery; *fig. 36–39*), the visual comparison of shapes, fabrics, colours and textures between the material from Setefilla and Mesa Redonda allowed the research team to identify some similarities between the prehistoric material collected in the field and the material from strata XV and XIV of Setefilla, which was dated to the Full Bronze Age.[14]

14 Access to the museum's material was only granted for a very limited time. Apologies for the quality and the disposition of the pieces in the pictures.

Fig. 36. Burnished materials identified from the excavation conducted in 1979 by Huntingford in the site of Mesa Redonda.

Fig. 37. Burnished materials identified from the excavation conducted in 1979 by Aubet in the site of Setefilla (stratum XV).

Fig. 38. Burnished materials identified from the excavation conducted in 1979 by Aubet in the site of Setefilla (stratum XV).

Fig. 39. Burnished materials identified from the excavation conducted in 1979 by Aubet in the site of Setefilla (stratum XIV).

Fig. 40. Sample of the stone axes from the Marsal collection.

The material from the collection of Ricardo Marsal Monzón was stored in a different place, but also under the supervision of the Culture and Heritage Office of the 'Junta de Andalucía'. This material was retrieved from a private collector who bought the pieces illegally from looters, years before Elisabeth Huntingford started excavations at the site. According to the information given by the collector, part of these objects has been catalogued as material coming from the Mesa Redonda site; but they have no context and no information about the specific sectors of the hill from which they were obtained.

Among several Roman coins, fibulae and some Medieval material, the following are the most remarkable prehistoric finds:

– 23 stone axes of varying sizes and made of different types of stone (especially granite and marble). Similar axes make up part of several Chalcolithic prehistoric sets identified along the whole Guadalquivir Valley, such as the ones found in La Loma del Real Tesoro, close to the survey area (*fig. 40*).
– One knife and one stone spear point, typical of Copper Age contexts such as the ones identified in Valencina de la Concepción (*fig. 41*).
– Seven palmela points. This type of point is present in several Chalcolithic/Bell Beaker contexts dated to the transitional Copper/Bronze Age (*fig. 42–45*).
– Three halberds and one dagger made of bronze, similar to those identified in several funerary contexts in the southeast as well as in the tomb found in Stratum XIV of Setefilla (*fig. 46–48*). Some of the types identified have been dated to the last quarter of the 2nd mill. BC (Castro et al. 1993).

It is definitively a misfortune having so many objects of such quality without any clear association to the Mesa Redonda site. Despite the reports mentioning that indeed the objects were obtained from that specific hill, all these can be approached only as indirect evidence.

After consulting the collection, the research team returned to the field in 2020 and decided to focus on the terrace that had less cultural layers and less mixing of materials in order to search for an unaltered context with Bronze Age layers.

Fig. 41. Stone spear point and knife from the Marsal collection.

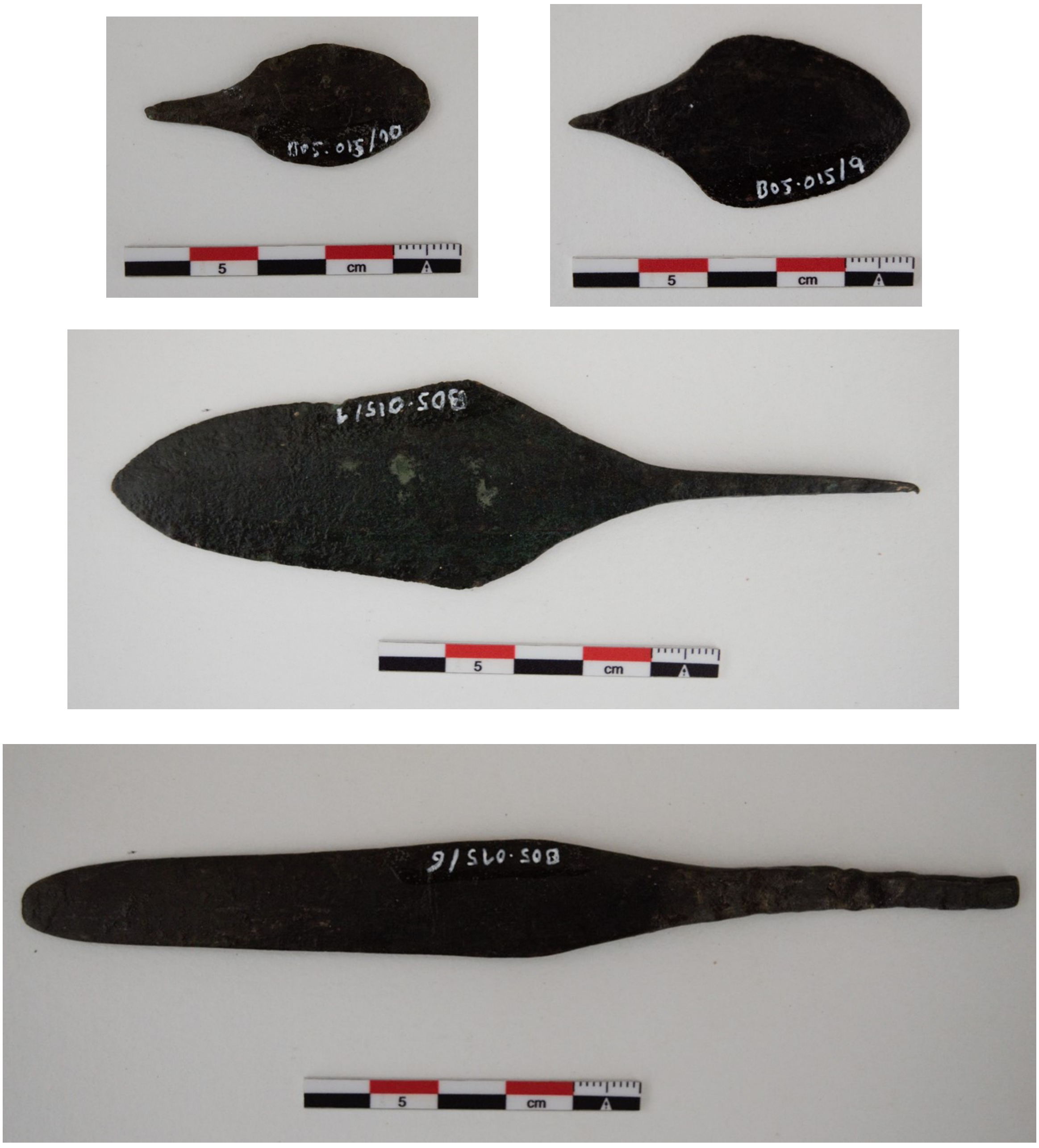


Fig. 42–45. Sample of the palmela points from the Marsal collection.

Fig. 46–48. Sample of the halberds and the dagger from the Marsal collection.

4.5 Intensive Surveying of the Site of Siete Arroyos and Survey of the Floodplains next to the Hill (Fourth Field Campaign, March 2020)

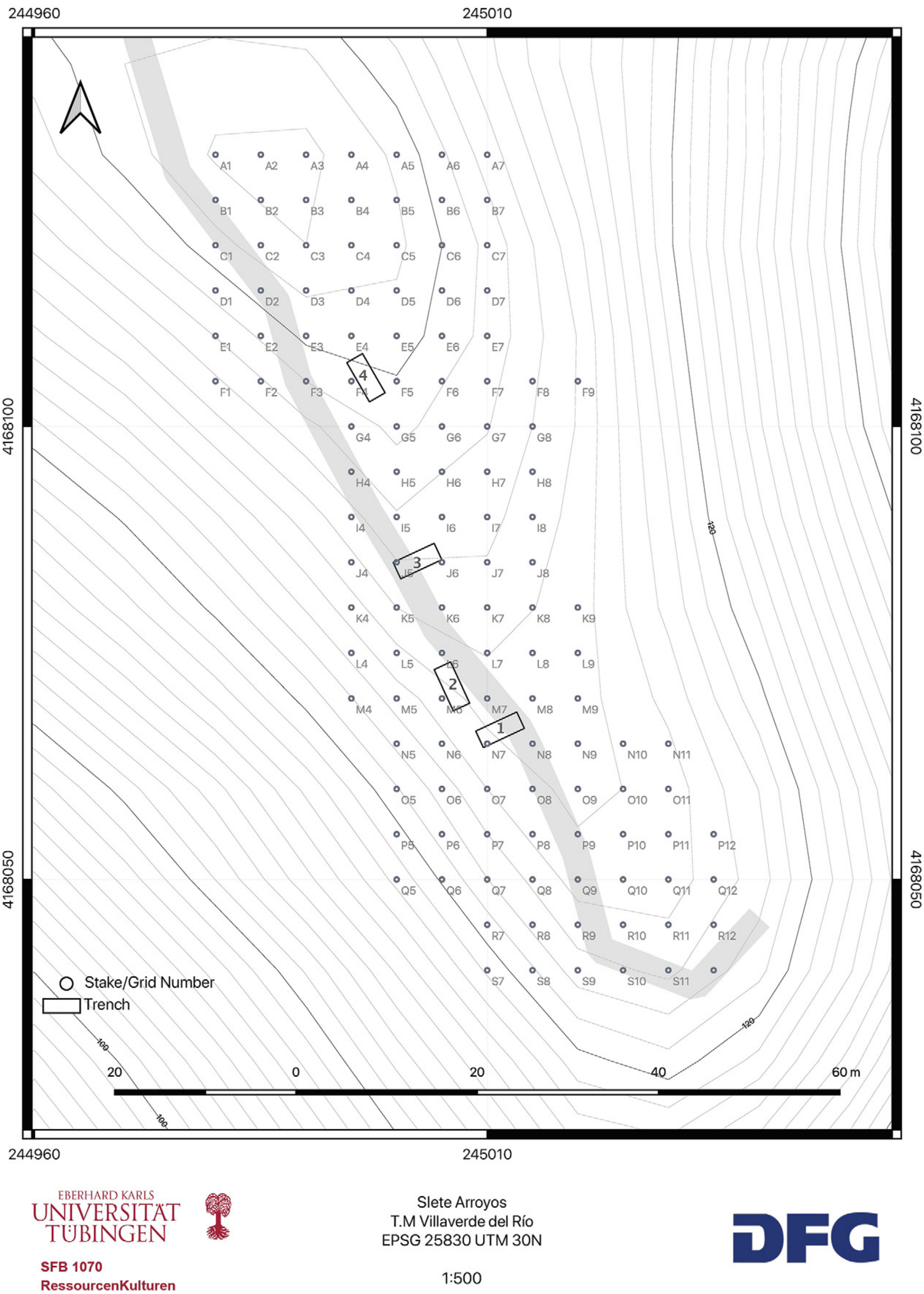
According to the finds obtained during the third field campaign, the site of Siete Arroyos was intensively surveyed following the same strategy as the one implemented at the summit of Mesa Redonda. Grids of 5m x 5m each, oriented N-S, were designed along the terrace and the surrounding slopes. 79 grids were suitable for surveying.

Most of the material collected during this survey was identified as prehistoric, with only a small accumulation of Medieval material in the north sector of the terrace. It seems that the highest area of the terrace made up part of a Medieval construction, based on the high number of tiles and bricks found in this sector. No sign of Roman or protohistoric material was spotted on the terrace surface. The area with the largest concentration of prehistoric material was towards the western slope, next to a new wall identified and characterised with the help of the GPS (*map 7*). Some of the shapes resemble Final Bronze Age pottery (with carinated borders and broaden, burnished bowls, reported for example in Aubet et al. 1983; López Palomo 1993), whereas others look more similar to older sets already identified, for example in Setefilla Stratum XV.

The diagnostic prehistoric material collected from the surface survey in Siete Arroyos is listed below.

Pottery

– Grid F9: One hand-made bowl rim with a harsh texture (eroded) and a medium-big grain size matrix (*fig. 49*).
– Grid L5: Three hemispheric (*fig. 50a–b, d*) and one ellipsoidal (*fig. 50c*) hand-made bowl rim, all of them with smoothed surfaces and medium grain size matrixes.
– Grid L6: One globular vessel with everted rim, burnished surface and a fine grain size matrix (*fig. 51a*); one U-shaped/sharpened rim bowl with a burnished surface and a fine grain size matrix (*fig. 51b*); one mid carinated/everted rim bowl, with a burnished surface and a fine grain size matrix (*fig. 51c*).
– Grid M5: One globular vessel with everted rim, harsh texture (eroded) and medium-big grain size matrix (*fig. 52a*); two hemispheric, hand-made vessel rims with harsh textures (eroded) and medium-big grain size matrixes (*fig. 52b–c*).



Map 7. Trenches and grids at the Siete Arroyos site. Grey line follows the trace of the wall identified.

Fig. 49. Surface prehistoric ceramic fragment collected in grid F9 (Siete Arroyos).

Fig. 50. Surface prehistoric ceramic fragment collected in grid L5 (Siete Arroyos).

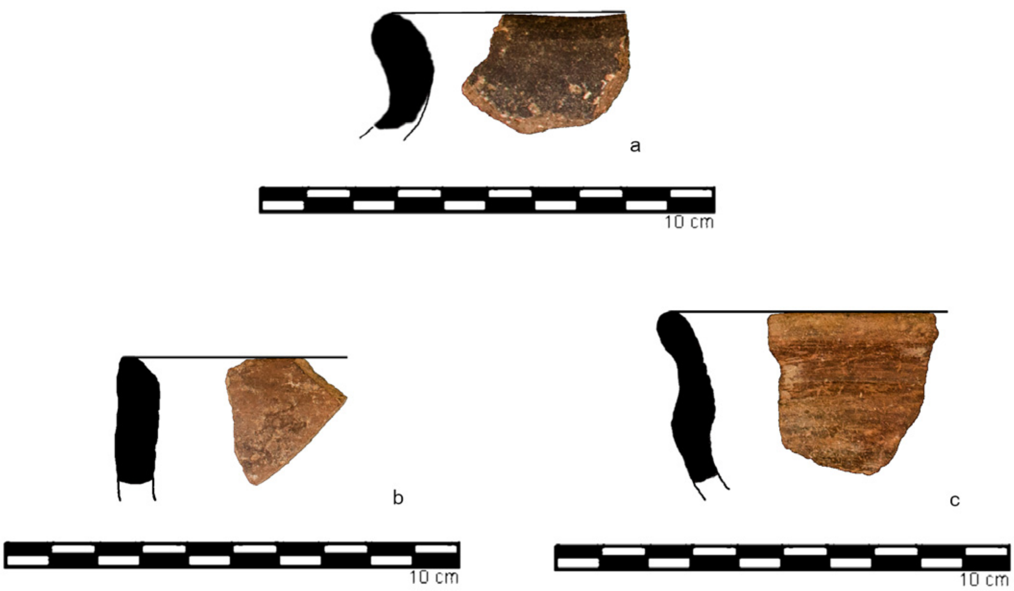


Fig. 51. Surface prehistoric ceramic fragments collected in grid L6 (Siete Arroyos).

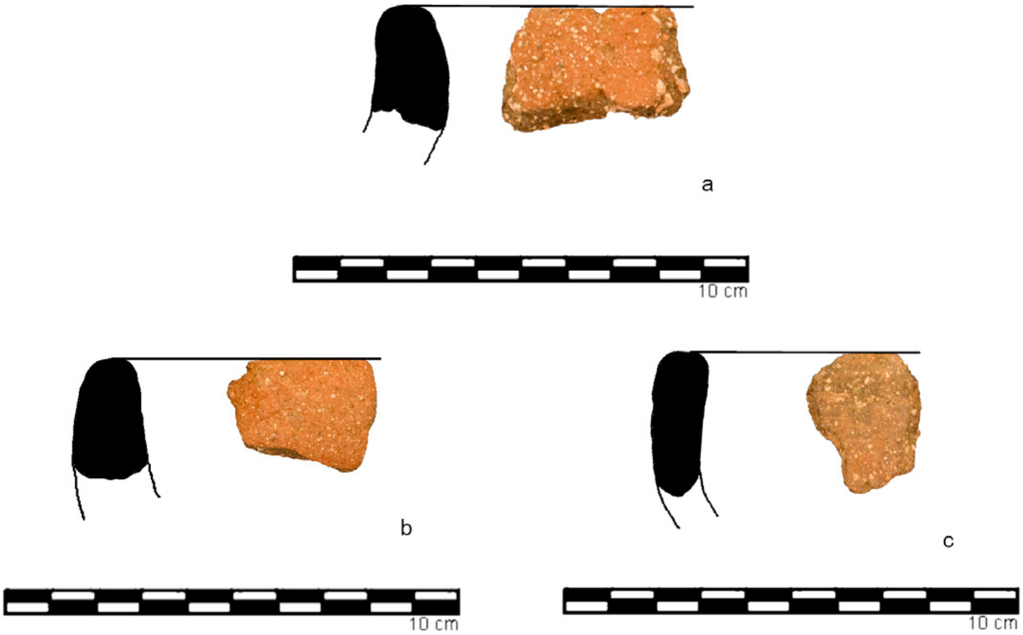


Fig. 52. Surface prehistoric ceramic fragments collected in grid M5 (Siete Arroyos).

Fig. 53. Surface prehistoric ceramic fragment collected in grid N6 (Siete Arroyos).

- Grid N6: One hemispheric, hand-made bowl rim with a burnished surface and a fine grain size matrix (*fig. 53*).
- Grids M8 to N8 (western wall cleaning): One hemispheric, hand-made vessel rim with smoothed surfaces and small grain size matrixes (*fig. 54a*); three mid-carinated, hand-made bowl rims, two burnished and one with smoothed surfaces and small grain size matrix (*fig. 54c–e*); two globular vessels with everted rims, one with harsh texture and small grain size matrix, the second with polished surface and fine grain size matrix (*fig. 54b, f*).
- Grid N7: One hemispheric, hand-made bowl rim with a smoothed surface and a fine grain size matrix (*fig. 55*).
- Grid P7: One hand-made vessel with slightly everted rim, with a smoothed surface and a small grain size matrix (*fig. 56a*); one hand-made, high-carinated bowl rim with a smoothed surface and a medium grain size matrix (*fig. 56b*); one hemispheric, hand-made bowl rim with a smoothed surface and small-medium grain size matrix (*fig. 56c*).

Fig. 54. Surface prehistoric ceramic fragments collected in grids M8 to N8 (Siete Arroyos).

Fig. 55. Surface prehistoric ceramic fragment collected in grid N7 (Siete Arroyos).

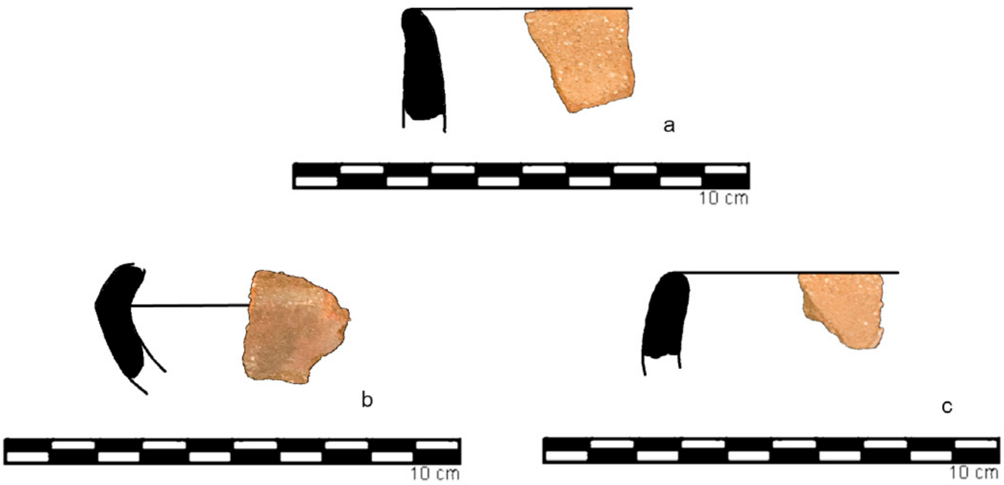


Fig. 56. Surface prehistoric ceramic fragments collected in grid P7 (Siete Arroyos).

Fig. 57. Surface prehistoric ceramic fragment collected in grid P8 (Siete Arroyos).

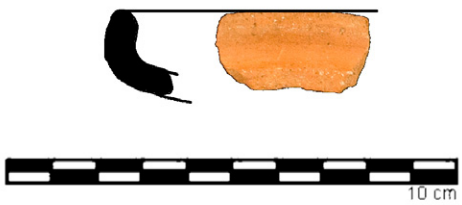


Fig. 58. Surface prehistoric ceramic fragment collected in grid P9 (Siete Arroyos).

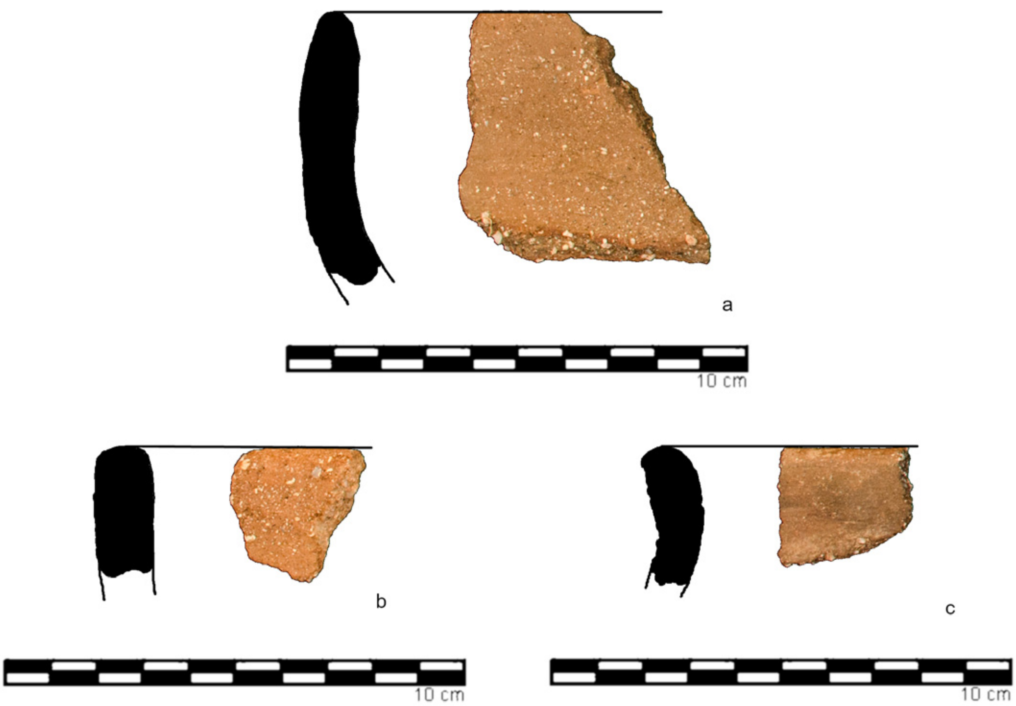


Fig. 59. Surface prehistoric ceramic fragments collected in grid S9 (Siete Arroyos).

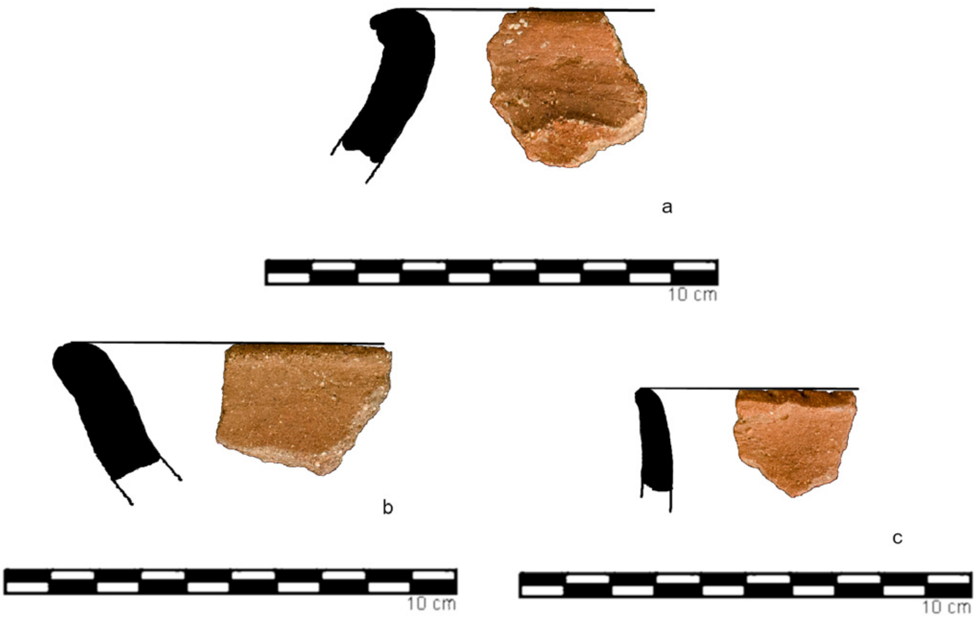


Fig. 60. Surface prehistoric ceramic fragments collected in grid S10 (Siete Arroyos).

Fig. 61. Surface prehistoric ceramic fragment collected in trench 2 cleaning (Siete Arroyos).

- Grid P8: One hand-made, globular vessel with everted rim, with a smoothed surface and a fine grain size matrix (*fig. 57*).
- Grid P9: One hand-made, ellipsoidal bowl rim with a smoothed surface and a fine grain size matrix (*fig. 58*).
- Grid S9: One hand-made, hemispheric bowl rim with a smoothed surface and a medium grain size matrix (*fig. 59a*); one hand-made, U-shaped rim with a smoothed surface and a medium grain size matrix (*fig. 59b*); one hand-made, globular vessel with everted rim with a smoothed surface and a medium grain size matrix (*fig. 59c*).
- Grid S10: One hand-made, globular vessel with everted rim, a smoothed surface and a small grain size matrix (*fig. 60a*); one hand-made, V-shaped rim with a smoothed surface and a small grain size matrix (*fig. 60b*); one hand-made vessel with a slightly everted rim, smoothed surface and a small grain size matrix. The rim is decorated with digital incisions along the top of the lip (*fig. 60c*).
- Trench 2 (cleaning): One hand-made, hemispheric bowl rim with a smoothed surface and a fine grain size matrix (*fig. 61*).

Fig. 62. Millstone collected in grid P6 (Siete Arroyos).

Fig. 63. Grindstone collected in grid P10 (Siete Arroyos).

Lithics

- Grid L6: one nucleus and one flake.
- Grid M6: two flakes.
- Trench 2: two flakes.
- Grid P6: one millstone (*fig. 62*).
- Grid P10: one grinding stone (*fig. 63*).

In addition to the intensive surveying of the Siete Arroyos terrace, the research team surveyed the floodplains next to the Mesa Redonda hill (*map 8*), identifying the sites listed below.

Aguas Santas

(Central point: X: 245025 E; Y: 4167619 N): This site is located right at the foothill of the Mesa Redonda complex, 50m from the right riverbank of the 'Siete Arroyos' stream. It has elevations between 50 and 96m.a.s.l. Today, the area is used as an olive plantation. The site was named after the Aguas Santas hermitage placed on the other side of the stream. Historically, this place has been considered a 'holy peregrination site' for both Medieval Muslim and Catholic populations (Rodríguez Becerra 2015).

The dispersion of material covers an area of 25ha.

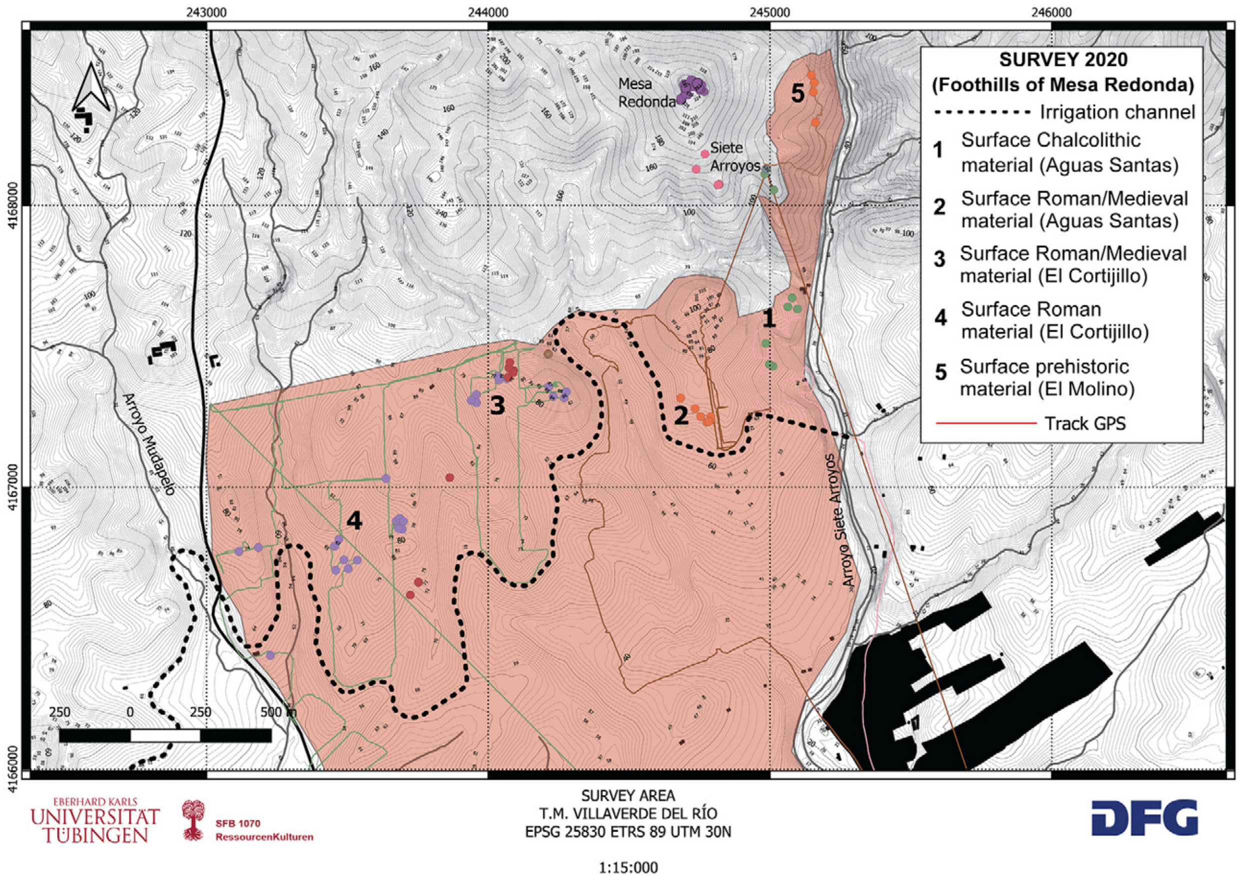
Aguas Santas has mainly Chalcolithic, Roman and Medieval material dispersed over the floodplain. Among the prehistoric material, almond-shaped plate rims (*fig. 64*) as well as several bowls with broadened rims were identified. Seven lithic flakes were also collected (*fig. 65*).

El Cortijillo

(Central point: X: 243740 E; Y: 4166924 N): This site is situated west of Aguas Santas, only separated from it by the Arroyo de Oromana stream. The southern limit is the Canal del Viar channel and the western limit is an artificial channel parallel to the Camino de Castiblanco de los Arroyos path. It shows elevations between 63 and 90m.a.s.l. The site was named after the farmstead where the survey was performed.

The dispersion of material is distributed in three main concentrations that cover an area of 88ha.

El Cortijillo, like the Aguas Santas site, presents a mixture of surface Chalcolithic, Roman and Medieval materials. The prehistoric material has the same characteristics as that collected at Aguas



Map 8. Survey across the foothills next to the Mesa Redonda complex. Highlighted polygon represents the surveyed area and dots represent the dispersion of materials in the sites identified.

Santas. Because of the distribution and proximity of the surface materials, the research team considers that El Cortijillo and Aguas Santas likely made part of the same context during the Copper Age.

El Molino, **La Vereda** and **Rodeos terraces** (Central point: X: 245123 E; Y: 4168341 N): These sites are part of the Mesa Redonda complex. The terraces are located around the same altitude as the one of Siete Arroyos (100m.a.s.l.).

The dispersion of material is around 2.74ha and covers all the three terraces.

These terraces mainly have concentrations of mixed surface Medieval, prehistoric and protohistoric materials. Their location guarantees access to the water of the stream as well as to several places in the valley through its riverbank. These terraces were likely part of the same complex; several test trenches would be needed to characterise their occupation phases.

Among the prehistoric material, some Bronze Age pottery was identified: One hand-made, hemispheric bowl rim with a harsh surface (eroded) and a small grain size matrix (El Molino) (*fig. 66*); one hand-made bowl rim with digital incisions on the upper side of the rim (El Molino, *fig. 67*); one hand-made, hemispheric bowl rim with a smoothed surface and a small grain size matrix (La Vereda, *fig. 68*); three millstones (*fig. 69*); one stone axe (El Molino, *fig. 70*).

Unfortunately, because of the Covid-19 lockdown measures and the closing of national borders implemented during the months of March and April 2020, the field campaign had to be stopped and the site closed. Only the surface layers of trenches 1 and 2 (above the western wall) were reached. The intensive survey of the Siete Arroyos terrace and the survey of the floodplains have been completed.

Fig. 64. Surface prehistoric ceramic fragments collected in Aguas Santas site.

Fig. 65. Surface prehistoric lithic fragments collected in Aguas Santas site.

Fig. 66. Surface prehistoric ceramic fragments collected in El Molino site (I).

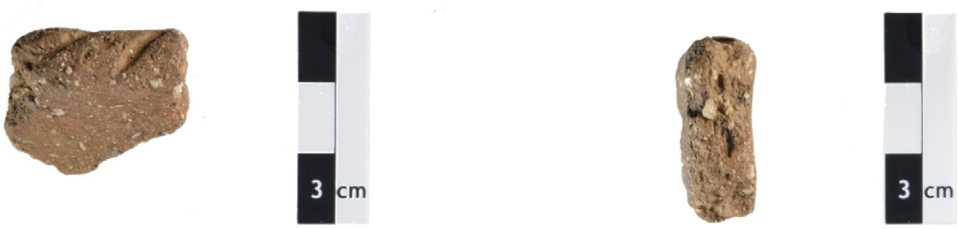


Fig. 67. Surface prehistoric ceramic fragments collected in El Molino site (II).

Fig. 68. Surface prehistoric ceramic fragments collected in La Vereda.

Fig. 69. Millstones collected in El Molino site.

Fig. 70. Stone axe collected in El Molino site.

4.6 Concluding Remarks on the Information Collected during the Field Campaigns

Considering the information provided by the geoelectric survey, the depth of the cultural layers beneath the surface of Siete Arroyos is approximately 2m. According to the material collected, it is possible that these two metres belonged not only to Final Bronze Age occupation layers, but even to older periods. Further excavation of the trenches is necessary in order to confirm any assumption. To the date of submission of this thesis (November 2020), it had not been possible to travel back to Spain.

One of the remarkable results of the survey is the evidence of the occupation length of the whole Mesa Redonda complex. It seems that the site has been continuously populated since the Chalcolithic period. The lands along the floodplains may have been used as settlements as well as agricultural and farming fields. Their position took advantage of the water as well as the proximity to the Sierra for collecting minerals or wood, as it has been confirmed for similar sites such as Valencina de la Concepción or La Loma del Real Tesoro. The interaction with neighbouring sites, such as the ones identified further east during the first field campaign (which are along the same floodplain), could have been crucial for the social and cultural relationships of the whole region.

No Bell Beaker material was found in the whole survey area. Likely, the arrival of such material was sectorised and only reached very specific corners of the Middle Guadalquivir Valley. Further research at these Chalcolithic sites is needed in order to confirm this trend.

At certain points during the transition from the 3rd to the 2nd mill. BC, the settlement pattern seems to have changed in this sector of the Middle Guadalquivir. The people living at the floodplains moved towards elevated places, to sites such as Setefilla, Mesa Cordobesa, Mirasivienes or Mesa Redonda (in the Sierra) or sites like La Ranilla or the complex of Carmona (in Los Alcores). Considering that these are the first field campaigns conducted in this area of the Middle Guadalquivir, further research is needed in order to comprehend the reason for such changes in the settlement pattern during the Bronze Age.

After moving to the hills, these places became attractive for settling also during later periods, as is confirmed by uninterrupted settlement sequences during the Final Bronze, Iron Age, Roman and Medieval periods, not only in Mesa Redonda, but also in Setefilla, Cerro San Juan and Carmona. Similar multiphase sites may exist in other elevated places that have not yet been discovered. Indeed, one of the explanations for the difficulty in finding Full Bronze Age record in the Middle and Low Guadalquivir Valley could be the presence of several layers above the potential Bronze Age sites existing in this region. The quality of the soils next to the Guadalquivir River, along with the proximity of the resources provided by the neighbouring Sierra Morena, offers enough material for human groups to have settled the area for millennia, and to continue to thrive in it into the present day.

As stated above, along with sites such as Cerro San Juan, Setefilla, Llanete de los Moros or the city of Carmona, Mesa Redonda is another example of multiphase sites, which could be practically considered as an archaeological ‘tell’. The particularity of Mesa Redonda is that the area has not undergone drastic interventions during modern times. The different approaches implemented at this site, despite not providing strong evidence, give important clues that need to be further explored. Mesa Redonda is a very promising site but reaching a 10m depth requires larger efforts and much more time than the one calculated for this project. Even though the site itself was not the main scope of the research presented here, the information provided, in a regional perspective, allows to formulate some ideas regarding the Bronze Age in the Guadalquivir Valley.

Possibly, anthracological and palynological analyses of the soils from the Aguas Santas site, complemented with parallel analyses of the mid-terraces (site of Siete Arroyos) and the summit of Mesa Redonda (in its Bronze Age layers, if they are reached), may help to understand the changes that motivated people to move towards the mountains.

It is not yet clear what came first: changes in people’s way of interacting with their neighbours, or changes in the landscape itself. Autochthonous or influenced cultural changes may have implied transformations in the way people perceived the surrounding landscape and have motivated them to transform it again. This is expressed in new architectural styles, new burial rituals and new stylistic traits in the pottery and metal objects used.

Likewise, the changes in the resource landscape (motivated by people or climate) may have ended up modifying the social and cultural relationships between human groups at the transition from the 3rd to the 2nd mill. BC. Further research, and proper excavations of sites such as Mesa Redonda, might possibly provide more information to comprehend these transformation processes.

The characterisation of a proper Full Bronze Age site in the Middle Guadalquivir requires a continued effort. With the empirical evidence collected so far (i.e. the material identified in the museum collections, as well as the findings collected during the surface surveys), it would not be a rash idea to suggest that this region of the Middle Guadalquivir was not unoccupied during the transition from the 3rd to the 2nd mill. BC. Other sites in the region have been identified as Full Bronze Age, thanks to the ceramic or metal material collected.

The next chapter takes advantage of the material reported in several sites and adds more evidence of the continuous population of the Middle and Low Guadalquivir regions.

5 Pottery Typologies and GIS Analyses

5.1 Discussing Typologies[15]

What is a pottery typology for? Since the beginning of the discipline, classifying the material record according to typologies has been the primary systematic activity for any archaeological study. The action of classification brings order to the world and makes it understandable (Gnecco/Langebaek 2006). Typologies have been used mainly as a common language between archaeologists as well as a form of empirical evidence for interpreting several phenomena in the past (Moy 2019). After centuries of elaborating and using them, they have become something that is often taken for granted as a mere preliminary step for characterising a cultural area or an archaeological site without consideration for the implications that elaborating a typology has.

The archaeological record includes many other materials besides pottery, and some of them have been used in archaeology to answer questions that pottery cannot. Elaborating typologies is still the primary action in archaeological research; but pottery typologies seem to have been relegated to characterising cultural areas, an activity intrinsic to culture-historical approaches. Even though, pottery can provide additional information. This chapter discusses the act of classifying and comparing pottery shapes or figures drawn on paper or digitalised.

Elaborating typologies has always been linked to the characterisation of a geographical space; one that, most of the times, is also a product of the interpretations made by the archaeologist. One of the principal approaches in normative archaeology is the elaboration of pottery typologies to define the material record that comes from (and belongs to) a determined place. If archaeologists give names to sites or cultural areas to identify them, typologies can be considered the character behind such names. But typologies have a problem: they tend to universalise (Gnecco/Langebaek 2006). Today, such generalisations, based on pottery typologies and cultural areas, seem to be shadowing other ways of reading space and materials in the past.

Spatial delimitation of cultural areas has been – and still is – a traditional activity in archaeology, along with the elaboration of models of dispersion (or diffusion) of a culture. Pottery typology has been deeply involved with both. Such models are possible thanks to the identification of materials in a determined area. Thereafter, normative archaeologists delimit a 'territory' according to the presence or absence of pottery types and then give it a name. If materials are dispersed in big areas with diverse environments and settlements very distant from each other, models of dispersion and cultural diffusion start to be considered. The problem behind this is that these archaeologically defined cultural areas are often assumed to be real entities existing in the past, and further material evidence is sometimes adapted to the hypotheses of the researchers.

For example, in southern Iberia, cultural-historical approaches have defined the way of how space has been perceived and represented in the past from the very beginning. For the Full Bronze Age, two main cultural areas in the southeast and the southwest corners have been identified. The first of these cultures has been named 'El Argar' and the second 'Southwestern Bronze'. From the very first moment these areas were characterised (around the end of the 19th cent. AD), El Argar was perceived as a real entity, that means, a territory such as the ones we identify today as 'nations', something typical for cultural-historical approaches.

Although settlements identified as 'Argaric' provided empirical evidence of the drastic social and cultural changes occurring during the Bronze Age in the whole region, this evidence seems to have ended up being absorbed by the effort to prove the existence of a state in this region (see chapter 2.2.3).

15 This whole chapter, including pictures and maps, has been already published in Chala-Aldana 2022. The pictures displayed here showing the pie charts and the network of interactions are improved versions from the 2022 published article.

El Argar has been considered an ancient state (Lull 1983). The rise of elites and the control of social production along a delimited territory, via social coercion of small settlements, is one of the main characteristics of this hypothesis. Cultural-historical perception of El Argar as a 'real' territory (not as a model elaborated by the archaeologists) went as far as considering territorial expansions and cultural diffusions as part of a conflictive interaction between the local elites and the peripheries (Arteaga 1992). This means that the presence or absence of 'Argaric' materials ended up associating the settlements to the dynamics around the conflictive and violent power relationships in the frame of the 'Argaric state'.

The pottery typology elaborated for El Argar was also adapted to the hypotheses regarding the existence of a state, to the point that it became one of the main pieces of empirical evidence of the so-called 'Argaric norm' (*norma argárica* in Spanish). Apart from uniform characteristics in the funerary expressions and the settlement patterns, the 'Argaric norm' was based on the homogeneity in the materials produced and used (González Marcén 1994). The homogeneity of the pottery types identified in the 'Argaric' settlements was interpreted as part of a specialised and standardised production (Lull et al. 2010b; 2013), all in the frame of a control exercised by elites.

The presence of Argaric materials outside the Argaric territory (delimited by archaeologists) was interpreted by some as evidence of a territorial expansion of El Argar (Escacena Carrasco/Berriatúa Hernández 1985), by others as acculturation (Ruiz Lara 1987) and still by others as simply exchanges between two different and autochthonous cultures (Aubet et al. 1983; López Palomo 1993).

It is necessary to distinguish two levels of interpretation of the material record to clarify the nature of such debate. The first level is the one based on the facts, the empirical evidence. The second aims at generalising and giving explanations about social and cultural phenomena.

Indeed, the uniformity in the materials and the diffusion of such uniformity along southeast Iberia can be seen in several Bronze Age sites. Departing from the first level of interpretation, it is also possible to see the expansion of some 'Argaric' materials beyond the area where such uniformity was more concentrated. The presence of 'Argaric' materials in several corners of southern Iberia can be considered as cultural diffusion; but how did this diffusion occur?

At the second level of interpretation, the presence of materials is hypothesised in several ways, meaning that there is no certainty about the real processes going on. Diffusion of a pottery type, as mentioned above, can be correlated with the expansion of a territory, an acculturation process, or a mere exchange. But what if we took one step back, to the first level, and consider for a moment the presence of pottery as mere movements of people sharing ideas and values?

The dispersion of pottery types, architectural styles, settlements, or funerary patterns is irrefutable evidence that at least one person moved, carrying an idea or an object that represented socially shared concepts and values linked to the style of the object itself. Interaction existed; a fact that researchers can agree upon without discussion. At the second level of interpretation, archaeologists try to link such values and ideas to the processes of social and cultural change that occurred during the Bronze Age. Whether such ideas or values were linked to coercion or territorial control processes seems to depend more on the ideas and values of the researcher than on the evidence itself.

The second level of interpretation also has direct influence on the cartographical representations of the space. The borders of the 'Argaric territory', drawn after the identification of 'Argaric traits' in southeast Iberia, are interpretations that support ideas regarding coercion and land control. The same occurs with pottery typology. The 'Argaric typology' was used to represent standardised production processes, territorial expansions, or acculturation processes. In doing so, the first level of interpretation was left behind to jump directly to the second.

Such generalisations shadow alternative ways of reading spaces and materials in the past. According to Gnecco and Langebaek, typologies, as any other social product, are part of ideologic struggles; that is to say, the approach itself is product of the differences between schools of thought during the last centuries (see chapter 1.2). Both authors reflect on how 'typological thinking' has been linked to the same paradigm supporting conformation of nation-states and colonialist expansion (Gnecco/Langebaek 2006). It can be said that 'Argaric typology' has a historical frame associated with the scientific paradigm of the researchers analysing El Argar.

El Argar has been, and still is, treated as a culture area and is now also treated as a state. Such a theoretical frame does not seem to be completely linked to the set of evidence available. Culture-historical approaches sometimes abandon the first level of interpretation and go directly to the second. In this particular case, they associated the material record found with representations of controlled territories and standardised production processes. According to Gnecco and Langebaek, with the shift made by some archaeologists to neo-evolutionist approaches for classifying societies, they continued using a historicist attitude, which led them to 'confirm' the existence of types already linked to the theoretical framework of the researcher. Archaeologists were looking for what, beforehand, they already knew they would find (Gnecco/Langebaek 2006).

It is even more complicated if the study area is not El Argar, but an area that has been understudied and does not have enough material record to be properly characterised. The Middle and Low Guadalquivir Valley, west of the 'Argaric territory', has been considered a gap between the southwest and the southeast, and, at the same time, as a periphery of the Argaric state. There have been several typological studies, one for each Bronze Age site found along the valley. But there is no clear relationship between the material record present in the sites identified and the 'Argaric phenomenon', which leads to different interpretations than the ones mentioned above.

If 'Argaric research' is focused on finding the state, the same occurs with the sites outside its 'territory'. Once sites outside the 'Argaric territory' are found, they are usually adapted to the proposed model and become simple peripheries of it, with researchers ignoring how these interpretations possibly insert bias into their results. At the end, given the few stratigraphic sequences and chronologies for the Middle and Low Guadalquivir, the interpretations depend more on the opinions of the researchers than on what evidence shows.

This chapter intends to present a pottery typology for the Middle and Low Guadalquivir Valley, but not oriented towards characterising a new cultural area nor characterising type changes through chronological phases. This typology is elaborated mainly for providing evidence for interactions between settlements during the Bronze Age, and to show that the Middle and Low Guadalquivir Valley regions were not empty places or low ranked regions between two powerful 'territories'. This pottery typology is linked to a Geographical Information System (GIS), with the intention of generating a cartographic representation of southern Iberia based on the material evidence that the land itself provides.

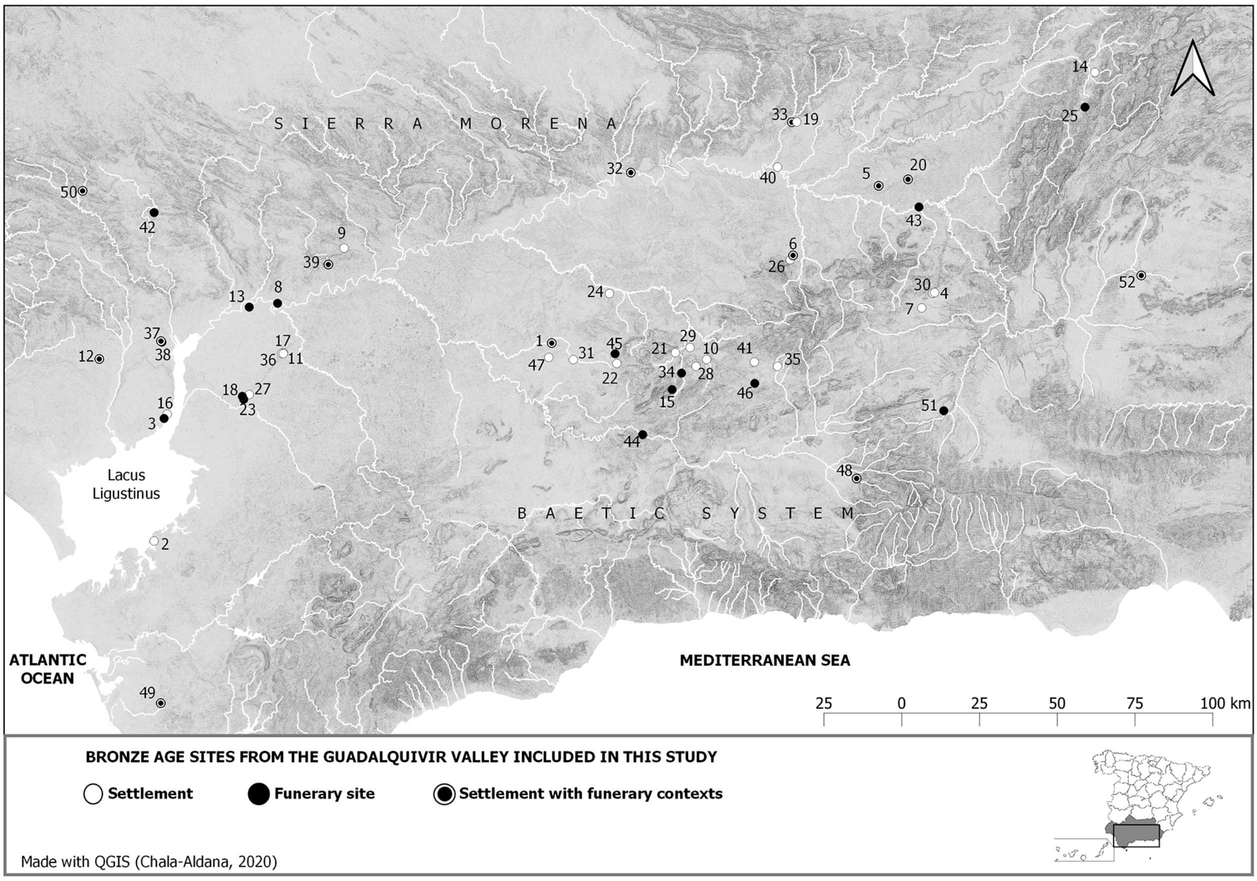
As with any other research, this project also has the intention of showing an alternative way of perceiving this region. By departing from the first level of interpretation, the Middle and Low Guadalquivir Valley can be considered as a region that makes part of a landscape, which was used as a resource for shaping and modifying social and cultural relations between human groups during the Bronze Age. The cartographic model presented here does not include any reference to borders, ethnic affiliations or other categories linked to the traditional paradigms leading the research today.

All the steps taken for elaborating the typology, as well as the procedures followed with the GIS are explained in order to make the reader aware of the treatment of the data, without jumping directly to interpretations.

5.2 Pottery Typology of the Middle and Low Guadalquivir Valley

The typology was elaborated with 604 pottery fragments, taken from pictures in several articles, books and reports published during the last 80 years. These reports belong to 47 sites, spread across different corners of the Guadalquivir Basin, mainly in today's provinces of Jaén, Córdoba and Seville (see chapter 5.3; *map 9*).

Publications are the main source of information used for the elaboration of the typology. These publications included useful data such as chronologies, description of matrixes or surfaces and morphological or decorative comparisons



Map 9. Bronze Age sites from the Guadalquivir Valley included in this study. For site names see table 4.

with contemporary sites across our study area. A comparison based on original materials deposited in the Archaeological Museum of Seville was also planned. This last activity could not be performed, as the museum was closed for renovations during the development of this research (see chapter 4.4).

There are only eleven sites with published radiocarbon chronologies confirming their occupation during the Full Bronze Age. Considering the low number of stratigraphic sequences with radiocarbon dates available for the Middle and Low Guadalquivir Valley, it was decided to use the term 'Full Bronze Age' to refer to the period between 2200 and 1550 BC (see chapter 2.2). This term is not as structured as the chronologies from neighbouring regions but recognises the current lack of elements for differentiating Early or Middle phases in our study area (Bartelheim et al. 2021). Until having significative evidence to clearly differentiate phases between this span of time, its use is recommended. The materials obtained from sites without radiocarbon chronologies were associated with this period by comparing their material record with typologies elaborated from Bronze Age sites dated to the period mentioned above (mainly Argaric). These comparisons are depended on the criteria of every researcher.

For the typology here elaborated, the selection of non-dated sites considered the following aspects:

– The stratigraphic situation of the findings. Some of the findings published were found above Chalcolithic layers and below Iron Age strata and are also associated with Argaric or Southwestern Bronze (dated) materials.
– The similarities noted when comparing the material record. Archaeologists evidenced some similarities between their findings and those already identified for Bronze Age sites regarding shapes, pottery treatments, and contexts (e.g. the findings in cist burials).

– The pictures of the material record published. This was the most important aspect for developing this typology. The drawings of the material found were suitable for comparisons only if they had good quality and scale. Pictures without scale or with poor quality were excluded.

Despite having hundreds of Bronze Age sites reported in the IAPH database, most of them consist only of material collected from the surface and were therefore not included in the typology. Sites with reports that have not been published yet, were also unsuitable for the selection. The sites selected are listed in table 4.

The first 47 sites (from AGU to ZON) were selected for analyses; the last five (from CEN to ORC) are Bronze Age sites already described in publications and are useful for comparison. These five comparative sites belong mainly to regions surrounding the Guadalquivir Basin. Cerro de la Encina (CEN), Orce (ORC) and Cuesta del Negro (NEG) belong to the Baza and Guadix Valleys, one of the western regions of the so-called 'Argaric territory'. Cerro del Berrueco (BER) belongs to the estuarine region next to the Atlantic coast and El Trastejón/La Papúa belongs to the Sierra Morena region, which is linked to the Guadiana Valley and part of the so-called Southwestern Bronze region. All these sites offer the advantage of having chronologies that confirm their occupation during our period of interest.

The type of site ('settlement', 'funerary', or 'settlement with funerary sites') corresponds to the own characterisation made by the author of the publication. It is important to note that only small scale excavations took place at most of these sites, which means that it is still unknown if there is a settlement pattern or a shared vision regarding the dwelling systems and the organisation of the villages where people settled (Bartelheim et al. 2021b). It was decided to keep the character given to the site by the author.

It is possible that some sites have been unintentionally overlooked or not taken into account; but the method applied here is cumulative, meaning that any new sites or pictures found in the future can be included into the databases and analyses. The typology elaborated here is inclusive; it does not intend to express a 'closed system' but rather aims for the opposite. This typology wishes to show how typologies could be elaborated and used as open systems for evidencing interactions. In the same direction, GIS analyses are also cumulative, meaning that any region outside the study area which has not been included yet, can be included in future runs.

Maps in Appendix V show an example of how sites not included in this analysis can also be considered and their pottery typologies compared with the one elaborated here, suggesting further developments using the method proposed here.

To elaborate the typology, each pottery drawing from the sites was scanned, and the scans were edited with an image manipulation software,[16] which generated a layer for each of the 604 pieces of pottery (fragmented or complete) identified. All layers were adjusted to the same ratio (1:3), making them suitable for comparisons.

The layers were grouped, and the typology was elaborated as described below.

The first to be organised were the complete pots; they helped to define the forms present. Each form consists of basic shapes, representing the general attribute of the vessel and its identity or functionality compared to other forms.

For this typology, 5 forms were identified:

– Form 1: bowls (*cuencos* in Spanish). Open recipients with a diameter between 1.5 or 2.5 times their height (Heras-y-Martínez 1992).
– Form 2: *orzas*. This is the Spanish word for vessels similar to pots. They have an open mouth (which is smaller than in pots), a flat or convex base, and one or more handles (Caro Bellido 2008).
– Form 3: *tulipas*. This is the Spanish word for low-carinated vessels, with a convex base, an open mouth and a curve-everted body. Their shape resembles a tulip flower, thus the use of this name.
– Form 4: globular vessels.
– Form 5: cups.

16 GIMP (GNU Image Manipulation Program).

N°	Abbr.	Name of the Site	Type	Location	Province	Reference
1	AGU	Castillo de Aguilar	Settlement & Funerary	Aguilar de la Frontera	Córdoba	Junta de Andalucía 1987; Ruiz Lara/Murillo Redondo 1992
2	ALC	Calle Alcazaba	Settlement	Lebrija	Sevilla	Caro Bellido et al. 1987
3	ARC	Cerro del Arca	Funerary	Puebla del Río	Córdoba	Escacena Carrasco 1980
4	ARR	Arroyo Salado	Settlement	Cabra del Santo Cristo	Jaén	Segovia Fernández 2004
5	BAE	Cerro del Alcazar	Settlement & Funerary	Baeza	Jaén	Zafra de la Torre 1991; Zafra de la Torre/Pérez Bareas 1992
6	BAJ	Marroquíes Bajos	Settlement & Funerary	Jaén	Jaén	Perales et al. 2008; Pérez Bareas/Sánchez Susi 1999
7	CAB	Cabeza Montosa	Settlement	Cabra del Santo Cristo	Jaén	Segovia Fernández 2004
8	CAN	Canama	Funerary	Alcolea del Río	Sevilla	Sierra Alonso 1993
9	CAR	El Carrasco	Settlement	Puebla de los Infantes	Sevilla	Ojeda Calvo et al. 1990
10	CAS	El Castillarejo	Settlement	Priego de Córdoba	Córdoba	Murillo Redondo 1990
11	CGF	Calle General Freire	Settlement	Carmona	Sevilla	Rodríguez 1995
12	CHI	Chichina	Settlement & Funerary	San Lúcar la Mayor	Sevilla	Fernández Gómez et al. 1976
13	CML	Cortijo María Luisa	Funerary	Cantillana	Sevilla	Santana Falcon 1990
14	COJ	Cerro de la Coja	Settlement	Orcera	Jaén	Crespo García/Pérez Bareas 1990
15	COR	Los Cortijillos de la Sierra	Funerary	Priego de Córdoba	Córdoba	Carmona Ávila 1997
16	CSJ	Cerro de San Juán	Settlement	Coria del Río	Sevilla	García Rivero/Escacena Carrasco 2015
17	CTO	Calle Torre del Oro	Settlement	Carmona	Sevilla	Román Rodríguez 2004
18	CVQ	Cueva del Vaquero	Funerary	Alcalá de Guadaíra	Sevilla	Domínguez Berenjeno/Fernández 2008
19	ENC	Castillo Baños de la Encina	Settlement	Baños de la Encina	Jaén	Castillo et al. 1990
20	ERA	Eras del Alcázar	Settlement & Funerary	Úbeda	Jaén	Ruiz Fuentes 1999
21	ESP	El Esparragal	Settlement	Priego de Córdoba	Córdoba	Murillo Redondo 1990
22	FUE	La Fuente del Río	Settlement	Cabra	Córdoba	Delgado Fernández/Vera Rodríguez 1996
23	GAN	El Gandul	Funerary	Alcalá de Guadaíra	Sevilla	Hurtado Pérez/Amores 1984; Pellicer Catalán/Hurtado Pérez 1987
24	GUT	Guta	Settlement	Castro del Río	Córdoba	Carrillero Millán/Martínez Fernández 1985
25	HOR	Hornos de Segura	Funerary	Hornos	Jaén	Maluquer de Motes 1974
26	JUA	Calle Juanito el Practicante	Settlement	Jaén	Jaén	Serrano Peña 1999
27	MAI	Mairena del Alcor	Settlement	Mairena del Alcor	Sevilla	Fernández Chicarro 1946

N°	Abbr.	Name of the Site	Type	Location	Province	Reference
28	MAR	Cueva de los Mármoles	Settlement	Priego de Córdoba	Córdoba	Carmona Ávila et al. 1999
29	MES	La Mesa	Settlement	Fuente Tójar	Córdoba	Murillo Redondo 1990
30	MOL	Molino Barranco	Settlement	Cabra del Santo Cristo	Jaén	Segovia Fernández 2004
31	MON	Castillo de Monturque	Settlement	Monturque	Córdoba	López Palomo 1993; Márquez 1987
32	MOR	Llanete de los Moros	Settlement & Funerary	Montoro	Córdoba	Martín de la Cruz 1987
33	PEN	Peñalosa	Settlement & Funerary	Baños de la Encina	Jaén	Alarcón García et al. 2008; Contreras Cortés et al. 1987b; 1990; Moreno Onorato et al. 2012
34	PIR	El Pirulejo	Funerary	Priego de Córdoba	Córdoba	Asquerino 1992; 1999
35	RIB	La Mesa	Settlement	Ribera Alta	Jaén	De la Torre Peña/Aguayo de Hoyos 1979
36	SAN	Plaza de Santiago	Settlement	Carmona	Sevilla	Belén et al. 2000; Cardenete López et al. 1992; Gómez Saucedo 2003
37	SEB	Cobre las Cruces (Sector B)	Settlement & Funerary	Guillena	Sevilla	Hunt Ortiz 2012
38	SEK	Cobre las Cruces (Sector K)	Funerary	Guillena	Sevilla	Hunt Ortiz 2012
39	SET	Setefilla	Settlement & Funerary	Lora del Río	Sevilla	Aubet et al. 1983
40	SEV	Sevilleja	Settlement	Espeluy	Jaén	Contreras Cortés et al. 1987a
41	SMR	San Marcos	Settlement	Alcalá la Real	Jaén	De la Torre Peña/Aguayo de Hoyos 1979
42	TRA	La Traviesa	Funerary	Almadén de la Plata	Sevilla	García Sanjuán/Vargas Durán 1995; García Sanjuán 1997
43	UBE	Úbeda la Vieja	Funerary	Úbeda	Jaén	Molina et al. 1978
44	VAL	Valdearenas	Funerary	Iznájar	Córdoba	Hitos Urbano 1990
45	VEL	La Veleña	Funerary	Cabra	Córdoba	Delgado Fernández/Vera Rodríguez 1996
46	VIL	Villalobos	Funerary	Alcalá la Real	Jaén	De la Torre Peña/Aguayo de Hoyos 1979
47	ZON	Castillo de Zóñar	Settlement	Aguilar de la frontera	Córdoba	Ruiz Lara/Murillo Redondo 1992
48	CEN	Cerro de la Encina	Settlement & Funerary	Monachil	Granada	Arribas Palau et al. 1974
49	BER	Cerro del Berrueco	Settlement & Funerary	Medina Sidonia	Cádiz	Escacena Carrasco/Berriatúa Hernández 1985
50	TRS	El Trastejón/ La Papúa	Settlement & Funerary	Zufre	Huelva	Hurtado Pérez et al. 2011
51	NEG	Cuesta del Negro	Funerary	Purullena	Granada	Contreras Cortés 1986
52	ORC	Orce	Settlement & Funerary	Orce	Granada	Schüle 1980

Table 4. Bronze Age sites included in this study.

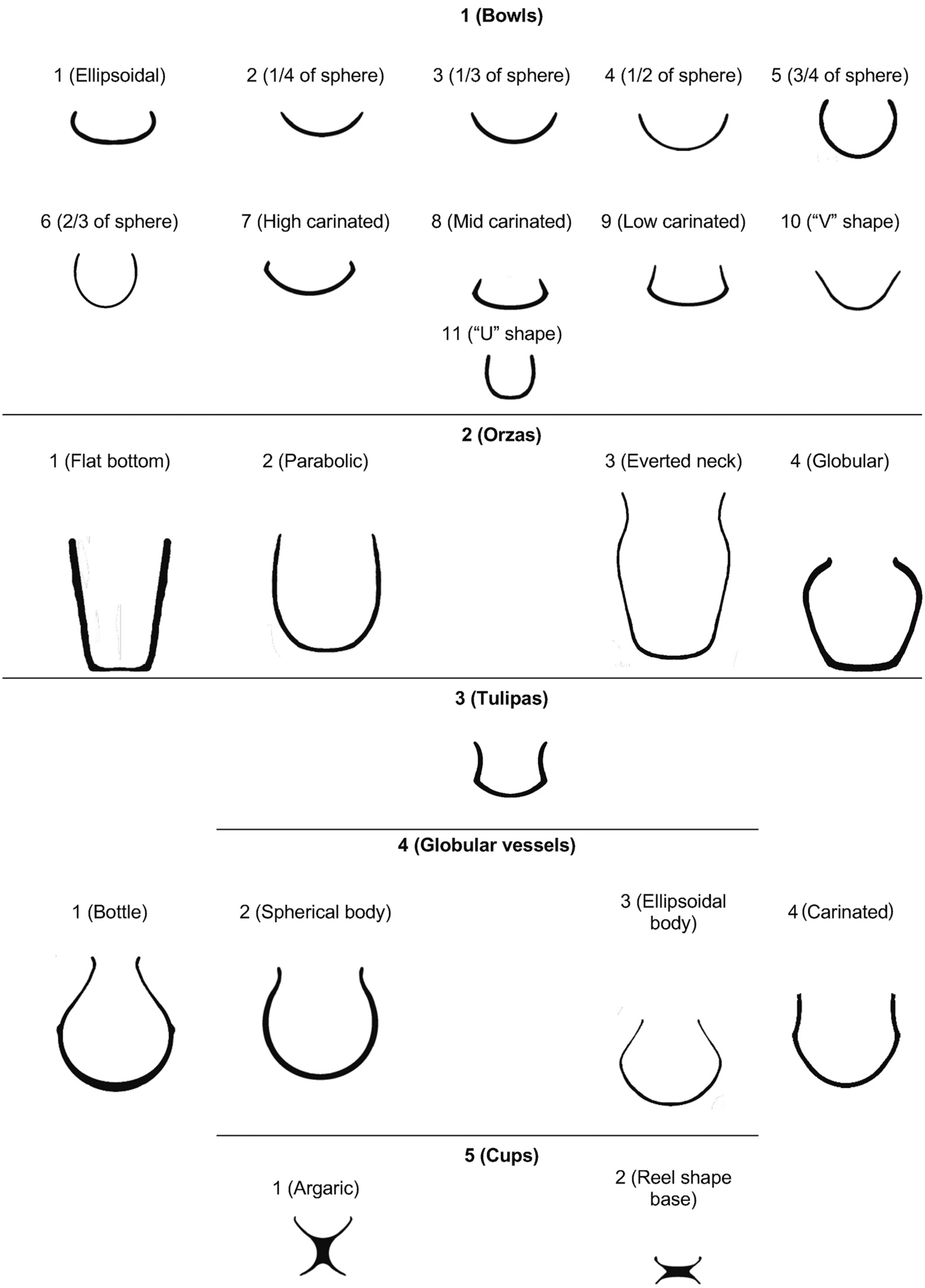


Fig. 71. General scheme of the typology elaborated. To consult it in detail, see Appendix I and II.

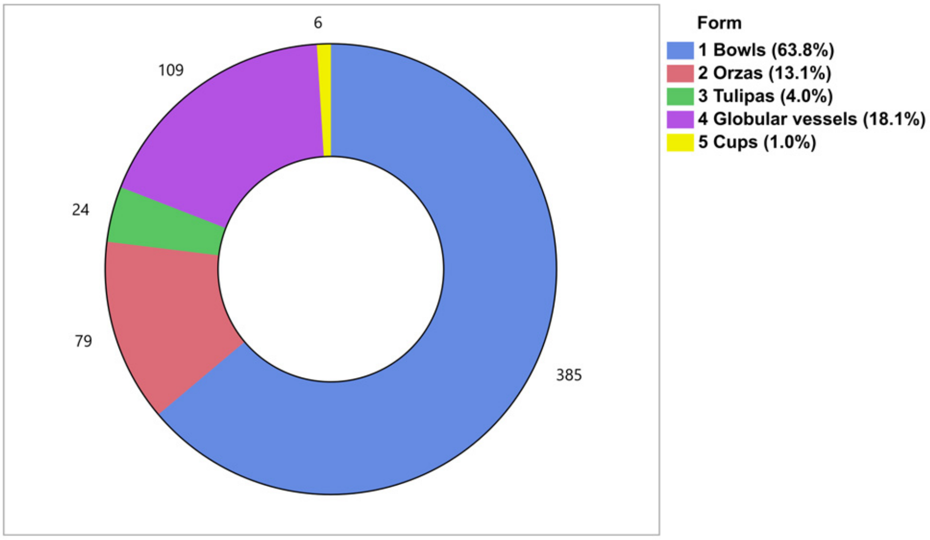


Fig. 72. Distribution of the pottery analysed according to the forms.

For each form, types were identified, according to variations in the general shape of the vessel. This variation does not modify the identity or functionality of the object.

For some types, subtypes were differentiated, according to variations in specific parts of the vessel. Most of the subtype variations in this typology are present in the shape or the angle of the rims (see Appendix I and II).

The fragments were grouped according to their resemblance to the shapes of complete pieces of pottery. Great care was taken to make a complete match (in size or angle) between the fragment and the complete vessel. The image manipulation software was a useful tool for overlapping every piece against another, reducing the probability of errors.

The number of fragments selected for comparisons differs by site. Some sites are closed, small contexts (such as the funerary cists) with a reduced number of vessels; other sites have a bigger number of materials and therefore a bigger number of types or subtypes identified. This does not impede comparing similar traits between them, independently of the context size or the number of fragments reported in each site. As mentioned above, this typology is focused on observing interactions, common traits shared between sites. The number of coincidences in such types and subtypes identified has been counted in order to hierarchise the degree of interaction between sites, only according to the coincidences in the typologies reported (see chapter 5.3).

The typology proposed here intends to be only the first step towards a better organisation of the material record of the Bronze Age in the Guadalquivir Valley. Further studies (based on first-hand analysis of the material rather than published images) need to be performed. This typology could be used as a base for further analyses or comparisons. The forms and types identified are listed in fig. 71. The percentage distribution of the analysed pottery according to shapes is shown in fig. 72. Further details are given in Appendix I and II.

Bowls: It is important to note that bowls have been one of the most common pottery forms throughout the Guadalquivir Valley not only during the Bronze Age, but since Neolithic times. According to the distributions, bowls are the largest group among the forms. One of the issues regarding the analysis of bowls is the way they are described or classified. The 'hemispheric bowl' is an unprecise category which does not distinguish how much from the sphere surface the bowl takes. For this study, it was decided to distinguish between the ellipsoidal and the real-spherical shapes and the different thirds or quarters of the sphere, and to separate the bowls according to these dimensions.

The percentage distribution of the bowls according to the types identified is shown in fig. 73.

Almost half of the bowls were produced with a spherical shape (48.9% n=188), with the carinated bowls following as the second most common type of shape (23.4% n=90), and the ellipsoidal bowls being the third most common (13.5% n=52)

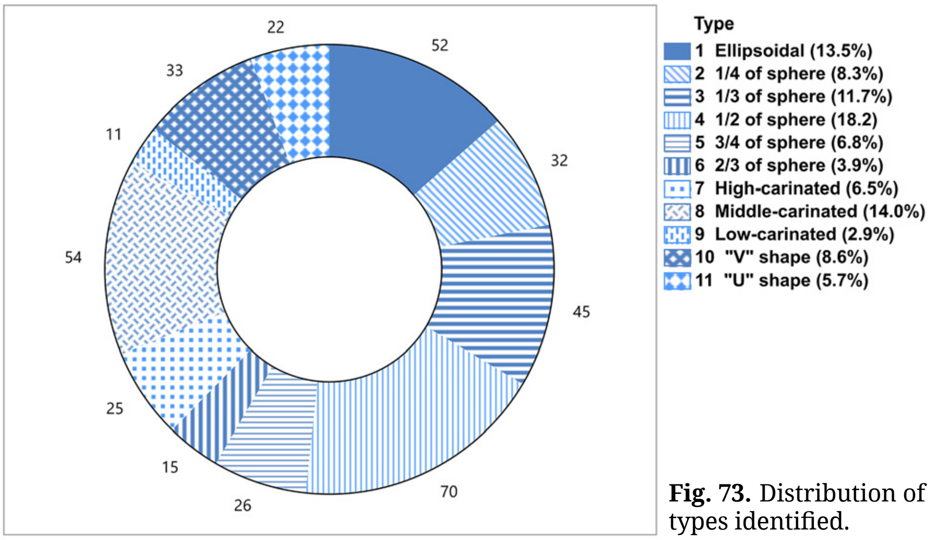


Fig. 73. Distribution of the bowls according to the types identified.

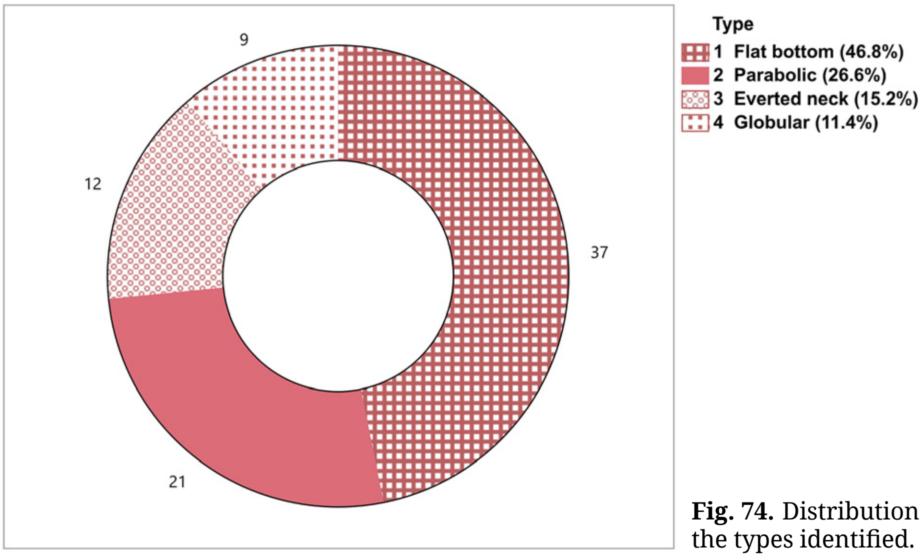


Fig. 74. Distribution of the *orzas* according to the types identified.

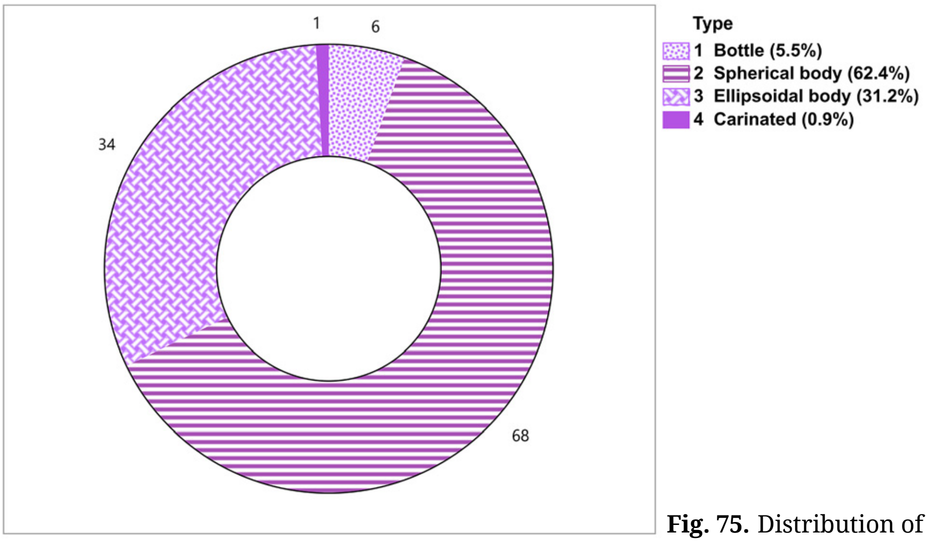


Fig. 75. Distribution of the globular vessel types.

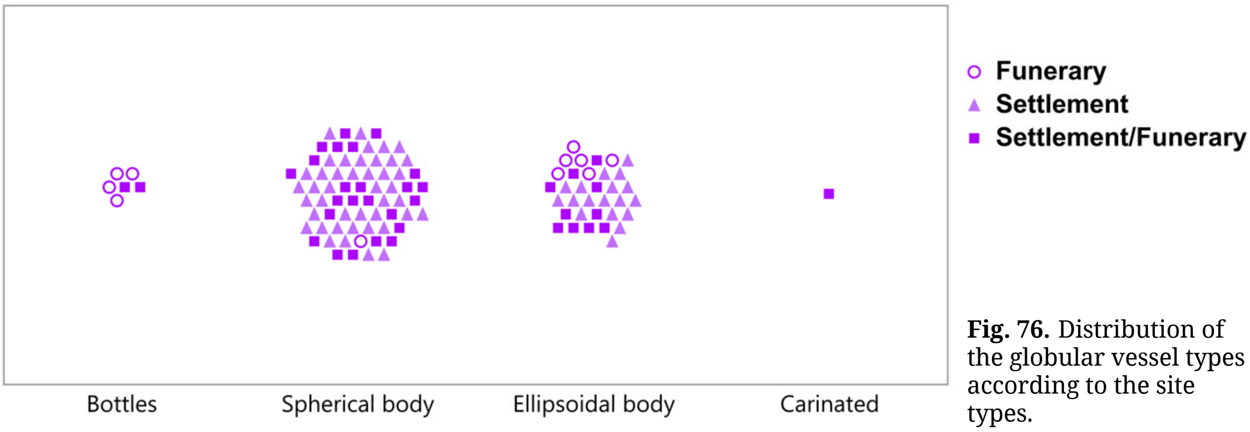


Fig. 76. Distribution of the globular vessel types according to the site types.

followed by the V- (8.6% n=33) and U-shapes (5.7% n=22) (*fig. 73*). It can be said that this distribution reinforces the trend seen along the Iberian Peninsula with spherical and burnished-carinated as representative shapes during the Bronze age (Almagro-Gorbea 1997).

All bowl types seem to be distributed along the whole valley indistinctively in any type of site (funerary, settlement or settlement with funerary contexts), supporting the idea that these recipients were useful for different purposes and did not have special shapes for particular contexts. Among the 384 bowls, 94% (n=362) have no decoration or functional attachments, while the rest present mainly the so-called *mamelón* (n=14), a 'nipple' generally in both sides of the bowl body, useful for holding the recipient. Only one handle was identified (n=1).

The types of decoration identified are linear-digital marks along the rim (n=3), zig-zag incisions along the internal border (n=2), 'bulges' along the external border (n=2), and reparation holes (n=1).

Orzas: *Orzas*, along with globular vessels, were used for the storage of both liquids and grains. The percentage distribution of the *orzas* according to the types identified is shown in fig. 74.

Regarding the distribution of the *orzas* along the Guadalquivir Valley, the parabolic and the everted neck types are not found in the Low Guadalquivir but are seen in the Middle and High Guadalquivir (see chapter 5.4). Among 79 *orzas* identified, only one was reported in a funerary site; the character of these vessels, according to this data, seems mainly domestic.

Of the *orzas*, 87% (n=69) have no decoration or functional attachments. The rest show a distribution of linear-digital marks along the rim with 9% (n=7), handles below the rim (1% n=1), incisions and dots forming triangles (1% n=1) and *mamelón* (1% n=1).

Tulipas: Among the 24 *tulipas* identified, only one is found in the Low Guadalquivir. The rest are distributed in the Middle and High Guadalquivir Valley (see chapter 5.4.2). Regarding their distribution according to the type of site, again, only one is from a funerary site, while the rest are distributed between settlements, and settlements with funerary contexts. None have any kind of decoration.

Globular vessels: The percentage distribution of the types of globular vessels is shown in fig. 75.

The largest type has a spherical body, having again the sphere as one of the main referents in vessel shapes. It is followed by the ellipsoidal (with a body width larger than the height), then the bottles (vessels with a long neck) and only one carinated vessel (*fig. 75*).

The distribution of globular vessel types according to the site types is shown in fig. 76.

Among six bottles identified, four were found in funerary contexts, the other two were reported in settlements with funerary contexts; however, these last two (the bottles from Chichina and Eras del Alcázar) belong to the funerary part of the complex (cist burials). The possibility that bottles were exclusively used as grave goods during the Bronze Age needs to be further explored.

Spherical and ellipsoidal vessels are present both in settlements and settlements with funerary contexts (showing a more domestic character). The carinated vessel from Chichina is also part of the funerary part of the complex (*fig. 76*).

Cups: Cups have been one of the most representative pottery forms for the Full Bronze Age. They have been associated to the presence or influence of the so-called 'Argaric territory'. But the appearance of this form in the Low Guadalquivir (see chapter 5.4.2) makes it necessary to consider other ways of interpreting the spatial relationship between sites according to the pottery distributions. Given the low number (n=6) of cups included in this study, it is more accurate to analyse them in the context of their spatial distribution.

5.3 Analysis of Interactions Between Sites According to the Types Shared

All pottery forms are classified in types, and some types also have subtypes, identified according to specific elements that facilitate the distinction of one piece from another (e.g. decoration, orientation of the border or shape of the rim). Subtypes help to determine which vessels are more similar than others (or even of identical shape), and to better organise the typology according to the matches found.

Every piece of pottery corresponds theoretically to the site at which it was found, meaning that there is a bond between the comparison of pottery types by site and the likely spatial correlations considered for them in the past. At the first level of interpretation, it is possible to say that matches identified at the subtype level are evidence that these sites 'shared' at least the knowledge and the preference for the same type of pottery.

The word 'shared' implies that sites with a specific position in the Guadalquivir Valley had people interacting during the Bronze Age. Beyond materials, these people shared ideas, knowledge, values, costumes and other resources that supported social life. Pottery types are only a very small material expression of all the material and immaterial resources that may have been shared in the past. In this study, pottery has a role in describing such interactions, but cannot be considered as the only source to demonstrate them. Further and complementary elements are also needed (see chapter 6.1).

This pottery typology can also provide evidence of knowledge being shared between settlements. Such knowledge could have flowed in two different ways, first, by contributing to the local production of the same ware in different settlements and second, as an end product, distributed from only a few production sites. These two possibilities can be assessed in a primary stage, through the archaeometrical provenance analyses of pottery collected from different sites. Until there is a proper archaeometrical study, it will not be assumed that all sites had their own local pottery production, but only that they kept such materials in their local contexts.

The matches at the subtype level were also useful for calculating the proximity of the sites according to the coinciding types of wares used. The more matching subtypes found between two sites, the more shared knowledge and the more proximity (not in space but on a relational level) becomes evident. In order to calculate such levels of proximity, a matrix of relationships was elaborated. Every match identified between two sites was counted and transferred into a matrix that crossed the coincidences found between all 52 sites included in this study (*fig. 77*). General matches (at the level of shapes or types, for example) were excluded. Counting the more specific coincidences helps to show interactions between sites according to similar ways of keeping or producing pottery. [17]

The matrix produced showed that some sites had more matches than others. Certainly, sites with larger amounts of pottery excavated and published are going to have more matches. But such counts, more than measuring, are mainly showing interactions between settlements based on one type of information, in this case, pottery. It is possible to generate matrixes with further coinciding types of data, such as types of metal artifacts, types of funerary sites or any other comparable aspect.

All these matrixes at the end would show the same outcome: that people interacted with each other, moved between sites and shared resources.

17 To consult the matrix as well as the 604 pottery fragments included in this study, organised by types and subtypes, see Appendix II and III.

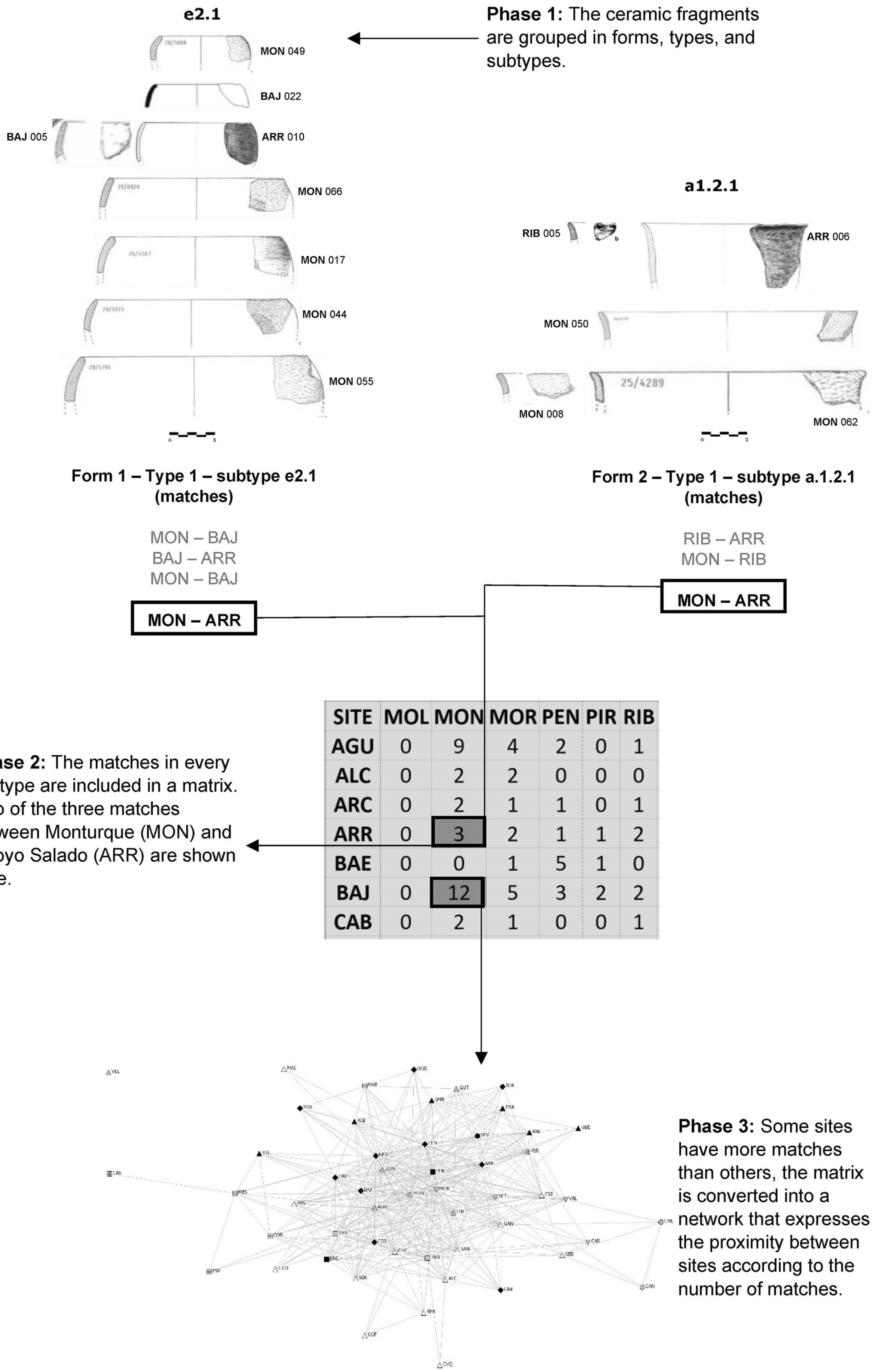


Fig. 77. Phases for identifying the level of interaction between sites according to the wares used.

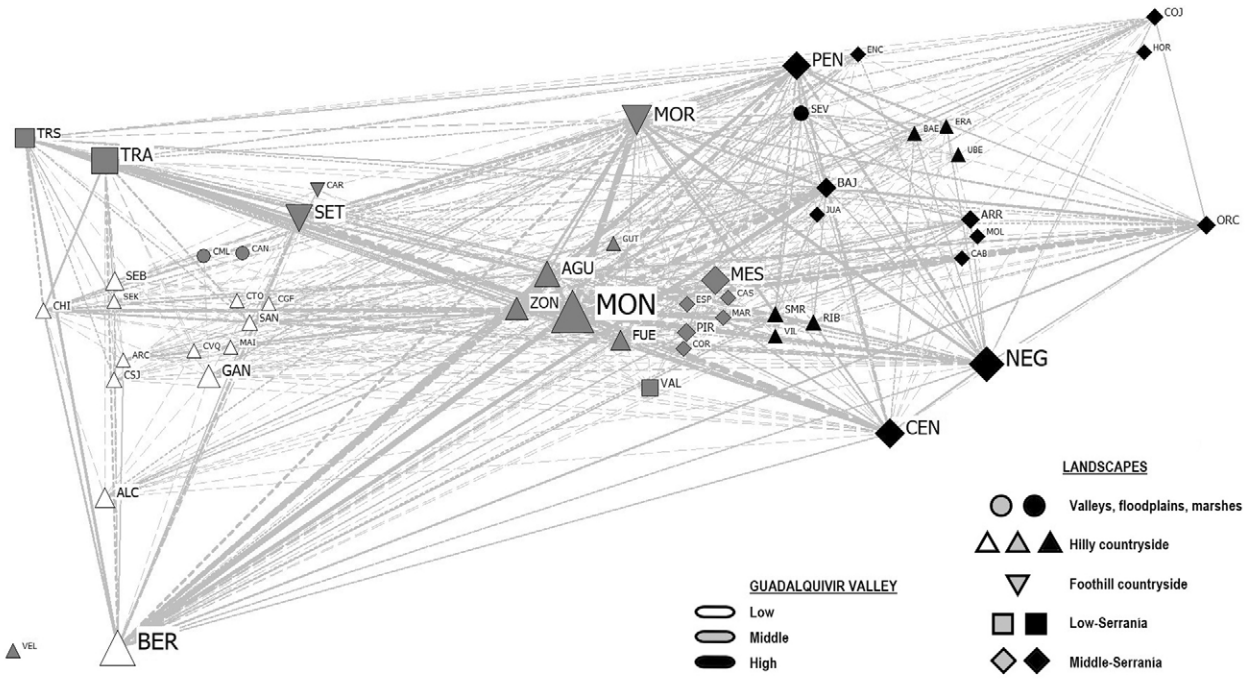


Fig. 78. Network of interactions between sites according to the number of matches in the pottery subtypes (Borgatti et al. 2002).

This is one of the main goals of this approach: showing that during the Full Bronze Age the Middle and Low Guadalquivir Valley regions were not empty, but had people living in them, moving between them and interacting with other groups along southern Iberia. Typologies, and the subsequent models elaborated from them, are used here not for delimiting a territory, but for generating awareness that space in the past was probably perceived in a different way. This method for showing spatial interactions in the past is not achieved through inventing arbitrary borders or arrows, but through using the provenance of all the material records or data obtained to generate models which may explain the flow of material and immaterial resources along the landscape. This approach produces something that could be more verifiable in reality than a 'territorial' map.

In order to better visualise the results obtained by the matrix, this was transformed into a network, using a software for social network analysis (Borgatti et al. 2002). Social networks help to understand the degree of interaction among the different components interacting (nodes). They also display the different roles played by each of them in the network, according to a determined **centrality** measure. Centrality analyses show how important a node is for the structure of the whole network (Borgatti et al. 2002). In this case, the betweenness centrality was calculated for the sites included into the matrix of relationships elaborated before. Betweenness centrality expresses the number of times a node lies on the shortest path between other nodes; it shows which nodes act as bridges in the network (Disney 2020). In the case of the sites included into this typological analysis, it shows which sites are influencing the flow of information – about pottery types – around this system (Disney 2020). Theoretically, the sites with the highest betweenness score (see Appendix IV) are the most influential in the dynamics or flows occurring in the network.

The betweenness centrality analysis produced a network graph representing how information flowed across the Guadalquivir Valley (*fig. 78*). The resulting network shows how information about the elaboration or consumption of different pottery types flowed and which sites were relevant for such a dynamic. Despite this model being elaborated with a pottery typology, the network obtained provides evidence that, along with this material, many other resources were circulating and linking the region. Cartographic representations of such interactions can be used to illustrate the flow of people, animals, material and immaterial resources during the Bronze Age.

After obtaining the network, the software allows for the customisation of the nodes with additional information that helps to better interpret the interactions shown. The nodes in the network were customised according to four criteria.

- The location of the nodes corresponds to their geographical position. Each node position has its corresponding geographic coordinate.
- The size of the labels represents the betweenness score obtained (see Appendix IV) and the width of the lines depends on the number of coincidences in pottery types. The biggest label sizes show the highest scores; these sites are the likely 'bridges' where information flows across the network.
- Nodes colours show the regions of the Guadalquivir Valley where the sites are located: Low Guadalquivir in white; Middle Guadalquivir in grey; High Guadalquivir in black.
- Nodes shapes represent the geographical landscapes identified by the Andalusian Agriculture, Fishing and Sustainable Development Council (Junta de Andalucía 2020):
  - Valleys, floodplains and marshes (circle)
  - Hilly countryside (upper triangle)
  - Foothill countryside (down triangle)
  - Low *Serranía* (square)
  - Middle *Serranía* (diamond)

Colours and shapes were assigned to every site following the criteria mentioned above.

According to the lines connecting the nodes, it is possible to see how the three regions of the Guadalquivir Valley were all interconnected. There was probably an important flow of information going on, and the size of the labels shows that sites such as Monturque (MON) and the ones surrounding it acted as bridges between the three different regions of the Guadalquivir Valley.

Not only Monturque may have acted as a bridge. One of the most relevant results of this analysis is that sites that look peripherical in the network act as bridges as well, which can be recognised in the high betweenness scores identified in sites such as Cerro del Berrueco (BER), La Traviesa (TRA), Peñalosa (PEN), Cerro de la Encina (ENC) and Cuesta del Negro (NEG) (see Appendix IV). All these sites helped in the dynamics not only inside the study area, but also outside, linking with other geographical regions such as the southeast Iberian Peninsula, the Meseta and the Guadiana Valley.

Regarding the types of landscapes, all the Low Guadalquivir Valley sites are set in the hilly countryside, taking advantage of the slight elevations next to big water bodies such as the already clogged *Lacus Ligustinus*. The countryside and the *Serranía* (with settlements at the foothills of the Sierra Morena or the Baetic System) are very close to each other, in terms of matches between the types of pottery identified. This is represented by the size and the number of lines connecting these types of landscapes in the network.

The landscape types distributed inside the network show a trend observed in other sites during the Bronze Age in southern Iberia; hilly and mountainous areas seem to be preferred for settlements, with only three sites located on the floodplains.

The resulting network of interactions was combined with a Geographical Information System (GIS) to complement the matches observed, and especially to observe further spatial expressions of the interactions identified.

5.4 Analysis of Spatial Distribution of the Pottery Types along the Guadalquivir Valley

Typologies have been the fuel for cultural-historical approaches. Generally, under this approach, pottery typologies are subscribed to a territory delimited by the archaeologist, defining an identity for the people and the space that is described. They have also been useful tools for organising the material record and finding links between different sites or regions.

Interpreting the material record sometimes requires deciding the way in which these interactions between people are going to be described. Some matches may be associated with 'influence', others with 'invasion'. An accurate definition of the character of these interactions depends on the integration of diverse types of data.

The Guadalquivir Valley is problematised by having some areas understudied for the Bronze Age (Bartelheim et al. 2021; see chapter 2.2). Most of the findings in this region have been associated with the 'influences' of the 'Argaric territory' or the 'Southwest Bronze'; but neither the distribution of types, nor the regional links between them have been clear.

The methodology presented here intends to give an alternative perspective for the treatment of the material record along the Guadalquivir Valley. The typology elaborated does not integrate a new delimited 'territory' nor has its own 'identity' against other territories as El Argar. This typology also abandons perspectives such as 'acculturation' or 'territorial expansion' that have not been properly proved for the Full Bronze Age.

This approach is just the first step of a spatial analysis that intends to show the flow of information, ideas and people in the south of the Iberian Peninsula during this period. As mentioned above, GIS can be used to show the spatial expressions of this flow. GIS is also a very useful tool for understanding and describing landscapes from the past. It helps to go beyond the classic cartographic representation of a delimited map of a territory with an identity based only in its material record. GIS also helps to spatially organise the different resources identified along the landscape as well as the ways they interact. The procedure followed for the GIS analysis is described below.

A Digital Elevation Model (DEM) for the Guadalquivir Valley was downloaded from the Junta de Andalucía's mapping service (*fig. 79*). DEMs are raster maps that contain height information for a set of pixels arranged along the earth's surface. Each pixel provides information on the height above sea level across the area defined for the map (Conolly/Lake 2006). In this case, the model contains information of the elevations along the Guadalquivir Valley and the surrounding mountains in the Sierra Morena and the Baetic System.

The DEM was inserted into the GIS, and the percentage of slope on the terrain was calculated with one of the tools provided by the GIS for raster analyses. It generated a new raster map with information of the percentage of slope in every pixel (*fig. 80*). This slope layer contains relevant information for calculating the cost of movement between two points across the surface.

After inserting a third layer in the GIS, with vector points indicating the location of the 52 sites included in this study (*fig. 81*), the Least Cost Path (LCP) between pairs of sites was calculated. An LCP represents a hypothetical route that goes across the surface, following the easiest path between two points, according to a predefined set of costs. The resulting LCP shows the route with less accumulated cost (Conolly/Lake 2006). There are mainly three types of costs that can be considered when reconstructing a hypothetical path: slope-dependent, land cover and sociocultural costs (Herzog 2013). Land cover was not taken into account, due to the lack of information about the soils and the exact vegetation cover during the timeframe studied; sociocultural costs were also discarded, considering the lack of information regarding the character of the interaction between sites. In this opportunity, slope-dependent costs were chosen for elaborating the LCPs. So, the LCPs here calculated, correspond to the paths that avoid the surfaces with the highest positive or negative slopes.

The criteria for deciding which sites were going to be linked through LCPs were based mainly on the matches found during the elaboration of the pottery typology. All the LCPs elaborated composed a vector (line) map with a hypothetical network that helped to show the high spatial interaction between the different regions along the Guadalquivir Valley (*fig. 81*).

Both networks, the one elaborated in the GIS and the social network (see chapter 5.3), are different ways of representing interactions between sites. Whereas the one made with LCPs expresses these interactions spatially, the graph indicates their intensity and their compared weight.

Despite giving a representation of spatial interactions, LCPs are not enough evidence of spatial links between sites in the real terrain. They are just models that need to be validated in the real world. Therefore, it was necessary to find evidence of real routes (Herzog 2013). One way of solving this issue was considering the current livestock routes in Andalusia.

It is important to note that migratory herding has been evidenced in the Guadalquivir Valley since at least Iberian (pre-Roman) times (Klein 1985). The knowledge, and use, of these livestock routes has been also documented for the Roman period (Blanco 1999). Today, most of these ancient routes are still in use for the same purpose and are very important for the mobility of cattle and

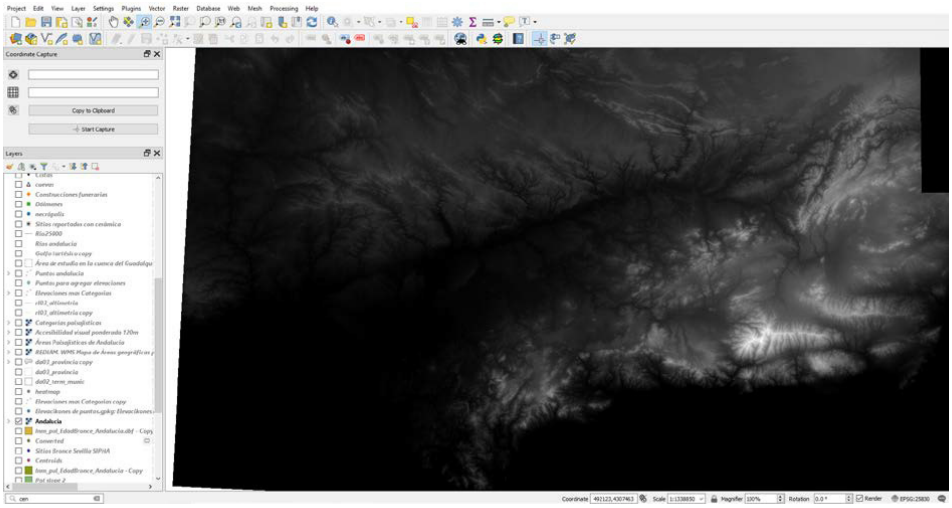


Fig. 79. Raster layer with the Digital Elevation Model (DEM) of the Guadalquivir Valley, downloaded from the Junta de Andalucía's mapping service. Render type: single band grey, colour gradient: black to white, where black represents the lowest elevation (0 m.a.s.l.) and turns white according to the elevation increase. ©QGIS 2020.

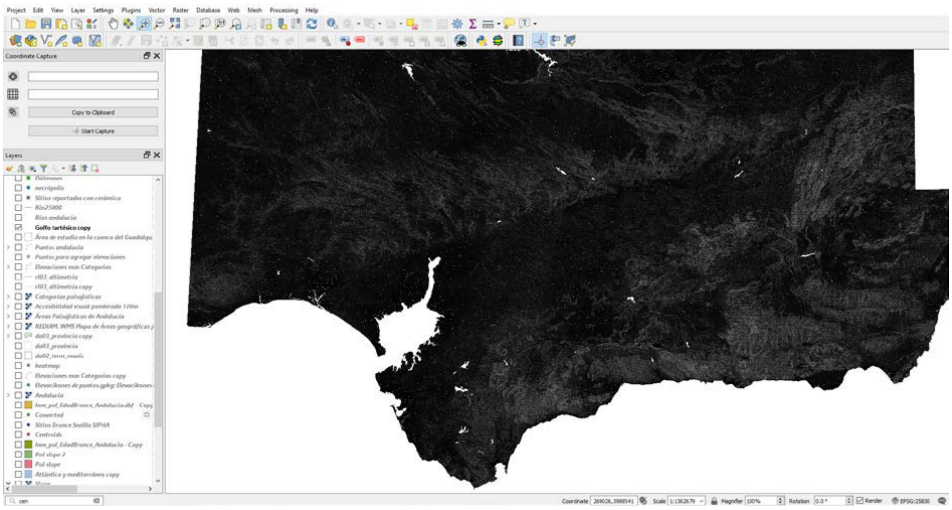


Fig. 80. Raster layer with the slopes calculated from the DEM. The sea/ocean coast was clipped as well as the former *Lacus Ligustinus*. Render type: single band grey, colour gradient: black to white, where black represents the lowest elevation (0 m.a.s.l.) and turns white according to the elevation increase. ©QGIS 2020.

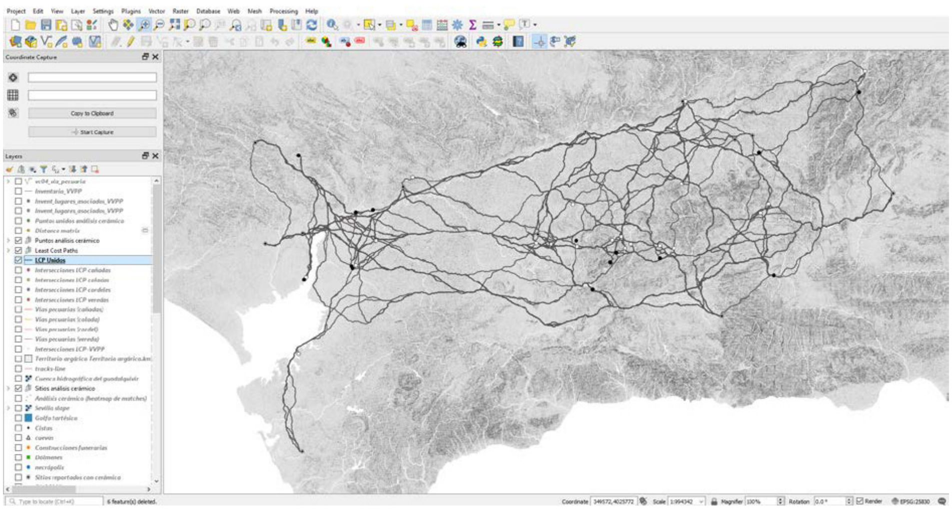
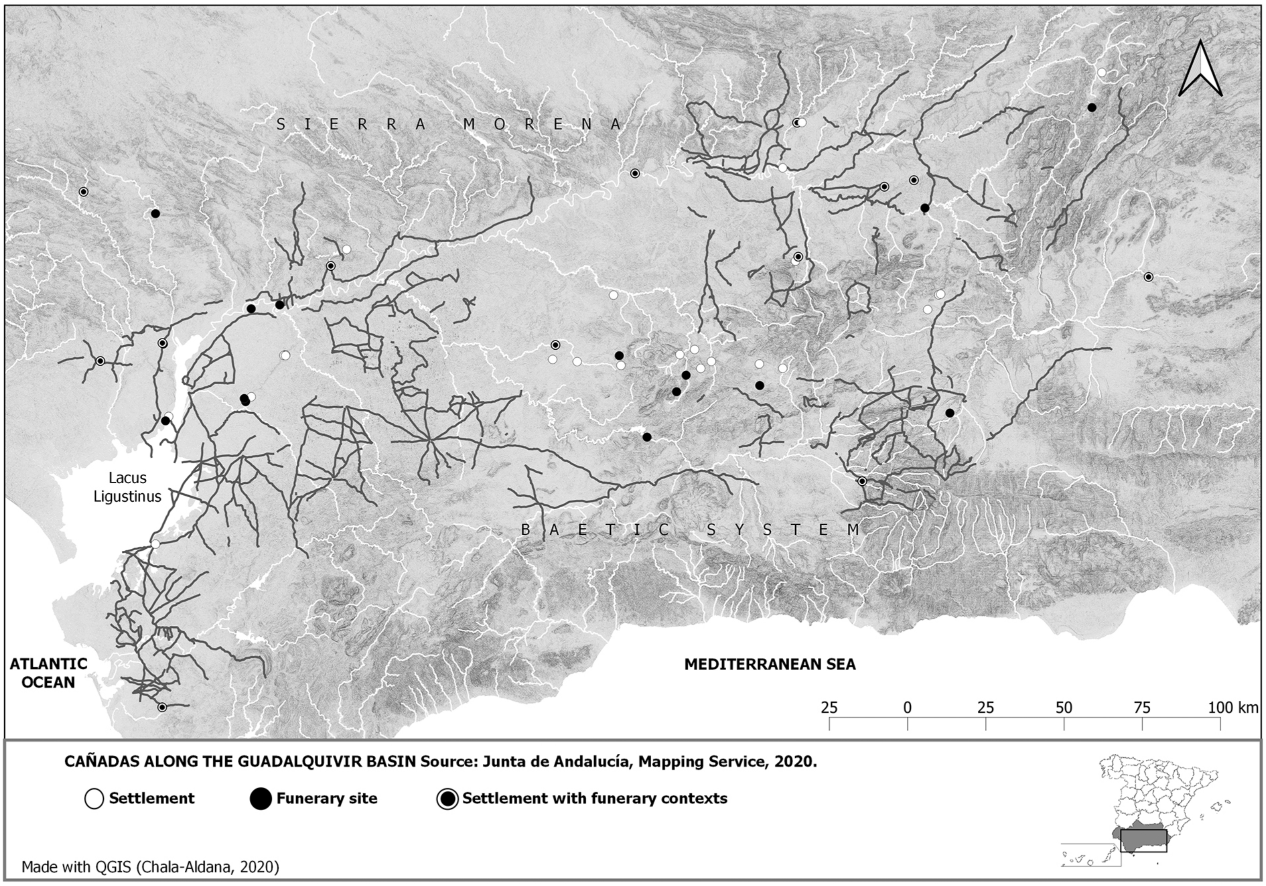


Fig. 81. LCP network between the 52 sites, calculated according to the matches in their ware. The slope map layer is in the background, its colour gradient was inverted (now white represents the lowest elevation [0 m.a.s.l]) to facilitate the view of the other layers. © QGIS 2020.



Map 10. *Cañadas* along the Guadalquivir Basin. Points on the map are the Bronze Age sites included in this study. Positions and names are the same as the ones displayed in map 9. Numbers were removed to emphasize the livestock path.

ovicaprids across the Guadalquivir Valley and beyond, being finally another component of the landscape (Caballero Cobos 2014). Additionally, herding of ovicaprids has also been documented during the Chalcolithic and the Bronze Age (Murrieta Flores et al. 2011a; 2011b; Wheatley et al. 2010). Despite the changes in the landscape during the last millennia, herding practices have taken advantage of the same terrain, leaving traces that could be hypothetically interpreted as the diachronic accumulation of movements, without implying the continuous uninterrupted use of such paths.

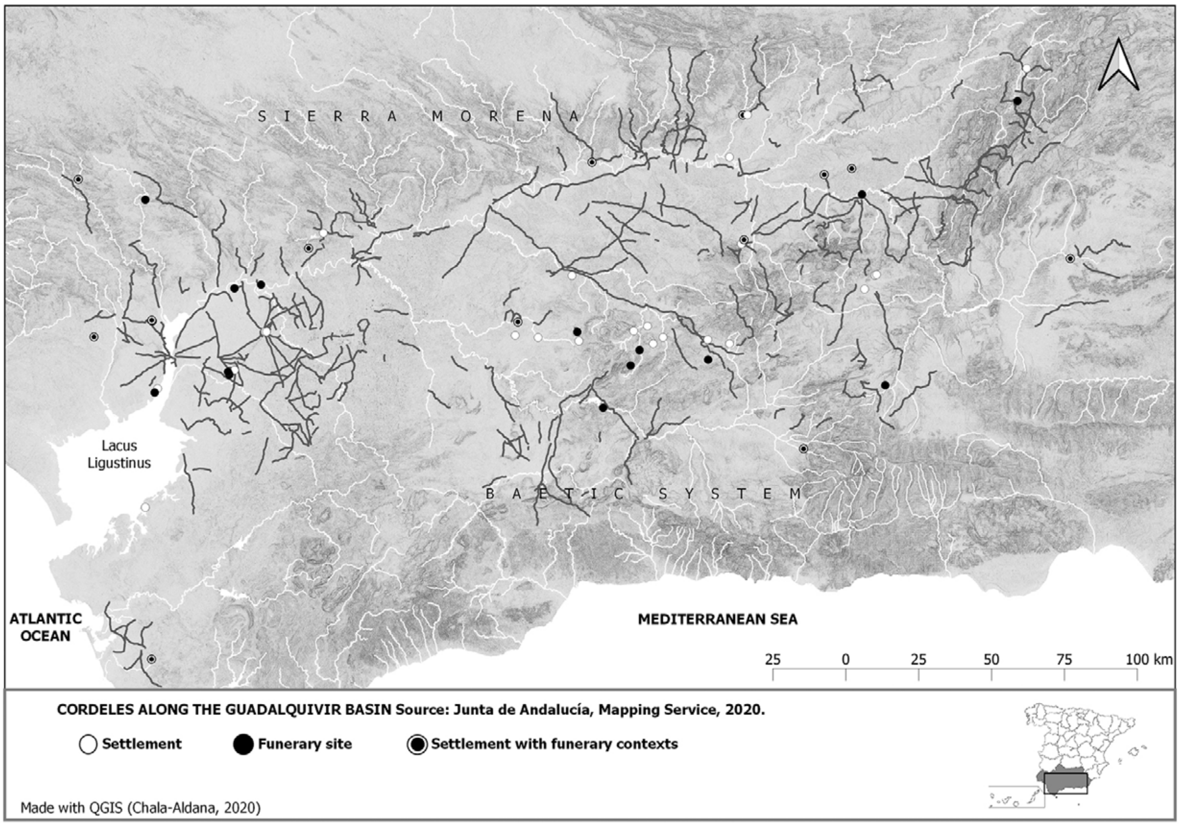
There are the four types of livestock paths according to their size (Blanco 1999):

– *Cañadas*: paths with a width that does not exceed 75m (*map 10*),
– *Cordeles*: paths with a width that does not exceed 37.5m (*map 11*),
– *Veredas*: paths with a width that does not exceed 20m (*map 12*),
– *Coladas*: paths with a width lower than 15m (*map 13*).

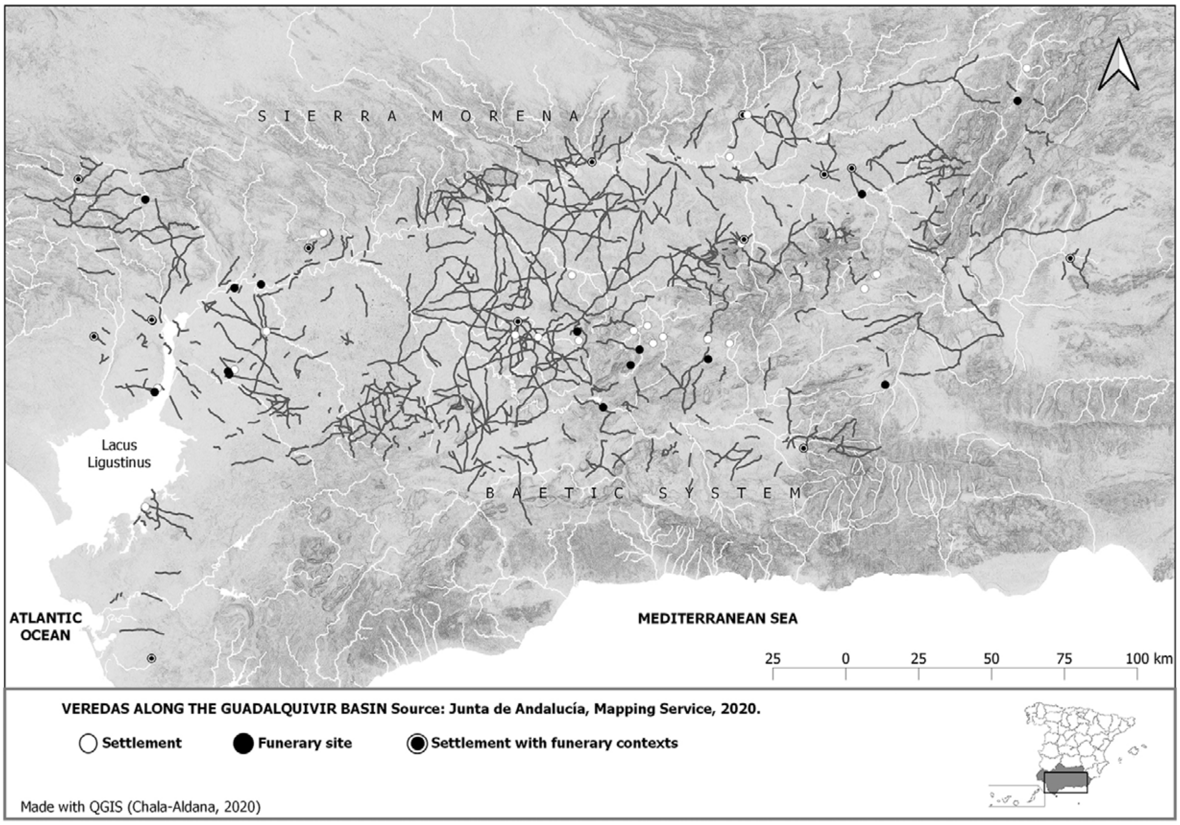
As with the DEM, the vector map with the livestock routes (digitalised from the real terrain) was downloaded from the website of the Junta de Andalucía's mapping service. The metadata (information) that comes with the vectors allowed to classify the paths according to each one of the four types known. These vectors (lines) were crossed with the ones produced by the LCP network in order to see the intersections between the two types of information (*fig. 82*).

After running the algorithm for comparing both the LCPs and the livestock paths, the resulting map showed a series of vector points marking the sectors where both LCPs and livestock paths intersected (*map 14*). Most of these intersections were not perpendicular but followed the same direction as the real path (*fig. 82*). Pearson's χ^2-test was performed to check whether the theoretical model resulting from crossing LCPs and livestock paths arose by chance or not (*fig. 83*).

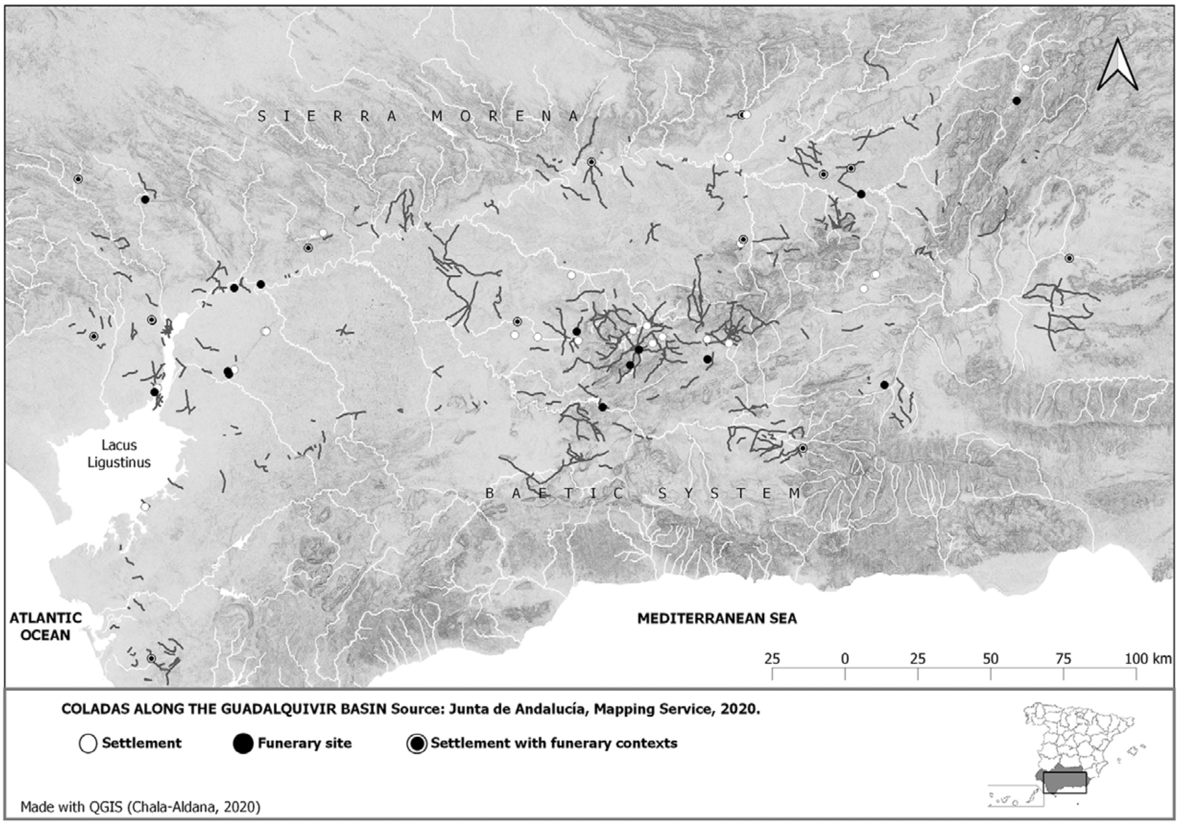
According to the results of Pearson's χ^2-test, the model generated with GIS is far from being



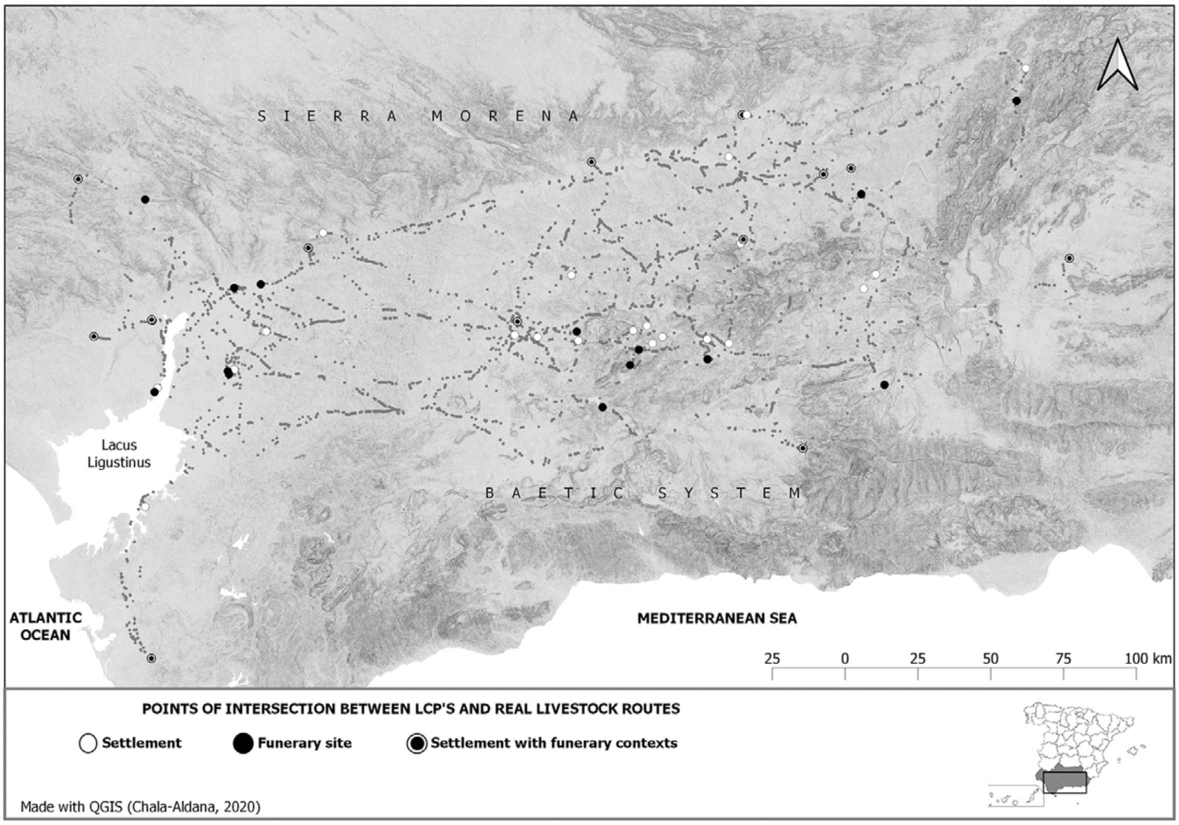
Map 11. Cordeles along the Guadalquivir Basin. Points on the map are the Bronze Age sites included in this study. Positions and names are the same as the ones displayed in map 9. Numbers were removed to emphasize the livestock path.



Map 12. Veredas along the Guadalquivir Basin. Points on the map are the Bronze Age sites included in this study. Positions and names are the same as the ones displayed in map 9. Numbers were removed to emphasize the livestock path.



Map 13. Coladas along the Guadalquivir Basin. Points on the map are the Bronze Age sites included in this study. Positions and names are the same as the ones displayed in map 9. Numbers were removed to emphasize the livestock path.



Map 14. Intersections between LCPs and real livestock routes. Points on the map are the Bronze Age sites included in this study. Positions and names are the same as the ones displayed in map 9. Numbers were removed to emphasize the intersection points.

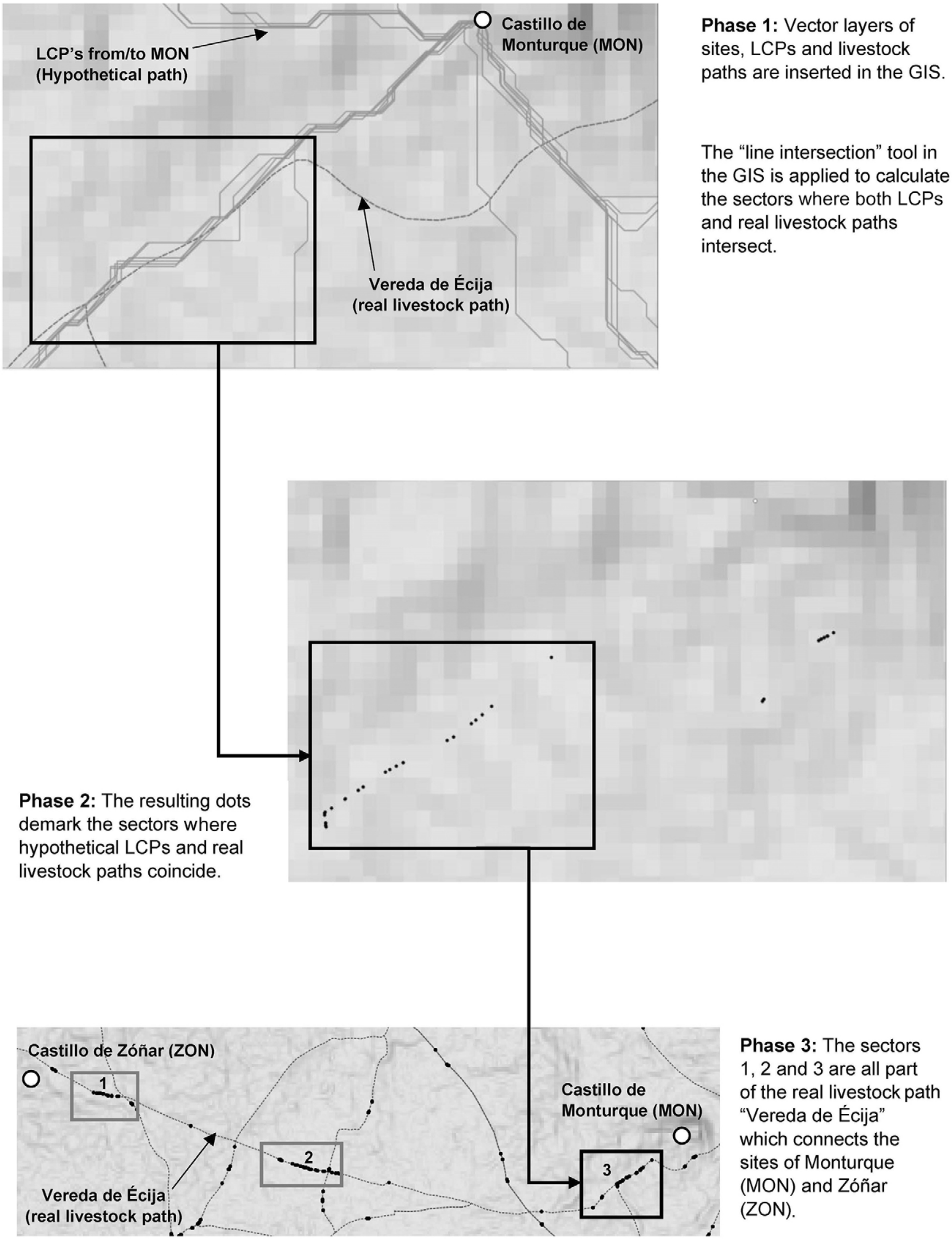
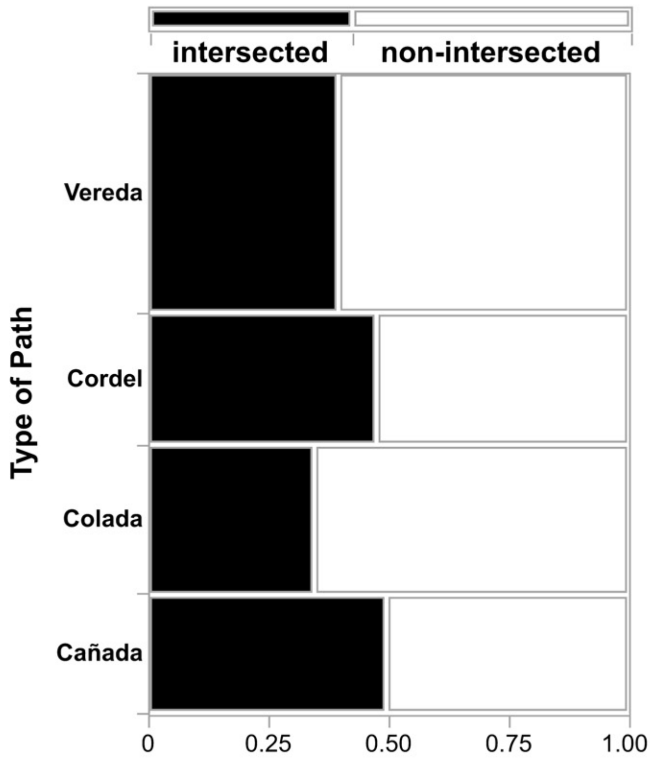


Fig. 82. Phases for identifying real connections between Bronze Age sites.

Contingency Analysis of LCP Model Intersections by Type of Path

Mosaic Plot



Contingency Table

LCP Model Intersections

Type of Path	Count / Expected	intersected	non-intersected	Total
Cañada	Count	197	199	396
	Expected	167.013	228.987	
Colada	Count	172	320	492
	Expected	207.501	284.499	
Cordel	Count	208	228	436
	Expected	183.883	252.117	
Vereda	Count	315	476	791
	Expected	333.604	457.396	
Total		892	1223	2115

H_0: There is no dependence between LCP model intersections and the real livestock paths, in other words, the theoretical model resulting from crossing LCPs and livestock paths arose by chance.

H_1: There is dependence between the LCP model and the real livestock paths, which means that the theoretical model did not arise by chance.

Tests

N	DF	-LogLike	RSquare (U)
2115	3	13.564862	0.0094

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	27.130	<.0001*
Pearson	27.079	<.0001* → **H_0 Rejected**

The distribution of the least cost paths (LCPs) across real livestock path types differed significantly from random.

(Pearson's X^2= 27.079, df= 3, N= 2115, p<0.0001)

Fig. 83. Pearson's χ^2-test between the theoretical LCP model and real livestock routes.

a product of chance, which means that there is a probability that current livestock routes could also represent ancient movements between the sites selected in this analysis. Considering that the use of these livestock paths has been evidenced since pre-Roman times, these calculations suggest that their origin could be even more ancient, possibly reaching back to prehistoric times. In the end, Bronze Age people had to move through the same space, transporting objects, herds and cattle. These livestock paths may be the result of diachronic movements related from prehistoric herding practices to protohistoric trade and roman territorial expansion.

Identifying real routes connecting Bronze Age sites may provide new possibilities for future surveys around these paths, increasing the probability of finding other undiscovered Bronze Age sites in a region that still needs to be properly surveyed.

5.4.1 Corridors Identified

According to the model obtained, several corridors linking different corners of southern Iberia could be identified. The main ones are listed below and represented in map 15.

Corridor 1, Guadalquivir Route: This route follows the whole course of the Guadalquivir River, starting from the High Guadalquivir in the region around Úbeda and leading in western direction, always following the river until its ancient mouth next to Coria del Río. This route is the 'backbone' that connects the southeast with the southwest. Likely, this route was complemented by the use of the river itself as a traffic route (*map 15*: dark blue line).

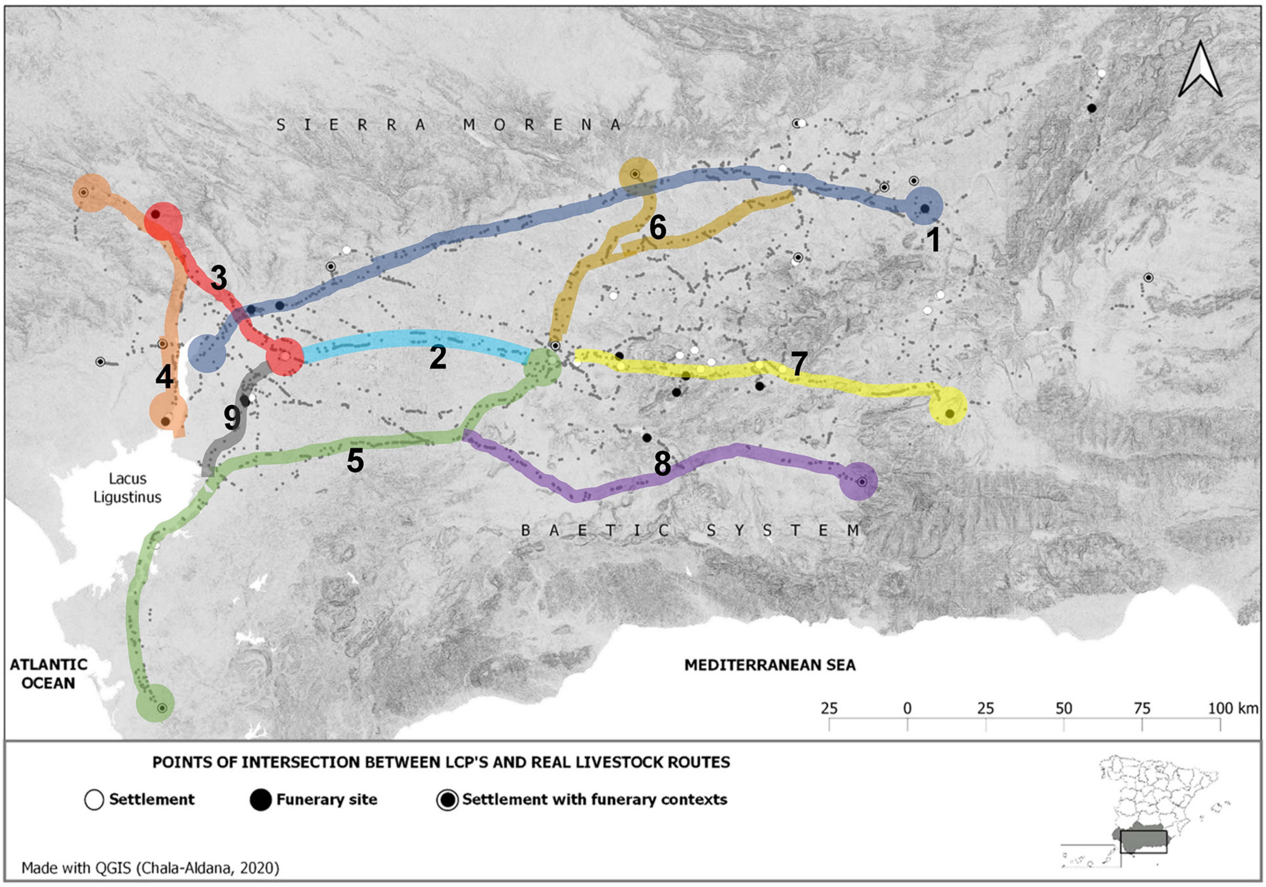
Corridor 2, Campiña–Los Alcores Route: This route starts from the south of the countryside of Córdoba, next to the sites of Monturque (MON) and Castillo de Aguilar (AGU). It leads in a northwest direction by the 'Colada de Fuente Vieja', connecting with the *vereda* from Écija to Lucena. Then it turns west along the 'Cañada real de Don Francisco' and the 'Cañada real de la Carretera a Madrid' until it connects with the 'Cordel de la Vereda de la Venta de la Portuguesa al Mirador', which arrives in the Los Alcores region in today's Carmona next to the sites of Plaza de Santiago (SAN) and Calle Torre del Oro (CTO) (*map 15*: light blue line).

Corridor 3, Los Alcores–Rivera del Cala Route: This route starts from the Los Alcores region. It leads northwest by the 'Vereda de Cantillana', crossing the Guadalquivir and reaching the 'Volada de Burguillos'. It connects with the 'Vereda del Barranco del Infierno' until it reaches the riverside of Cala in the Sierra Morena, next to the sites of El Trastejon (TRS) and La Traviesa (*map 15*: red line).

Corridor 4, El Aljarafe–Rivera del Cala Route: This route starts next to the sites of Cerro San Juan (CSJ) and Cobre las Cruces (SEK–SEB). It leads in northern direction by the 'Colada del Camino de Palomares a Sevilla', then follows a section of the 'Cordel de la Vereda de Campogaz' until it reaches the 'Vereda de Guillena a Castiblanco', following the same path as the 'Vereda de Sevilla y Guillena' until the 'Vereda del Barranco del Infierno', conducing, as Corridor 3, to the riverside of Cala (*map 15*: orange line).

Corridor 5, Campiña–Atlantic Coast Route: This route starts from the countryside of Córdoba going in a southwest direction by the 'Cañada de Granada', connecting with the 'Cañada real de Marchena a Estepa' before reaching the 'Cañada real de Morón', where the path turns west. The path links with the 'Vereda de Herrera', 'Cordel de Barros' and 'Cordel del Gallego' until it reaches the eastern coast of the *Lacus Ligustinus*. Here it turns in a southern direction by the 'Cañada de Sanlúcar a Sevilla', the 'Cañada de Lebrija', 'Cañada de Guadabajaque, Corchuelo y Moro', 'Cañada de Cadiz' and 'Cañada real del camino de Paterna' until it reaches the 'Cañada real del Camino de Medina Sidonia' next to the site of Cerro del Berrueco (BER) (*map 15*: green line).

Corridor 6, Campiña–High Guadalquivir Route: This route starts at the countryside by the 'Vereda de Mora', turning north by the 'Cordel del Cortijo del Rey', following the path by the 'Vereda de Los Limones', the 'Vereda de Córdoba a Cabra' and the 'Vereda de Montilla a Bujalance'. Then it takes the 'Vereda de Castro a El Carpio' until the 'Cordel del



Map 15. Routes along the Guadalquivir Valley identified from the livestock routes crossed with the LCP model.

Camino de Córdoba', where the path turns to the east until the 'Colada de Los Almendros', reaching the site of Llanete de los Moros (MOR), and from there, connects with the Guadalquivir Route until the high valley (*map 15*: brown line).

Corridor 7, Campiña–Guadix Route: This route starts at the countryside by the 'Cordel de la Fuente del Chorrillo' going east by the 'Cordel de Doña Mencia a Carcabuey', 'Cordel de Córdoba a Granada', 'Cordel de Baena', 'Vereda de Martos', 'Colada de Frailes', 'Cordel de Jaén a Trujillos', 'Cañada real de la Atalaya de Cogollos' and 'Cañada real de Bogarre' until it reaches the 'Cañada real de Iznalloz a Guadix' and entering to Guadix and Baza Valleys (*map 15*: yellow line).

Corridor 8, Sierra Nevada–Atlantic Coast Route: This route starts from the foothills of the Sierra Nevada, next to the site of Cerro de la Encina (CEN). It leads west by the 'Vereda del Camino de Los Abencerrajes', 'Colada de Las Calesas' and 'Colada del Hoyo' until it reaches the 'Cordel de Montefrío', which connects with the 'Cañada real de Sevilla a Granada', 'Cordel de Santillán a Mollina y Málaga', 'Cañada real de Sevilla a Antequera', 'Vereda del Ventorrillo del Chacho a Fuente de Piedra y Antequera' and 'Cañada real de Granada a Sevilla', until it reaches the 'Cañada real de Morón', which follows the same path as Corridor 5 from the same point until the site of Cerro del Berrueco (BER) (*map 15*: purple line).

Corridor 9, Los Alcores–Atlantic Coast Route: This route starts in the Los Alcores region, following the 'Vereda de las Ventas de Sevilla' southwest, turning to the south at the 'Cordel del Término y de la Camorra' and 'Cordel de Mairena', until it reaches the coast of the *Lacus Ligustinus* by the 'Cañada real de la Armada' and 'Cañada real de Utrera a Jeréz', finally linking with the 'Cañada de Sanlúcar a Sevilla' and following the same path from here, until the site of Cerro del Berrueco (*map 15*: grey line).

5.4.2 Archaeotopograms and Pottery Distributions

After verifying that the model obtained could be used for representing movements between Bronze Age sites, the next step was to generate a spatial representation of the interactions between sites for each pottery subtype identified. Representing such interactions by only displaying lines (prehistoric paths) connecting dots (Bronze Age sites) would ignore the space surrounding them, underestimating the ability of human groups to integrate the whole landscape into their daily lives.

One way of cartographically representing the potential movements of people through the landscape (and beyond the paths) is by generating 'archaeotopograms' (Wilkinson 2014). Such models use 'cost-surface' analysis in GIS to explain the flow of people, material and immaterial resources across a region. Basically, they calculate the costs of moving in any direction from a determined point (or group of points) to surrounding areas, which are selected according to specific criteria. Cost-surface analyses are usually elaborated using both slope-dependent costs based on the information of the terrain (i.e. raster maps of elevation and slope) and calculations about time and velocity (energy) spent walking (*fig. 84*). Further costs can be included, depending on the needs of the research.

In this particular case, the GIS cost-surface analysis used the simple Euclidean distance between a predefined starting point and several matching sites to assess the effects of topography (slope) and terrain (land cover) on movement (Ejstrud 2005). Once the GIS software calculated such effects for each pair of the sites considered, all these were summed, providing a raster map with a gradient that expresses, in colours, the accumulated effort and energy spent from the departure point to a group of sites into the study area, according to distance, slope and land surface (*fig. 84*). The closer to red, the higher the cost in energy and time necessary to reach sites within this colour; the closer to blue, the higher the chances of interaction and accessibility to whatever resources these sites can provide.

The criteria used for matching sites were pottery typology (see chapter 5.2) and chronology. Cost-surface analyses were elaborated for each group of sites sharing the same pottery subtypes. The resulting maps showed the most accessible areas by walking as well as the space of interaction between sites. The space of interaction represents the areas where movement costs are lower and the chances for interactions between sites are higher. In this particular analysis, such interactions are based on the knowledge around the pottery produced or kept; as mentioned above, along with pottery, many other material or immaterial resources could have circulated inside this space.

Despite one cost-surface raster map being elaborated for each pottery subtype identified, not all of them were used to elaborate the archaeotopogram. It was necessary to have a chronological control for the information obtained, so only the sites overlapping in both pottery subtypes and radiocarbon chronologies (*fig. 85*) were included. Using the 'raster calculator' tool in GIS, the costs of all the raster maps grouped under the same chronology were summed. The sum of these accumulated costs helped to elaborate a final version of the archaeotopogram, showing the space of interaction between sites for a defined span of time.

Whereas a single cost-surface map shows the potential movements across the landscape and the potential space of interaction for a single group of sites, the sum of several cost-surface maps by pottery subtypes in further groups is capable of showing the degree of interaction for the whole region (at least based on pottery). Therefore, these archaeotopograms are the sum of several costs-surface maps. This is an accumulative model, which means that further elements (expressed in vectors) and costs (expressed in raster maps) could also be included to explain the dynamics occurring inside the study area. So, to the resulting 'chronologically controlled' archaeotopogram, the model of prehistoric paths and the location of resources surrounding the sites were added to map the landscape where people, livestock and knowledge about pottery, along with other material and immaterial resources, could have circulated (*map 28*).

This approach is not a result *per se*, but a starting point for further explorations. Archaeotopograms could be useful for further surveying and analyses on mobility across the southern Iberian Peninsula or for cartographic representation of

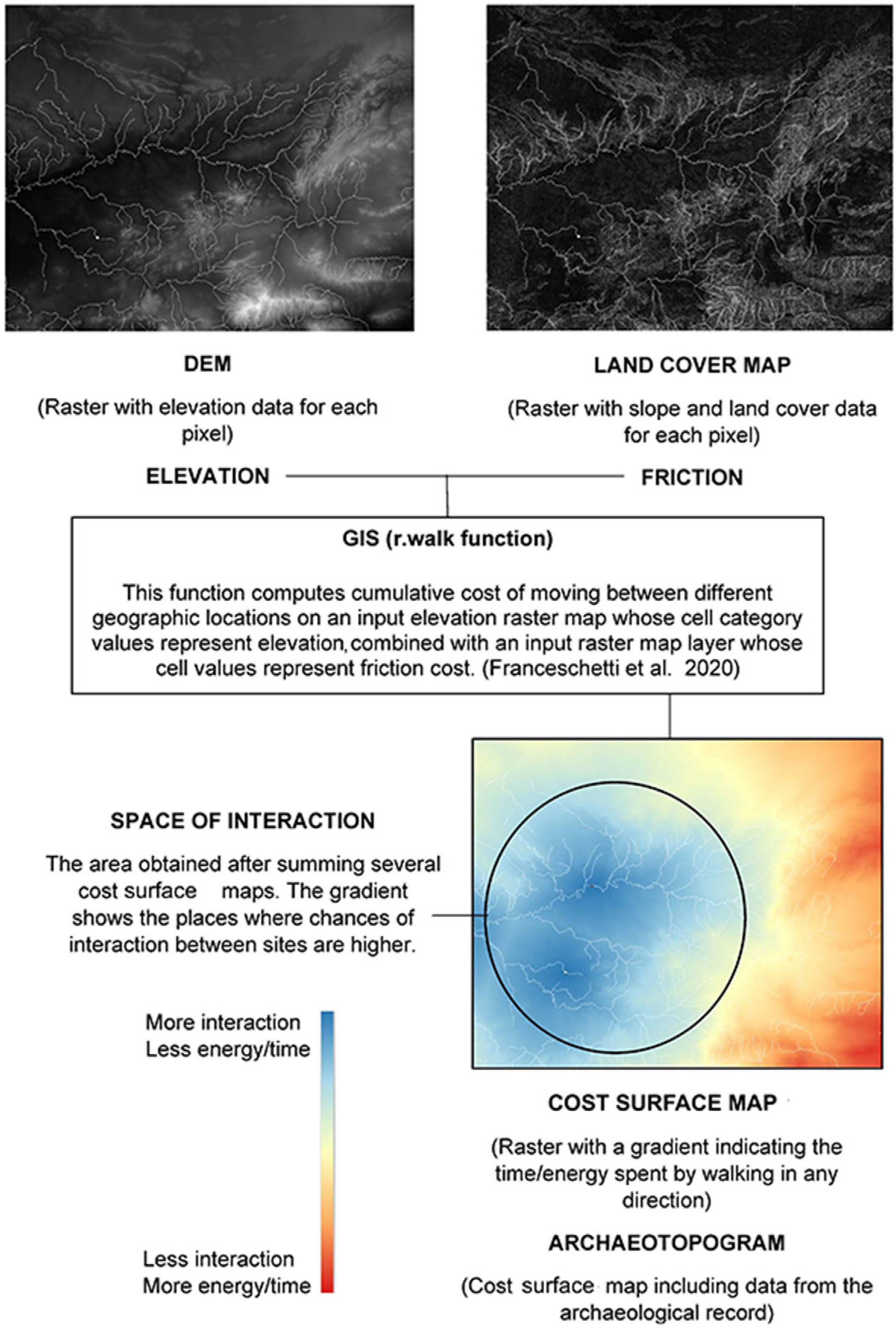


Fig. 84. Process of elaboration of an archaeotopogram.

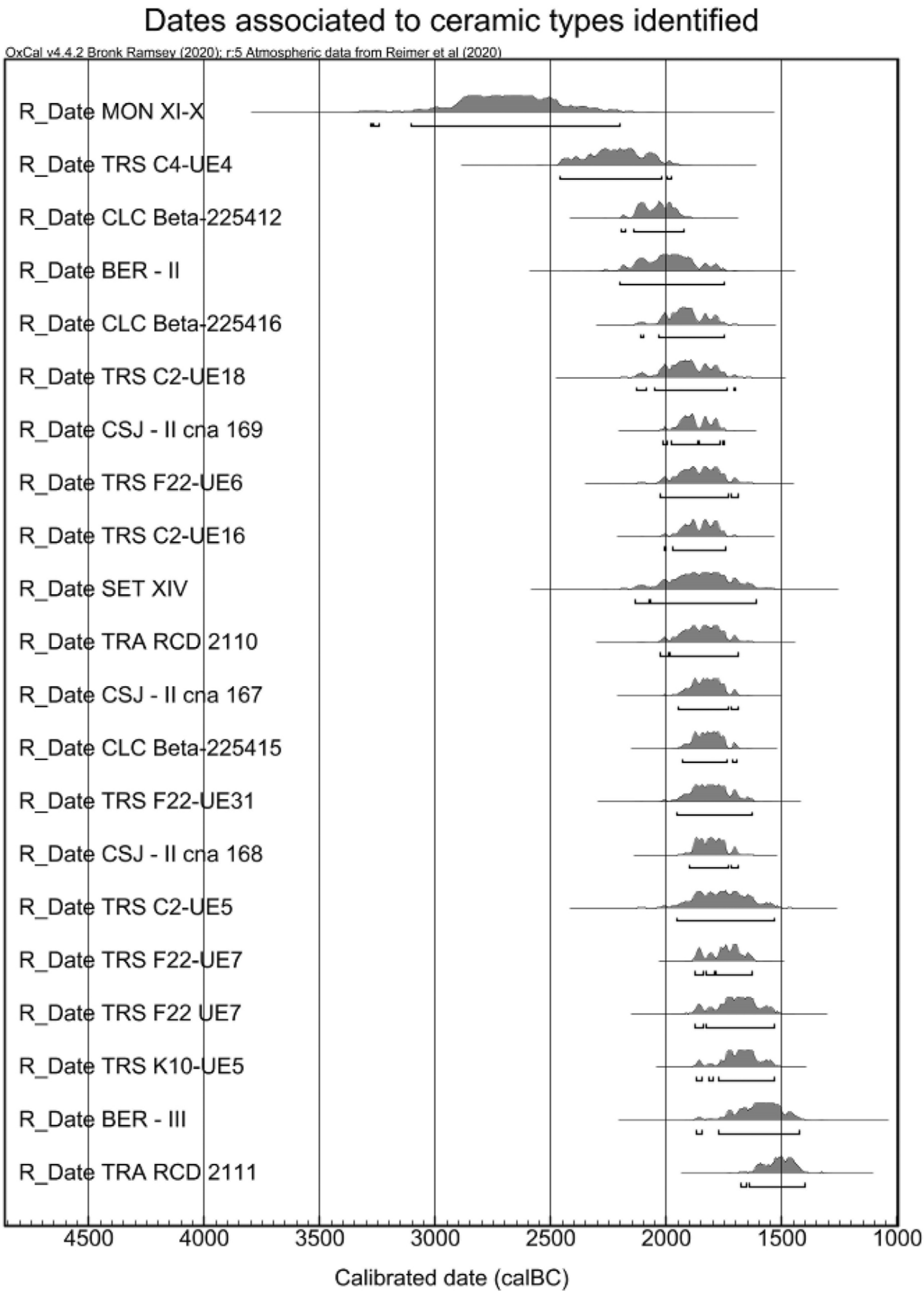


Fig. 85. Dates associated to the sites included in the archaeotopograms.

a diverse set of elements that composed the prehistoric landscape, elements that can be progressively incorporated into the model as they are encountered.

The archaeotopograms elaborated are presented in the following pages. They are named after the sites that served as starting point for the calculations.

Monturque (MON; No. 31)

Radiocarbon dates are only available for Monturque strata XI–X. Despite being obtained in the 1980s and having a very high ± deviation, they could still provide some clues about the chronological situation of the pottery groups identified for each layer. Monturque has prior levels with Chalcolithic and Bell Beaker pottery without any hiatus or break along the sequence, showing an apparent continuity in the occupation of the site for the transitional Copper-Bronze Age (López Palomo 1993).

The Bronze Age pottery, distinguished by the absence of decoration and the burnished treatment of the surface (López Palomo 1993), lies in level 33 of stratum X, levels 28 to 32 of stratum IX and 24 to 27 of stratum VIII. The pottery subtypes identified in the typology and the sites sharing them with Monturque are listed in table 5.

The space of interaction for stratum X of Monturque (*map 16*) shows a more intense blue gradient towards the High Guadalquivir Valley as well as the Guadix and Baza Valleys. Most of the pottery subtypes are shared with sites from these regions, such as Marroquíes Bajos (twelve subtypes), Cerro de la Encina (13 subtypes) and Llanete de los Moros (15 subtypes). The quantity of subtypes coinciding with other sites is enough to consider that the interactions may have occurred along the whole Guadalquivir Valley.

Mobility departing from the countryside geographical landscape (where Monturque is located) was possible using several corridors that connected it with practically every corner of southern Iberia (*map 15*). The gradient turns red towards the southeast; this is because the sites included in this study are restricted to the Guadalquivir Valley. If further sites in the southeast were added, the blueish trend would be expected to continue in this direction (see Appendix V). According to the social network analysis (see chapter 5.3), sites such as Cerro de la Encina (CEN) or Peñalosa (PEN) may have acted as bridges between the Guadalquivir Valley and the higher regions where the so called 'Argaric' sites were present.

The same spaces of interaction have been observed for strata IX (*map 17*) and VIII (*map 18*), meaning that the interaction of the countryside geographical landscape with the whole of southern Iberia was probably continuous.

Some subtypes seem to only be present in the site of Monturque. The subtypes exclusive for Monturque are listed below.

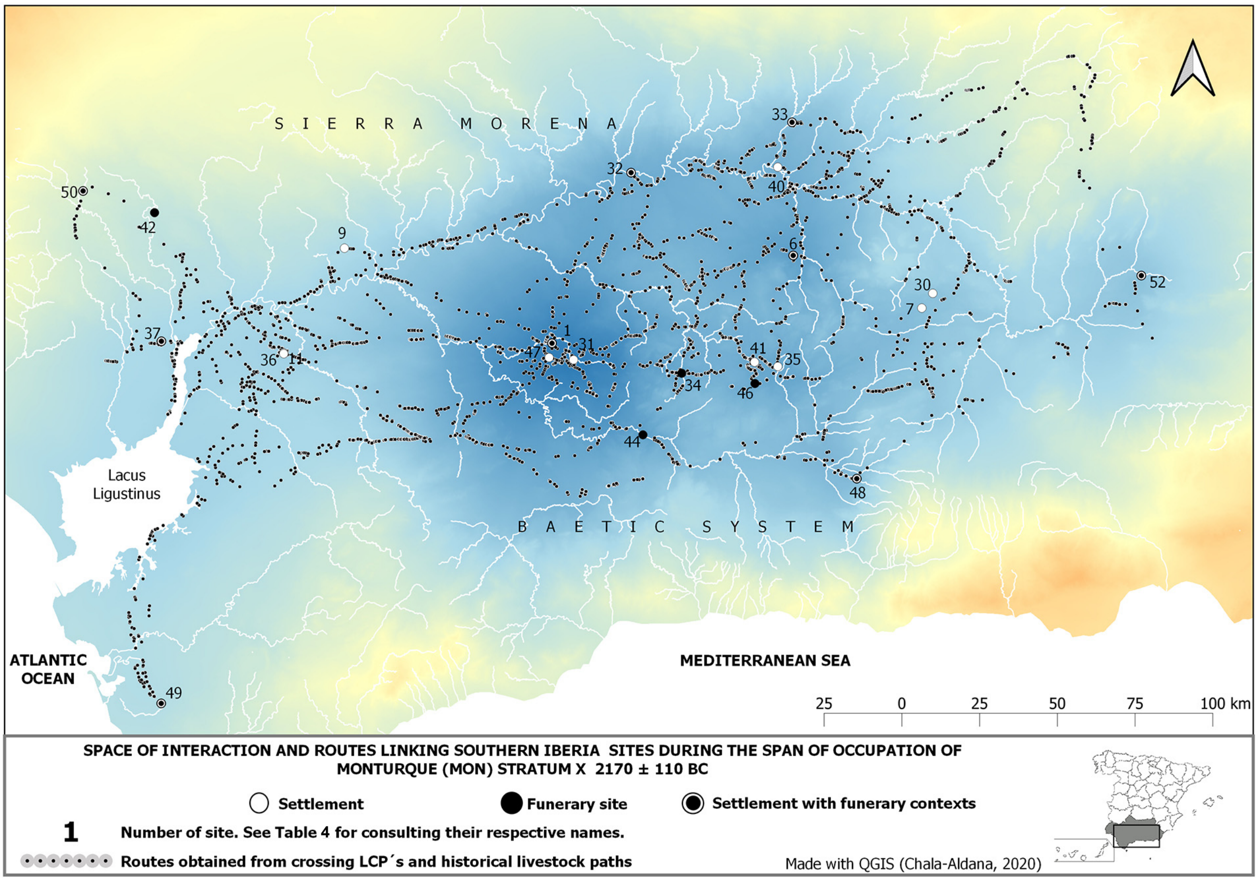
- Level 33:
  - $^1/_3$ of a sphere carinated bowl (Form 1, Type 7, Group a4).
  - *Orza* with slightly divergent neck (Form 2, Type 3, Group a1.4).
- Level 32:
  - (*) $^1/_2$ of a spheric bowl with slightly everted lip (Form 1, Type 4, Group d).
  - *Orza* with straight neck (Form 2, Type 2, Group a2.3).
  - *Orza* with everted neck and cylindrical body (Form 2, Type 3, Group a1.3).
- Level 31:
  - *Orza* with everted neck (Form 2, Type 1, Group b2).
- Level 30:
  - $^1/_3$ of a spheric bowl with an edge along the internal rim (Form 1, Type 3, Group a1.9).
  - V-shaped bowl with flat rim (Form 1, Type 10, Group a1.3).
  - (*) *Orza* with divergent body (Form 2, Type 1, Group a2.2.2).
- Level 29:
  - (*) U-shaped bowl with slightly everted rim (Form 1, Type 11, Group g).
  - *Orza* with broadened rim (Form 2, Type 1, Group a1.3).
- Level 28:
  - $^1/_3$ of a spheric bowl with everted lip and flat rim (Form 1, Type 3, Group b3).
  - Globular vessel with divergent lip (Form 4, Type 2, Group c2.4).
  - Globular vessel with broadened and divergent lip (Form 4, Type 2, Group c2.6).
- Level 27:
  - $^1/_3$ of a spheric bowl with bend (divergent) body (Form 1, Type 3, Group c).

S	Level	Form	Type	Sub	Coinciding Sites									
	33	1	2	a.1.1	BAJ	ZON	CEN	BER	ALA					
	33	1	2	a3	BAJ	SEV	BER	TRS						
	33	1	2	b	PIR	RIB	CEN	ORC						
	33	1	3	a1.1	TRA	VAL	ZON	CEN	ALA					
	33	1	4	a1	AGU	PEN	BER	ORC						
	33	1	4	a2.1	AGU	CAB	RIB							
	33	1	4	a4.2	CAR	PEN	PIR	SAN	SEB	TRA	BER			
X	33	1	6	b	AGU	ARR	BAJ	ZON	BER	ALA				
	33	1	7	a4	MON									
	33	2	2	a1.1	BAJ	MOR	PEN	RIB	SMR	ZON	CEN			
	33	2	3	a1.4	MON									
	33	4	2	a2	MOR	RIB	ORC							
	33	4	2	a4.1	MOL	MOR	ORC							
	33	4	2	a4.3	CGF	MOR	BER							
	33	4	3	a1.1	AGU	BAJ	VIL	ZON	ORC					
	32	1	4	a3	CAB	FUE								
	32	1	4	d	MON									
	32	2	2	a2.3	MON									
	32	2	2	a3	FUE	RIB								
	32	2	3	a1.2	PEN	ZON								
	32	2	3	a1.3	MON									
	32	4	2	a1	PEN	SAN	SET	TRS						
	31–32	1	3	a1.1	TRA	VAL	ZON	CEN	ALA					
	31	1	2	b	PIR	RIB	CEN	ORC						
	31	2	1	b2	MON									
	30–32	1	3	a1.9	MON									
	30	1	3	a1.2	ZON	ORC								
IX	30	1	3	a1.3	CHI	FUE	ZON	TRS	NEG					
	30	1	3	a1.4	FUE									
	30	1	6	b	AGU	ARR	BAJ	ZON	BER	ALA				
	30	1	8	d2	ZON									
	30	1	10	a1.3	MON									
	30	2	1	2.2.2	MON									
	30	4	3	a2.2	TRA									
	29–32	1	2	a3	BAJ	SEV	BER	TRS						
	29–32	1	4	a1	AGU	PEN	BER	ORC						
	29–32	1	4	a2.1	AGU	CAB	RIB							
	29–32	1	4	a4.1	AGU	ALC	CHI	COJ	COR	ENC	MOR	ZON	ALA	NEG
	29–31	1	8	b1	MES	TRA	CEN	ALA						
	29–31	4	2	a4.4	BAJ	CTO	SET	TRS	ORC					

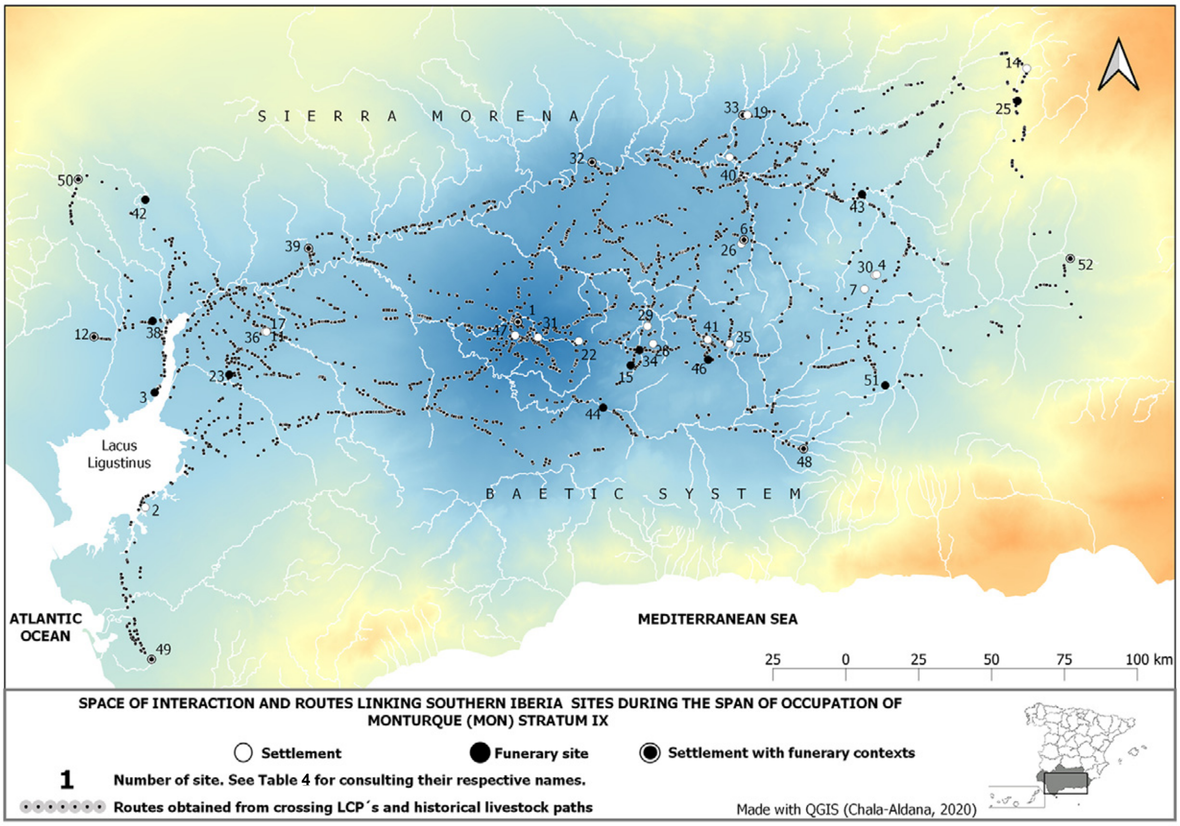
S	Level	Form	Type	Sub	Coinciding Sites										
	29–31	4	3	a3.1	AGU	MOR									
	29–30	1	2	a.1.1	BAJ	ZON	CEN	BER	ALA						
	29–30	4	2	a4.3	CGF	MOR	BER								
	29	1	1	d1	SAN	SET	TRA	CEN	BER						
	29	1	7	a1	MOR	SET									
	29	1	8	d1	GAN	HOR	MAR	MOR	PEN	ZON	CEN	NEG			
	29	2	4	a1	ALC	JUA	CEN								
	29	1	11	g	MON										
	29	2	1	a1.3	MON										
	29	4	3	a1.1	AGU	BAJ	VIL	ZON	ORC						
	28–32	1	10	b	CHI	MOR	TRA	ZON	NEG						
	28–31	1	1	e2	ARC	ARR	BAJ	RIB	ZON	BER	ORC				
	28–29	1	4	a2.2	SMR										
	28	1	2	a2	BAJ	ZON									
	28	1	3	b3	MON										
IX	28	1	5	a	AGU	ARC	BAJ	CHI	COJ	ENC	FUE	MOR	PEN	SAN	SEK
									TRA	ZON	BER	TRS	ALA	ORC	NEG
	28	1	8	a	AGU	SET	TRA	CEN							
	28	1	8	c	AGU	MOR	SET	SEV	SMR	UBE	ALA				
	28	1	8	e1	MOR	SMR									
	28	2	1	1.2.1	ARR	RIB									
	28	2	1	a2.1	PEN										
	28	2	1	a2.3	RIB	CEN									
	28	4	2	a2	MOR	RIB	ORC								
	28	4	2	a3	MAR	MOL	RIB	ZON	CEN	NEG					
	28	4	2	a4.1	MOL	MOR	ORC								
	28	4	2	b2	MOR	ORC									
	28	4	2	c2.1	BAJ	MOR									
	28	4	2	c2.3	FUE										
	28	4	2	c2.4	MON										
	28	4	2	c2.6	MON										
	28	4	3	b1	COJ	ZON									
	27	1	3	c	MON										
	27	1	4	a2.1	AGU	CAB	RIB								
	27	1	5	a	AGU	ARC	BAJ	CHI	COJ	ENC	FUE	MOR	PEN	SAN	SEK
VIII									TRA	ZON	BER	TRS	ALA	ORC	NEG
	27	1	10	b	CHI	MOR	TRA	ZON	NEG						
	27	4	2	a1	PEN	SAN	SET	TRS							
	27	4	2	b2	MOR	ORC									
	26–27	1	1	e2	ARC	ARR	BAJ	RIB	ZON	BER	ORC				

S	Level	Form	Type	Sub	Coinciding Sites								
VIII	26–27	1	3	a1.1	TRA	VAL	ZON	CEN	ALA				
	26	1	4	a2.2	SMR								
	26	1	8	c	AGU	MOR	SET	SEV	SMR	UBE	ALA		
	25	1	3	a1.2	ZON	ORC							
	25	1	7	1.2.2	SEV	ALA							
	25	1	8	e3	BAJ	FUE	SET	SEV					
	25	1	10	a1.1	BAJ	JUA	MOR	PEN	RIB	SMR	BER	ALA	NEG
	25	2	1	1.2.1	ARR	RIB							
	25	4	3	a1.2	CHI	FUE							
	24–27	4	3	a1.1	AGU	BAJ	VIL	ZON	ORC				
	24–25	1	6	b	AGU	ARR	BAJ	ZON	BER	ALA			
	24	1	3	a1.3	CHI	FUE	ZON	TRS	NEG				
	24	1	10	a1.4	TRA								
	24	4	2	a4.3	CGF	MOR	BER						

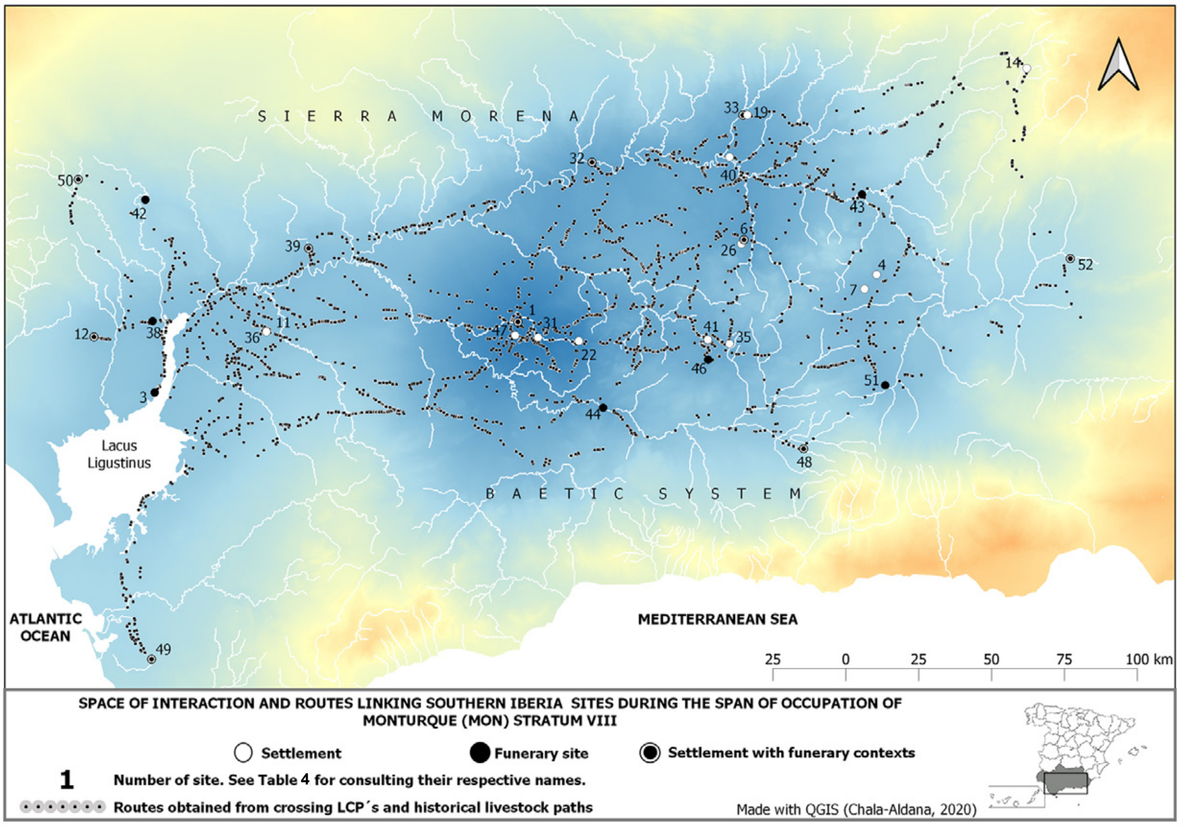
Table 5. Groups of sites sharing the same pottery subtype by each stratum (S) and layer of Monturque (MON). Types and subtypes can be observed in Appendix I–II. For the abbreviations of the coinciding sites see table 4.



Map 16. Archaeotopogram showing the space of interaction and routes linking sites sharing pottery subtypes with the site of Monturque (MON) (31) stratum X.



Map 17. Archaeotopogram showing the space of interaction and routes linking sites sharing pottery subtypes with the site of Monturque (MON) (31) stratum IX.



Map 18. Archaeotopogram showing the space of interaction and routes linking sites sharing pottery subtypes with the site of Monturque (MON) (31) stratum VIII.

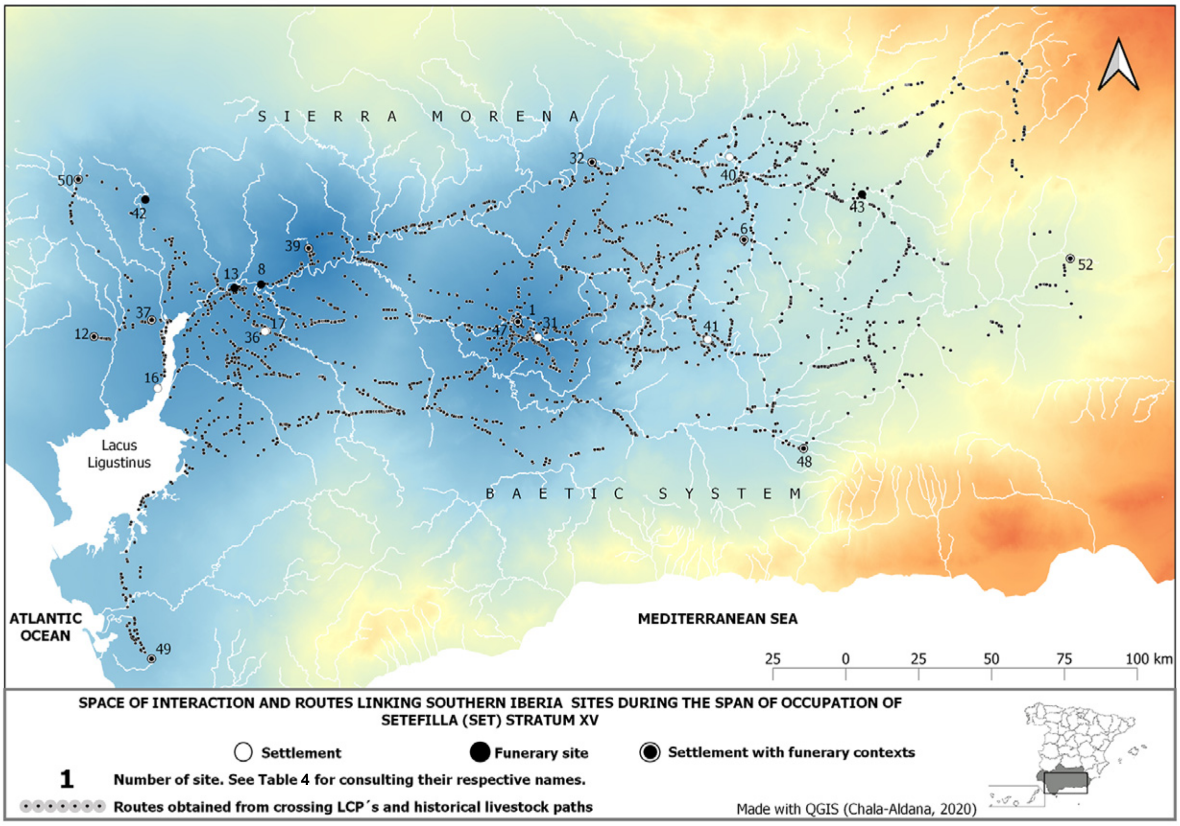
S	Level	Form	Type	Sub	Coinciding Sites						
XV		1	1	a1	CAN	CML	SEB				
		1	1	c	AGU	CHI	BER	TRS	ORC		
		1	1	d1	MON	SAN	TRA	CEN	BER		
		1	1	e1	CSJ	TRA	TRS				
		1	7	a1.1	MON	MOR					
		1	8	a	AGU	MON	TRA	CEN			
		1	8	c	AGU	MON	MOR	SEV	SMR	UBE	ALA
		1	9	d	SET						
		4	2	a4.4	BAJ	CTO	MON	TRS	ORC		
XIV		1	1	b	AGU	CHI	GAN	TRA	BER	TRS	
		1	1	c	AGU	CHI	BER	TRS	ORC		
		1	1	d1	MON	SAN	TRA	CEN	BER		
		1	1	e1	CSJ	TRA	TRS				
		1	7	a3.2	SET						
		1	8	e3	BAJ	FUE	MON	SEV			
		1	9	e	SET						
		2	4	b	SET						
	Tomb	4	2	a1	MON	PEN	SAN	TRS			
		4	2	c2.2	CHI	MOR	BER				
		4	2	c2.7	SET						
		4	2	c3	MOR	ZON					
		4	3	a3.2	FUE	MOR	VAL				
		4	3	a3.3	SET						
		5	1	b	SEV						

Table 6. Groups of sites sharing the same pottery subtype by each stratum (S) and layer of Setefilla (SET). Types and subtypes can be observed in Appendix I–II. For the abbreviations of the coinciding sites see table 4.

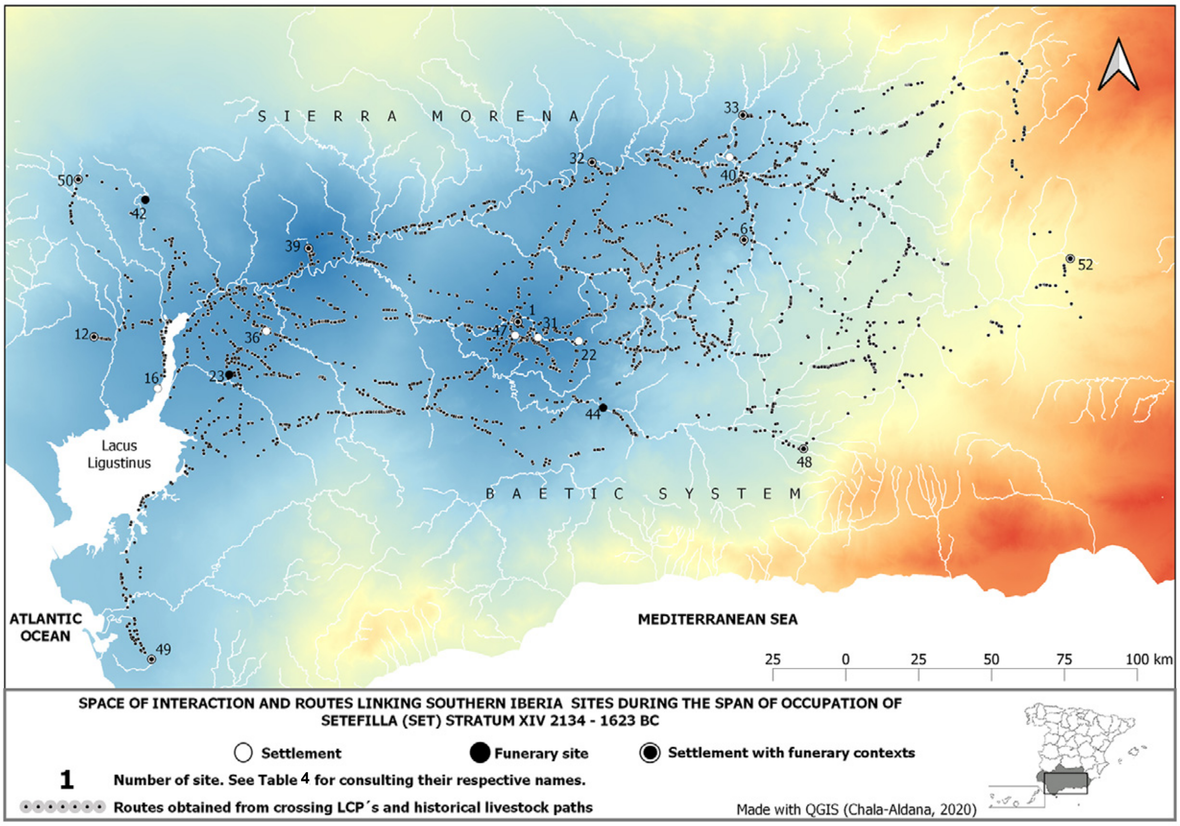
Such a large number of exclusive pottery types during the whole Bronze Age sequence of Monturque could correspond to a local production with autochthonous forms. This idea supports some models explaining a 'cultural autonomy' of this countryside geographical landscape against the 'Argaric' influences that are still present in its material record. It is important to note that at least three of these subtypes listed here (the ones with the asterisk *) are also present on the western Peninsula, reaching even the Alto Vouga and Alto Paiva regions (Senna Martinez et al. 1984). Such matching subtypes are indicative of long-distance interactions beyond the Guadalquivir Basin, probably through the same routes as the ones used by several Sierra Morena populations to access the Guadiana Valley, for example.

Setefilla (SET; No. 39)

Although the radiocarbon date was obtained more than 40 years ago, it still allows us to date the material record found in strata XV and XIV into the Full Bronze Age layers. The sequence of Setefilla seems to begin in the Full Bronze Age; but it is important to note that a larger scale excavation and new radiocarbon analysis of organic material from this site must be performed in order to properly define an accurate chronology.



Map 19. Archaeotopogram showing the space of interaction and routes linking sites sharing pottery subtypes with the site of Setefilla (SET) (39) stratum XV.



Map 20. Archaeotopogram showing the space of interaction and routes linking sites sharing pottery subtypes with the site of Setefilla (SET) (39) stratum XIV.

The pottery subtypes identified and the sites sharing them with Setefilla are listed in table 6.

The space of interaction for Setefilla stratum XV (*map 19*) shows a more intense blue gradient towards the countryside and the *serranía* geographical landscapes as well as the whole coast of the *Lacus Ligustinus*. The sites with the most shared pottery subtypes are Monturque (seven subtypes), Cerro del Berrueco (five subtypes), Llanete de los Moros (five subtypes) and El Trastejón (five subtypes). The interaction gradient turns to red towards the southeast, which means that the energy and time needed to reach these areas is higher. Some pottery subtypes are still shared with the southeast sites.

Mobility from Setefilla was possible through the Guadalquivir Route (*map 15*, Route 1) as well as several alternative branches of the Campiña–Los Alcores Route that go directly to this site. The proximity of Setefilla to the Guadalquivir River and its excellent visibility from several points of the valley make this site optimal for connecting with any region along the valley.

Only one exclusive subtype, or at least not occurring at any other site included in this study, was found in Setefilla XV. It is a low-carinated bowl with a linear zig-zag decoration in its internal body, just below the rim (Form 1, Type 9, Group d).

For Setefilla XIV, the space of interaction maintains the same condition of stratum XV but adds the High Guadalquivir to the regions with blue gradients (*map 20*), which means an increase in the number of sites in this region sharing pottery subtypes during this chronological period. One example is the fragment of a reel-base cup (Form 5, Type 1, Group b) found also in High Guadalquivir sites such as Sevilleja (SEV). Such matching types are in accordance with the ideas regarding a social and cultural exchange with 'Argaric' groups for this period, expressed not only in pottery but also in metal grave goods (Aubet et al. 1983). Setefilla XIV presents more exclusive subtypes than stratum XV. The following are the ones identified.

- Setefilla XIV:
  - High-carinated bowl with divergent rim and zig-zag decoration in the inner body below the rim (Form 1, Type 7, Group a3.2).
  - (*) Low-carinated bowl with slightly curved-divergent body (Form 1, Type 9, Group e).
  - Globular *orza* with mamelón on the shoulder and digital impressions along the rim (Form 2, Type 4, Group b).
  - Globular vessel with almond-like lip (Form 4, Type 2, Group c2.7).
  - Globular vessel with ellipsoidal body (Form 4, Type 3, Group a3.3).

As with Monturque, the exclusive forms could be indicative of autochthonous production of some pottery subtypes. The low-carinated bowl subtype (marked with asterisk *) is also present on the southwestern and western Peninsula (Senna Martinez et al. 1984), meaning that not only Monturque but also Setefilla could have interacted beyond the Guadalquivir Basin, something that can be seen in the area of interaction that links Setefilla to the Sierra Morena region, a traditional route of access to the southwestern Peninsula.

El Trastejón (TRS; No. 50)

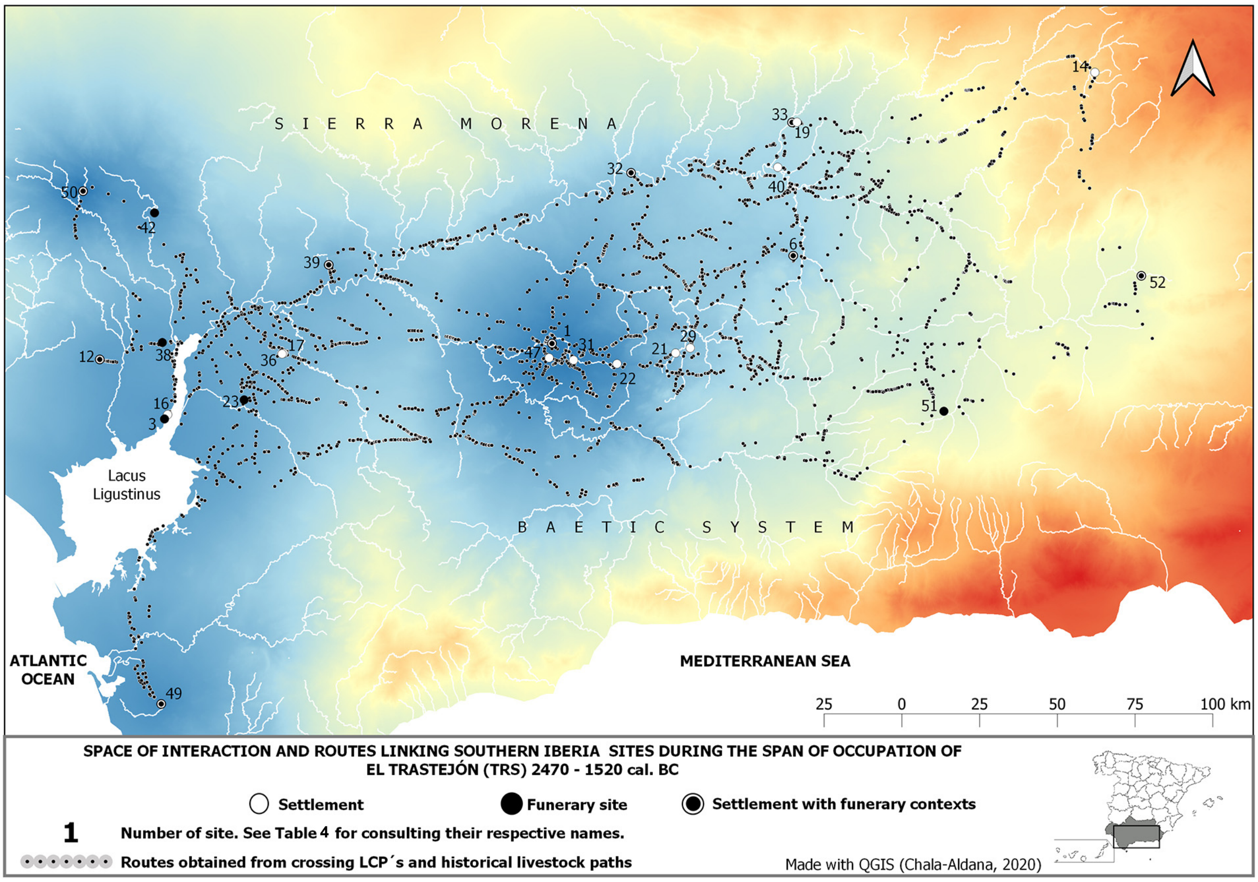
The radiocarbon chronology in El Trastejón confirms its occupation between the 3rd and 2nd mill. BC. But there is no evidence of Chalcolithic or Bell Beaker sequences before. As with Setefilla, the first occupation layer belongs to an early phase of the Bronze Age, which continues without any interruption until the Final Bronze Age (Hurtado Pérez et al. 2011). The pottery subtypes identified and the sites sharing them with El Trastejón are listed in table 7.

The space of interaction for El Trastejón shows an intense blue gradient towards the *Lacus Ligustinus* and the countryside geographical landscape (*map 21*). It can be seen when looking at the sites with the most shared pottery subtypes as Cerro del Berrueco (six subtypes), Castillo de Aguilar, Monturque and Setefilla (all with five subtypes). Unlike the sites in the Middle Guadalquivir, the red gradient towards the southeast shows a lack of coinciding subtypes between El Trastejón and the so-called 'Argaric' sites. On the other side, the gradient towards the Sierra Morena and the Guadiana Valley is indicative of contacts, already confirmed, between the Sierra and the southwestern Peninsula (Hurtado Pérez et al. 2011).

The main corridors connecting the site of El Trastejón to the Guadalquivir Valley are the Rivera del Cala–Los Alcores and the Rivera del Cala–Aljarafe Routes (*map 15*, Route 3 and 4). From

Level	Form	Type	Sub	Coinciding Sites										
	1	1	b	AGU	CHI	GAN	SET	TRA	BER					
	1	1	c	AGU	CHI	SET	BER	ORC						
	1	1	e1	CSJ	SET	TRA								
C2	1	2	a3	BAJ	MON	SEV	BER							
C4	1	3	a1.3	CHI	FUE	MON	ZON	NEG						
F22	1	5	a	AGU	ARC	BAJ	CHI	COJ	ENC	FUE	MON	MOR	PEN	SAN
								SEK	TRA	ZON	BER	ALA	NEG	ORC
K10	1	7	b	AGU	CSJ	SEK	BER							
	1	8	b2	AGU	ESP	MES	BER							
	4	2	a1	MON	PEN	SAN	SET							
	4	2	a4.4	BAJ	CTO	MON	SET	ORC						

Table 7. Groups of sites sharing the same pottery subtype by each layer of El Trastejón (TRS). Types and subtypes can be observed in Appendix I–II. For the abbreviations of the coinciding sites see table 4.



Map 21. Archaeotopogram showing the space of interaction and routes linking sites sharing pottery subtypes with the site of El Trastejón (TRS) (50).

Los Alcores, the paths elongate until reaching the Atlantic Coast and the countryside geographical landscape. El Trastejón was probably a very important place, next to the corridor connecting the Guadalquivir and the Guadiana Valleys. It is confirmed by the presence of several vessels coming from the so called southwestern region that coincide with most of the typology from El Trastejón,

Level	Form	Type	Sub	Coinciding Sites
Cist 20	1	1	d1	MON SAN SET CEN BER
	1	1	b	AGU CHI GAN SET BER TRS
	1	1	e1	CSJ SET TRS
	1	3	a1.1	MON VAL ZON CEN ALA
	1	3	a1.5	TRA
	1	4	a4.2	CAR MON PEN PIR SAN SEB BER
	1	4	c	CHI SAN
	1	5	a	AGU ARC BAJ CHI COJ ENC FUE MON MOR PEN SAN SEK ZON BER TRS ALA NEG ORC
	1	8	a	AGU MON SET CEN
	1	8	b1	MES MON CEN
	1	10	a1.4	MON
	1	10	b	CHI MON MOR ZON NEG
	1	10	d1	ALC CVQ
	4	1	a2	SEK
	4	1	b1	TRA
	4	3	a2.2	MON

Table 8. Groups of sites sharing the same pottery subtype by each layer of La Traviesa (TRA).
Types and subtypes can be observed in Appendix I–II. For the abbreviations of the coinciding sites see table 4.

and some subtypes from Monturque or Setefilla. Its condition as a 'halfway site' is also expressed in the lack of exclusive pottery subtypes and in the social network.

La Traviesa (TRA; No. 42)

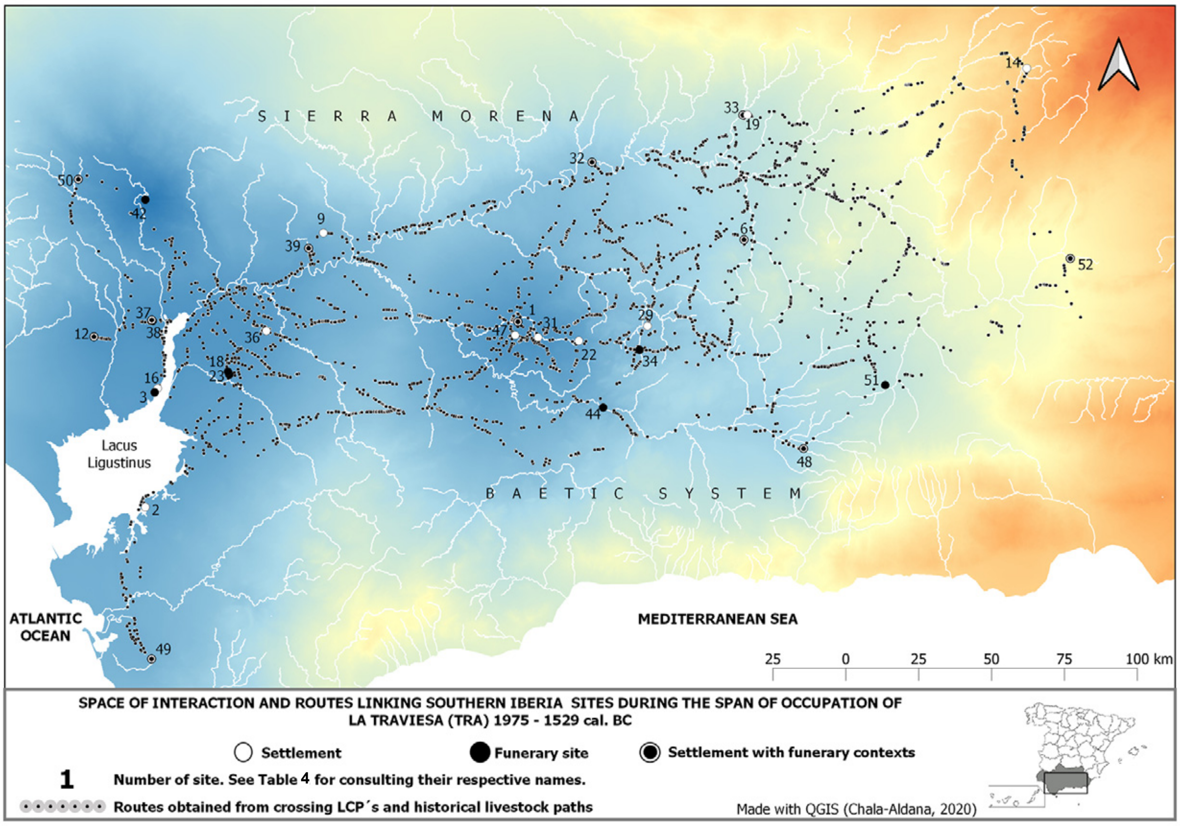
The radiocarbon chronology in La Traviesa places its occupation during the second half of the 2nd mill. BC. The necropolis site was occupied after El Trastejón; however, the site also seems to have the same continuity pattern during the Bronze Age (García Sanjuán 1998).

The pottery subtypes identified and the sites sharing them with La Traviesa are listed in table 8.

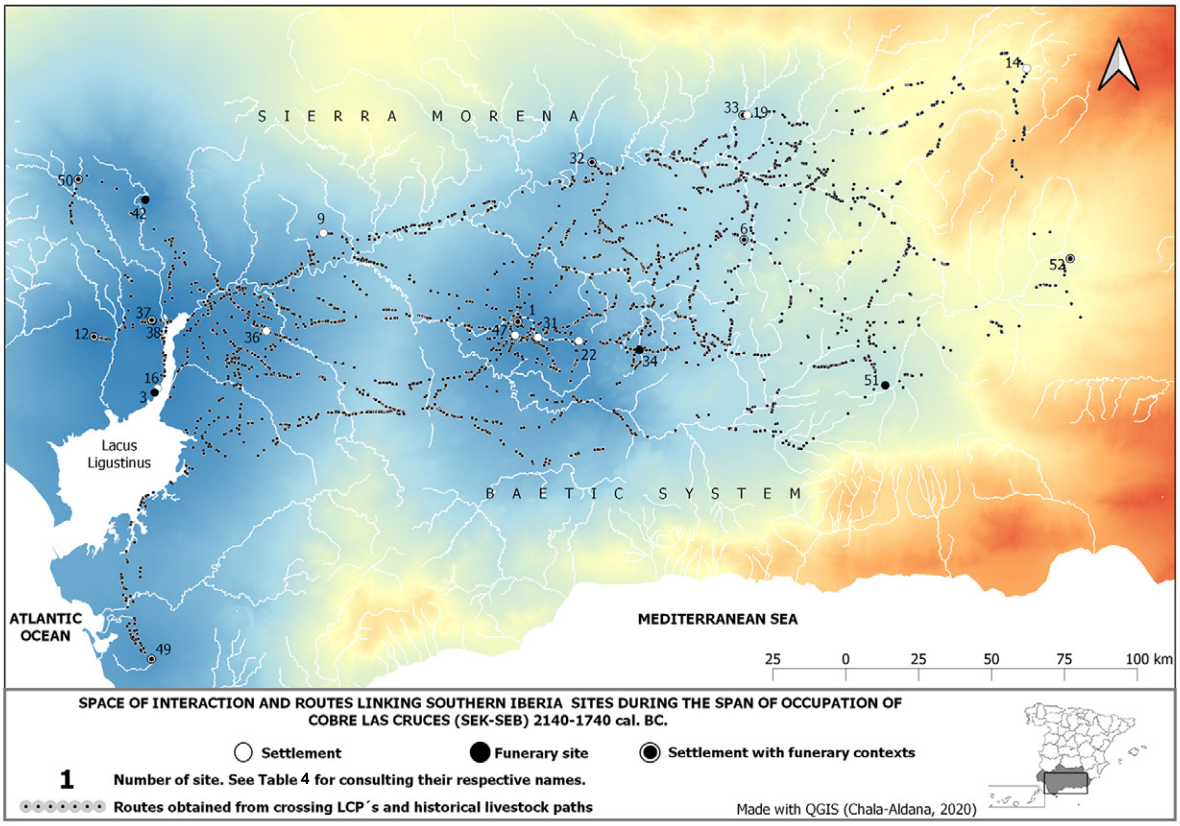
As with El Trastejón, the interaction space of La Traviesa shows an intense blue gradient towards the *Lacus Ligustinus* and the countryside geographical landscape (*map 22*). There is also a light blue gradient towards the Sierra Nevada, next to the Guadix Valley, denoting the presence of southeastern pottery subtypes and interactions between these two regions. The sites with the most shared pottery subtypes are Monturque (nine subtypes), Chichina, Plaza de Santiago, Setefilla, Cerro de la Encina and Cerro del Berrueco (with four subtypes each).

Its location in the same corridor as El Trastejón underlines the relevance of La Traviesa in the communication between the Guadalquivir and the Guadiana Valleys. The fact that some southeastern pottery types are also present on the site suggests the use of the Guadalquivir Corridor or the route towards Los Alcores to the countryside geographical landscape and from there to the Guadix Valley (*map 15*, Route 1).

One exclusive subtype was found in La Traviesa, a 1/3 of a spheric bowl with an external bevel (Form 1, Type 3, Group a1.5). The presence of just one subtype does not indicate autochthonous production. As mentioned above, most of the subtypes in La Traviesa share typological traits with southwestern sites, implying a large amount of interaction between the Sierra Morena region, the Guadiana Valley and the rest of the western Peninsula. If southwestern sites were included in this study, the space of interaction in blue would likely extend towards the southwest.



Map 22. Archaeotopogram showing the space of interaction and routes linking sites sharing pottery subtypes with the site of La Traviesa (TRA) (42).



Map 23. Archaeotopogram showing the space of interaction and routes linking sites sharing pottery subtypes with the site of Cobre las Cruces (SEB–SEK) (37–38).

S	Level	Form	Type	Sub	Coinciding Sites
T-4B	SEB	1	4	4.2	CAR MON PEN PIR SAN TRA
T-7 (1)	SEK	4	1	a2	TRA
T-23b (3)	SEK	1	5	a	AGU ARC BAJ CHI COJ ENC FUE MON MOR PEN SAN TRA ZON BER TRS ALA ORC NEG
-	-	1	7	b	AGU CSJ BER TRS

Table 9. Groups of sites sharing the same pottery subtype by each stratum (S) and layer of Cobre las Cruces (SEB–SEK). Types and subtypes can be observed in Appendix I–II. For the abbreviations of the coinciding sites see table 4.

Cobre las Cruces (SEB–SEK; No. 37–39)

The radiocarbon chronology places the site of Cobre las Cruces in the transition between the 3rd and 2nd mill. BC. The site is older than La Traviesa but younger than El Trastejón. Its sequence continues without interruption during the Final Bronze Age and even subsequent ages (Hunt Ortiz 2012). The three sites also seem to share the characteristic lack of Bell Beaker pottery or previous occupation layers. The pottery subtypes identified shared with the site of Cobre las Cruces are listed in table 9.

The space of interaction departing from Cobre las Cruces shares the same condition as the one observed for El Trastejón (TRS). The intense blue gradient is towards the Sierra Morena, the *Lacus Ligustinus* and the countryside geographic landscape (*map 23*). Despite sharing one subtype with sites such as Cuesta del Negro (NEG) and Orce (ORC), the amount of energy/time needed to reach these regions is higher. The sites with the most shared pottery subtypes are Cerro del Berrueco and La Traviesa (with three subtypes). The blue gradient in the countryside geographic landscape expresses the high number of sites from this region with one or two shared subtypes.

The main corridors connecting the site of Cobre las Cruces are the Guadalquivir and the Aljarafe–Rivera del Cala Routes (*map 15*, Route 1 and 4). The connection to the Atlantic Coast regions was also guaranteed, likely through the navigation of the *Lacus Ligustinus* or the use of the terrestrial paths surrounding the coast.

No exclusive subtypes were found at the site of Cobre las Cruces, which may be explained by its position at the Guadalquivir mouth. Along with Los Alcores, El Aljarafe is a converging region, receiving all the people and ideas moving inside and outside the Middle and Low Guadalquivir Valley. It is a highly interconnected area.

Cerro del Berrueco (BER; No. 49)

Despite radiocarbon dates being obtained several decades ago, the stratigraphic sequence allows to place the site in the transition between the Copper and Bronze Ages. Stratum I contains several Chalcolithic and Bell Beaker pieces and continues with the Bronze Age strata II and III. The site maintains its sequence without interruption, showing an apparent continuity in its occupation until the Final Bronze Age.

The pottery subtypes identified along the study area shared with the Cerro del Berrueco site are listed in table 10.

For Cerro del Berrueco II (*map 24*), the space of interaction shows an intense blue gradient towards the *Lacus Ligustinus*, the countryside geographical landscape and the High Guadalquivir region. The expression of such a gradient can be seen in the sites with the most pottery subtypes shared: Monturque (eleven subtypes), Marroquíes Bajos (eight subtypes), Castillo de Aguilar (seven subtypes), El Trastejón, Peñalosa and Llanete de los Moros (six subtypes).

There are two main identified access routes to Cerro del Berrueco: the Atlantic Coast–Los Alcores and the Atlantic Coast–Campiña Routes. After leaving the site, the path continues parallel to the coast of the *Lacus Ligustinus* and then separates into two different ones. One of them heads towards Los Alcores (Route 9) and from there to the High Guadalquivir, whereas the other goes to the countryside and from there to the Guadix Valley (*map 15*, Route 5 and 8). The communication with the Sierra Morena and El Aljarafe regions was likely linked

S	Form	Type	Sub	Coinciding Sites										
II	1	1	b	AGU	CHI	GAN	SET	TRA	TRS					
	1	1	c	AGU	CHI	SET	TRS	ORC						
	1	1	d1	MON	SAN	SET	TRA	CEN						
	1	1	e2	ARC	ARR	BAJ	MON	RIB	ZON	ORC				
	1	2	a1.1	BAJ	MON	ZON	CEN	ALA						
	1	2	a3	BAJ	MON	SEV	TRS							
	1	2	c	BAJ	PIR									
	1	4	a1	AGU	MON	PEN	ORC							
	1	4	a4.2	CAR	MON	PEN	PIR	SAN	SEB	TRA				
	1	5	a	AGU	ARC	BAJ	CHI	COJ	ENC	FUE	MON	MOR	PEN	SAN
								SEK	TRA	ZON	TRS	ALA	NEG	ORC
	1	6	b	AGU	ARR	BAJ	MON	ZON	ALA					
	1	6	c	BAJ	MOR	ALA								
	1	9	a2	AGU	ERA	ALA								
	1	10	a1.1	BAJ	JUA	MON	MOR	PEN	PIR	SMR	TRS	ALA		
	1	11	a1.1	BAE	PEN	SEV	ZON							
	1	11	b1	BAE	PEN									
	4	2	a4.3	CGF	MON	MOR								
	4	2	c2.2	CHI	MOR	SET								
III	1	7	a1.2.1	AGU	COR	MES	VIL	NEG						
	1	7	b	AGU	CSJ	SEK	TRS							
	1	8	b2	AGU	ESP	MES	TRS							

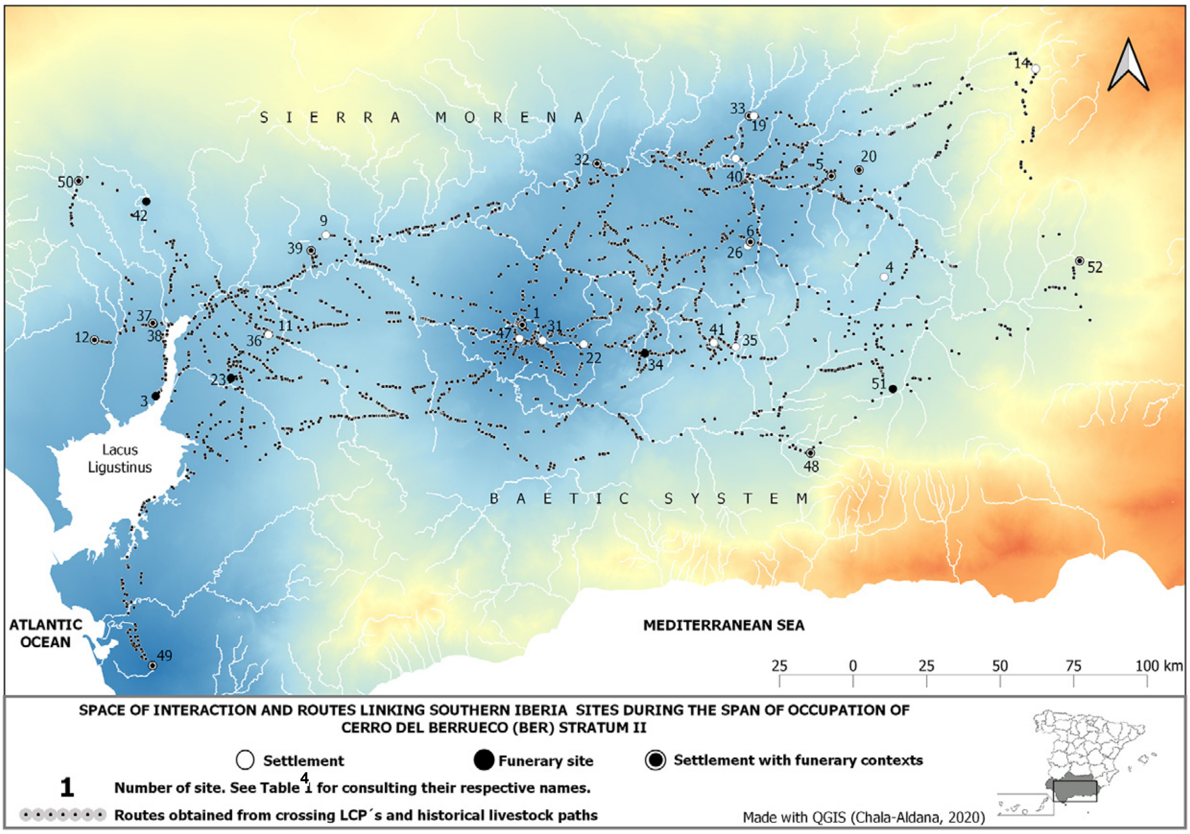
Table 10. Groups of sites sharing the same pottery subtype by each stratum (S) and layer of Cerro del Berrueco (BER). Types and subtypes can be observed in Appendix I–II. For the abbreviations of the coinciding sites see table 4.

to the navigation of the *Lacus Ligustinus* as well as to the use of the paths surrounding it.

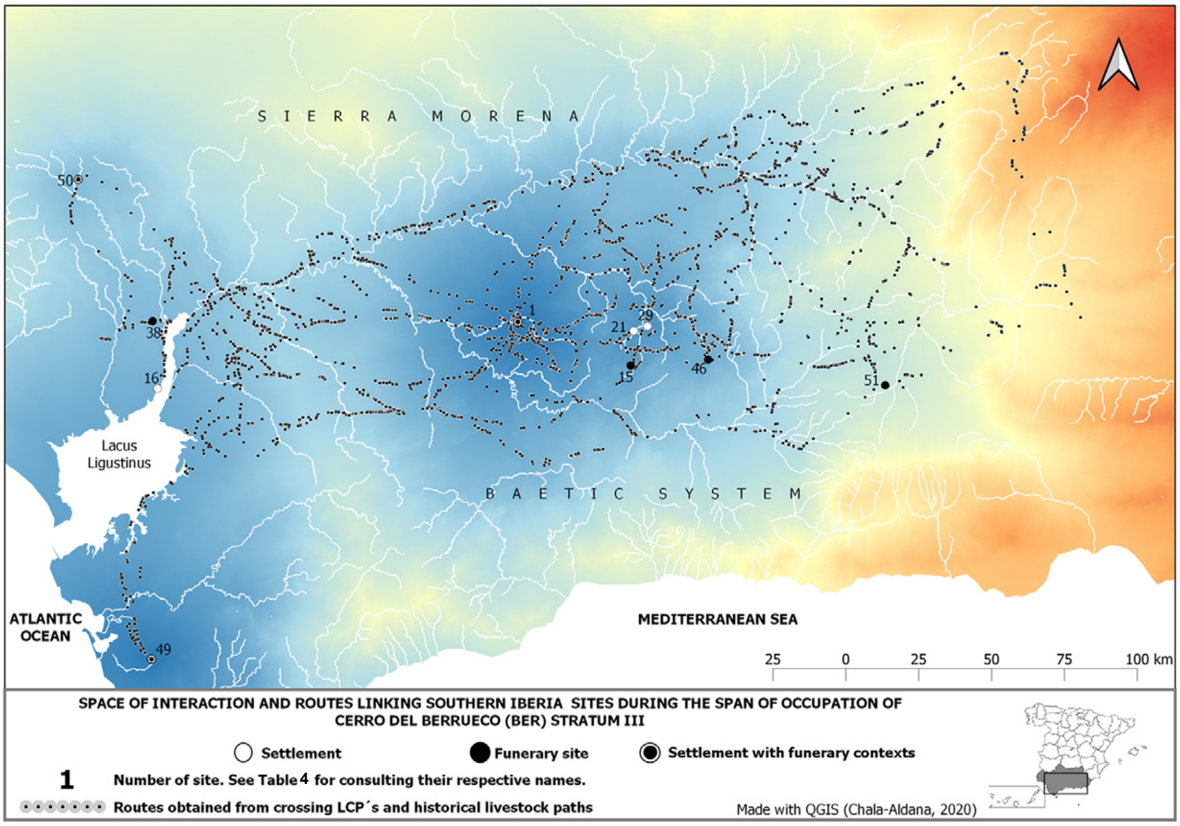
For Cerro del Berrueco III, there is a change in the space of interaction. The blue gradient intensifies in the countryside geographical landscape, whereas the High Guadalquivir sees a reduction in the grade of interaction compared to Cerro del Berrueco II. Such interactions are expressed in the pottery types shared mainly with Castillo de Aguilar (three subtypes), La Mesa (Fuente Tójar; two subtypes) in the Middle Guadalquivir and El Trastejón (two subtypes) in the Sierra Morena.

There are no exclusive types reported for Cerro del Berrueco. The region has been considered, also for Chalcolithic times, a place with many interactions with other regions along the Atlantic Coast as well as the Guadalquivir Valley. Even an 'Argaric expansion' has been hypothesised based on the pottery found in stratum III (Escacena Carrasco/Berriatúa Hernández 1985). Is it possible to consider 'territorial' expansions based on the presence of 'Argaric' materials in Cerro del Berrueco?

The archaeotopogram shows that the energy and time spent to move between the Atlantic Coast and the southeast is higher (*map 25*). Additionally, for Cerro del Berrueco III, the model shows a reduction in interactions with the High Guadalquivir and the southeast. At the first level of interpretation, the presence of carinated bowls in the funerary contexts of Cerro del Berrueco is only proving a moment of interaction between the Atlantic and the southeastern regions. Almost certainly, knowledge about funerary rituals and their associated



Map 24. Archaeotopogram showing the space of interaction and routes linking sites sharing pottery subtypes with the site of Cerro del Berrueco (BER) (49) stratum II.



Map 25. Archaeotopogram showing the space of interaction and routes linking sites sharing pottery subtypes with the site of Cerro del Berrueco (BER) (49) stratum III.

S	Form	Type	Sub	Coinciding Sites										
II	1	7	b	AGU	SEK	BER	TRS							
	1	1	e1	SET	TRA	TRS								
	3	1	a	ARR	BAE	ERA	FUE	GUT	PEN	PIR	SEV	CEN	ALA	NEG
	4	2	a4.2	CSJ										

Table 11. Groups of sites sharing the same pottery subtype by each stratum (S) and layer of Cerro San Juan (CSJ). Types and subtypes can be observed in Appendix I–II. For the abbreviations of the coinciding sites see table 4.

objects flowed between them; but the knowledge or the objects could have arrived from intermediate regions, such as the Middle Guadalquivir, as well. Sites such as Castillo de Aguilar in the countryside have the most interactions with Cerro del Berrueco and also share the same type of high-carinated bowls, which is considered by Escacena and Berriatúa to indicate an 'Argaric' expansion. If southeastern pottery styles, or the knowledge to elaborate them, arrived in Cerro del Berrueco, they probably had to pass through the countryside first, meaning that this interaction was probably not established directly from an 'expanding Argaric territory', but from a halfway region.

Additionally, such high-carinated bowls are also present in El Aljarafe and the Sierra Morena regions, which makes the argument of the 'Argaric' expansion difficult to prove considering the enormous amount of interaction observed through the Middle and Low Guadalquivir Valley and beyond. Indeed, these subtypes were shared, but it would be more cautious to read such overlaps as knowledge or objects flowing and not as a 'territorial expansion'. To prove such an expansion, it would be necessary to find other complementary types of evidence.

Cerro San Juan (CSJ; No. 16)

The radiocarbon chronology of Cerro San Juan places the site in the transition between the 3rd and 2nd mill. BC. Similar to Monturque and Cerro del Berrueco, Cerro San Juan has layers with Bell Beaker material; Escacena and García Rivero claim that there was no population continuity between the Chalcolithic and the Bronze Age, arguing instead for a population replacement model. Archaeotopograms could contribute to such discussion (Escacena/García Rivero 2015; 2018).

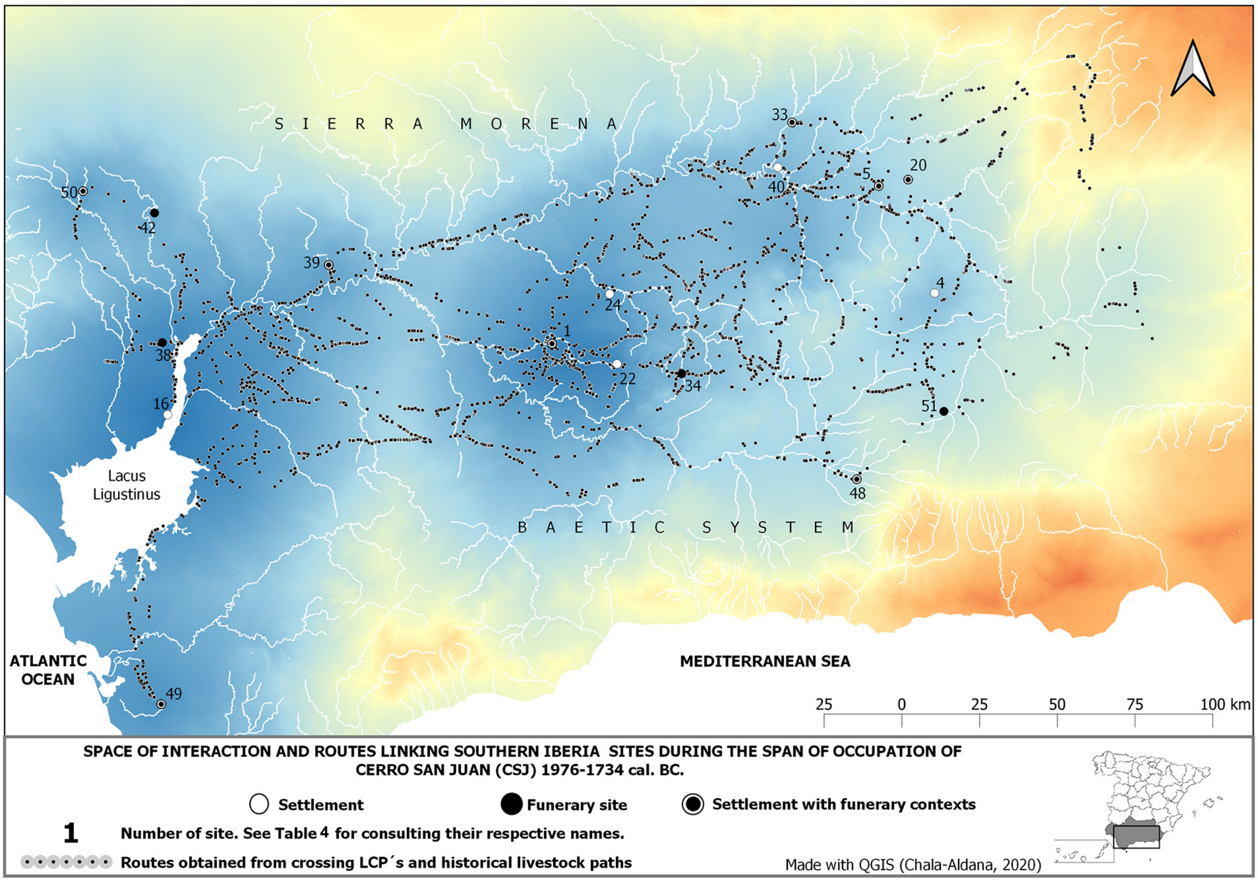
The pottery subtypes shared between Cerro San Juan and other sites in the study area are listed in table 11.

The space of interaction of Cerro San Juan (*map 26*) shows an intense blue gradient towards the Sierra Morena, the region around the *Lacus Ligustinus* and the High Guadalquivir as well as a slight blue gradient towards the Guadix Valley. There is no difference in the number of subtypes shared by region; the number of shared types with each site is always one (see appendix III). This distribution indicates that, at least for the span of occupation of Cerro San Juan, knowledge or material was flowing across all the regions.

As mentioned above, in the area between Los Alcores and El Aljarafe, there is a confluence of corridors. The number of coinciding subtypes, despite not being at the level of other sites, suggests that communication with all these regions existed. The corridor along the Guadalquivir, the Campiña–Alcores and the Aljarafe–Rivera del Cala Routes could make such interactions possible (*map 15*, Route 2 and 4).

One exclusive type was found in Cerro San Juan: a globular vessel with spherical body and bevelled rim (Form 4, Type 2, Group a4.2). As in the case of La Traviesa (TRA), this is not representative of an autochthonous production.

García Rivero and Escacena Carrasco pointed out that the culture-historical approach led archaeologists to interpret the continuity of materials in stratigraphic sequences as evidence of a continuity of 'cultures' or traditions and the spatial distribution of a material culture as the geographical frame for their expansion. These sequences were called 'horizons' (García Rivero/Escacena Carrasco 2015). Indeed, the culture-historical approach seems to



Map 26. Archaeotopogram showing the space of interaction and routes linking sites sharing pottery subtypes with the site of Cerro San Juan (CSJ) (16).

have motivated archaeologists to seek 'cultures' and to think all the time in terms of 'cultures'.

When analysing stratigraphic sequences or the distribution of 'horizons', some archaeologists still tend to consider particular traits and types as manifestations of a particular 'cultural entity', as if such entity was an ethnically and politically defined group. However, whereas the material record is just the empirical evidence of a cultural expression (related to the diverse spheres of life or death), 'cultural entities' are archaeological inventions. Researchers have produced cartographic representations of delimited territories that do not have enough empirical evidence to support them, along with representations of territorial expansions that are only based on the presence or absence of a particular trait. Such an approach does not explain the way all the things that make up the so-called 'culture' (knowledge, ideas, beliefs and materials) flow.

As Escacena and García Rivero pertinently point out, there was an 'autochthonist' trend among Andalusian archaeologists since the 1970s, that refused diffusion as a possible trigger of cultural changes (García Rivero/Escacena Carrasco 2015). They also mention that cultural 'continuity' models would depend on evidence of a 'continued' use of settlements and architectural structures, something that is not proved adequately (García Rivero/Escacena Carrasco 2015).

Escacena and García Rivero propose a model of 'puzzle replacement', with Late Chalcolithic and Early Bronze populations coexisting, the Chalcolithic populations substituted over time, due to the 'pressure' exerted by the latter. They find evidence for this hypothesis in the changes in funerary and settlement patterns as well as in the changes in the kind of material culture used between the two periods along the region (García Rivero/Escacena Carrasco 2015).

According to the scenario observed in the archaeotopograms elaborated for the sites with Bell Beaker substrates (MON, BER and CSJ) and considering that the Bell Beaker phenomenon also extended along all of southern Iberia, it is indeed possible to argue that a population replacement occurred, considering the number of *ex-novo* sites set in the same area; but such replacement was probably not a radical one.

The archaeotopogram model shows how sites were still interconnected during the Bronze Age, but not always based on the same pottery subtypes. There is a large diversity in the pottery types behind the interactions represented for every site. Likewise, beyond the trend obtained from pottery, the rest of the material culture also shows a large cultural diversity along the Middle and Low Guadalquivir Valley. Moreover, the character of the sites compared is also diverse; they do not have the same sequences or the same architectural style, funerary or settlement patterns. Further research is needed in order to properly characterise such diversity. The evidence available is still not enough.

Such diversity, inside such highly interconnected areas, suggests that there was not a population continuity across the whole region. If this continuity did exist, then evidence would show the same material changes along every sequence across the Guadalquivir Valley. It is necessary to avoid generalisations and consider models that allow to think of parallel cultural processes taking place at the same time, without leaning to only one. Population replacement is a hypothesis to consider; but it is still unknown if it was related to massive movements of people. This is something that only started to be studied a few years ago.

Based on palynological analyses of sequences, paleoclimatic and palaeodemographic calculations, relying on calibrated radiocarbon datasets, Lillios et al. (2016), Blanco González et al. (2018) and Hinz et al. (2019) have worked on a hypothesis that suggests a demographic collapse in the southwest and an increase in population in the southeast between the 3rd and 2nd mill. BC. They argue that this collapse was likely related to the climatic changes occurring during the 4.2 ky BP event. Lillios et al. (2016) consider a gradual but massive migration of people from one corner of southern Iberia to the other.

Is it possible to think of a process of several generations, with people moving gradually from one side of southern Iberia to the other, for example through the corridors mentioned above, looking for better places for establishing new settlements, but at the same time meeting and sharing the same landscape with local Chalcolithic populations? Could this explain the diversity of cultural expressions observed especially in the Middle and Low Guadalquivir Valley during the transitional period of the Copper to the Bronze Age?

To explore this idea, it would be necessary to have more radiocarbon dates and palynological analyses from the Middle and Low Guadalquivir Valley, something that does not yet exist. Despite fitting in a model of massive migrations between the southwest and southeast, the proposed hypothesis ignores the condition of the Middle and Low Guadalquivir Valley, considering it an essentially empty space, mainly because of the absence of data. Certainly, a model elaborated by comparing two corners without considering the centre will lead to such assumptions.

The archaeotopograms presented before show that the Middle and Low Guadalquivir Valley was not unoccupied during the Bronze Age and was not a low-ranked area. This implies that, if there was a migration caused by climate, this was probably neither massive nor fast. It must have affected the whole of southern Iberia, provoking movements of people between regions (or inside them) and resulting in several interactions that ended in the diversity archaeologists find today. Indeed, during almost one millennium, some people may have concentrated in some regions such as the southeast, while others remained in their traditional landscapes; others may have moved back from the southeast bringing customs, ideas and objects that resulted in the Bronze Age layers of the Middle and Low Guadalquivir Valley. All these interactions would have been integrated in the changing social and cultural environment of that moment.

Cerro San Juan represents the first proposal that confronts the traditional ways of reading space during the Bronze Age in the Low Guadalquivir, but in order to complete the task, much more research and open area excavations, with radiocarbon dates, must be performed. If this research is not carried out, then all the discussions will take place at the second level of interpretation, without enough evidence for affirmation.

The GIS model presented here may help to find more Bronze Age sites next to the corridors identified and bring new possibilities to explore a period that has been understudied in the Middle and Low Guadalquivir regions.

5.5 Concluding Remarks on the Approach Proposed Here

Cultural-historical approaches have influenced the way archaeologists read the past, regardless of the change in the techniques used or the turns in the approaches adopted to interpret the material culture. Interpretations occur at two different levels: the first is based on the empirical evidence, whereas the second on a higher theoretical level. Once second level interpretations are established as a scientific tradition, they are less likely to be questioned. Researchers may end up focusing more on sustaining these higher levels, rather than formulating new first level interpretations starting from the material record.

This is how pottery typologies, cartographical representations or the perception of the space itself became subordinated to the idea of finding theoretical 'cultural entities'.

The history of the research of the Bronze Age in southern Iberia has been more focused on discussions at the second level, even though, for the Middle and Low Guadalquivir Valley, the empirical evidence is still not significant enough for such levels of discussion. It is necessary to take one step back, to the first level of interpretation, and look at the empirical evidence again, or even better, look for it, because it is still missing.

The analysis presented here started by establishing a pottery typology for the Middle and Low Guadalquivir Valley which is not oriented towards claiming a new cultural area, but instead simply looks for indications of interactions in the valley and beyond. 47 sites were selected from the database of the Andalusian Heritage Institute (IAPH) and five more sites were added to establish comparisons with regions surrounding the study area. The shared pottery subtypes identified were considered to be part of a network of interactions between sites that can be represented cartographically. This method of mapping interactions in the past, based on the material record, can help overcome cultural-historical models of arbitrary delimited territories and cultural entities that have not been confirmed or cannot be confirmed.

Interactions were represented cartographically with the help of a Geographical Information System (GIS). The GIS calculated the least cost paths (LCPs) between all 52 sites included in the study. The main criteria for elaborating an LCP between two sites was having at least one shared pottery subtype. All the networks of calculated LCPs were crossed with the network of historical livestock routes, some of which even have prehistoric origins. The spatial intersections (matches) identified between the LCPs and the livestock paths were the basis for identifying several corridors between the Bronze Age sites considered in this study.

These identified corridors connected all the corners of the Guadalquivir Valley during the Bronze Age; the interactions may have not occurred exclusively or precisely through them, as people can move across the landscape in many directions. This is just a model to depict the most likely paths where people and resources may have flowed.

GIS also helped to calculate the costs for moving between sites with coinciding pottery subtypes, based on raster information of the elevation, slope and land cover along the study area. From these calculations, a colour gradient that represented the energy and time spent for moving from one region to another was obtained. A cost-surface map was calculated for every group of sites sharing pottery subtypes. Then, the sites with confirmed occupation during the Bronze Age (with radiocarbon dates) were selected and their cost-surface maps were summed, obtaining an archaeotopogram for each site.

The archaeotopograms include not only the costs for moving between sites, but also the spaces of interaction, which are calculated after summing all the cost-surface maps obtained from all the coinciding pottery subtypes, for a determined site and span of time. Spaces of interaction assume that two different sites sharing the same trait during the same span of time must have interacted at least once. Such interactions do not necessarily correspond to processes of acculturation or territorial expansion; they just indicate that objects (and possibly the knowledge about how to elaborate and produce them) were shared.

The sum of all these interactions produces a colour gradient based on all the accumulated costs or movements required to interact with another site. The more intense the blue, the more interactions are identified because of the low energetic cost for moving; the redder, the fewer interactions are observed, and the more energy is needed.

Archaeotopograms were obtained for the sites of Monturque, Setefilla, El Trastejón, La Traviesa, Cerro del Berrueco, Cobre las Cruces and Cerro San Juan, which are the sites with confirmed radiocarbon dates during the transition between the 3rd and 2nd mill. BC. The corridors identified were also added to the model.

Based on the archaeotopograms obtained for every site, it was possible to confirm that during the Bronze Age, people in the Middle and Low Guadalquivir Valley interacted between the sites and also with other regions, such as the High Guadalquivir, the Sierra Morena and beyond. These interactions, and the cartographic representation obtained from the empirical evidence, are proof that this area was not low-ranked or unoccupied. The history of the research also confirms that the Middle and Low Guadalquivir Valley has been understudied and needs more survey and excavation campaigns to characterise it well.

The evidence of interactions obtained is also useful for discussing the way archaeologists perceive the space and think of the past. Indeed, drastic social and cultural changes occurred between the Chalcolithic and the Bronze Age. In the frame of such changes, ideas of delimited territories or cultural expansions following the concept of territorial control are beyond what the empirical evidence can show right now. Social and cultural changes occurred, but within an interconnected environment, which does not necessarily imply the existence of a centralised space controlled by a small group of people, as considered by other models.

Such high connectivity, among such diverse cultural expressions found along the Middle and Low Guadalquivir, is indicative of other types of territorial organisation, far from the centralised territorial models. If the study was extended, and more sites from the southeastern and southwestern corners were added, it might be possible to show that the same level of connectivity has been present; the same that helped to link people sharing ideas and materials during former periods even at a continental level. Probably, the model would show that there were no territorial limits, but instead paths and sites serving as bridges. Cultural borders can be considered as archaeological inventions founded in our current subsistence paradigm (see chapter 1.1); they resemble today's idea of nations as cultural entities and the struggle for power between them.

People in the past perceived, thought about and moved through their landscape in their unique ways, impossible to comprehend for us. Cartographic representations elaborated from empirical evidence are the tool proposed here to get useful information to create first level interpretations regarding the ways people may have interacted spatially in the past. This is a cumulative model, which means that its database can incorporate new types of information, not only regarding pottery, but also other kinds of material culture and values obtained from several types of analysis performed, for instance in plants, animals, or people. By including new types of information to the database, new explanations may be provided regarding social and cultural processes involving interaction between human groups in a region.

6 Archaeometrical Analyses

6.1 Evidencing Interactions and Identifying Resources with Isotopic Analyses of Diet and Mobility in Cobre las Cruces (CLC)

Several Full Bronze Age sites in the Middle and Low Guadalquivir Valley have been discovered during the last decades. Some criteria for establishing a chronology for such sites have been the stratigraphic position of the remains found (e.g. Calle Alcazaba, Lebrija; Caro Bellido et al. 1987), the similarities of the ceramic traits with traits from sites which had been already dated (e.g. the pottery found in Plaza de Santiago, Carmona; Cardenete López et al. 1992) or the similarities in the character of the contexts (e.g. the cist tombs from the necropolis of Canama; Sierra Alonso 1993).

Archaeologists had to adopt most of these strategies, given the difficulty of finding organic materials suitable for absolute radiocarbon dating. Recent findings in the sites of Cerro San Juan (García Rivero/Escacena Carrasco 2015) and Cobre las Cruces (Hunt Ortiz 2012) have provided absolute dates that undoubtedly position the settlements of this region within the Full Bronze Age.

Along with confirming the occupation of this region through absolute dating, another issue to consider is the quality of the information recovered from the reported archaeological context. In the case of Cerro San Juan, like in Setefilla (Aubet et al. 1983) for example, the evidence comes from small trenches to establish a stratigraphy. Despite providing enough information for confirming the occupation of these sites during the 2nd mill. BC, less is known about the character of the settlements and their composition, because it was not possible to excavate extended areas.

The opposite case is seen at Cobre las Cruces. This site was found during an infrastructure project: the expansion of a copper mining area that occupies part of the municipalities of Gerena, Salteras and Guillena in the province of Seville. Since 1996, several teams have been performing surveys as well as rescue activities in the mining area, the last of them in 2011. In this process, 49 archaeological contexts were identified in the area affected by the mining project. These contexts belonged to several phases including prehistory, protohistory, Roman and Medieval periods. Three of them, SE-L, SE-B and SE-K, were identified as part of a Full Bronze Age settlement with an adjacent necropolis (Hunt Ortiz 2012).

Sites SE-L, SE-B and SE-K were found in the southeast corner of the affected area (*fig. 86*). The first site documented, SE-L, consisted of a fireplace without any apparent link to any settlement structure; but it was possible to identify a hemispheric bowl with some animal bones (likely ovicaprid; Hunt Ortiz 2012) dated to the first half of the 2nd mill. BC (Carrasco Gómez 2007).

The settlement SE-B was studied in more detail. Ten small tranches to establish a stratigraphy were excavated and six of them presented evidence of occupation from the first half of the 2nd mill. BC to the beginning of the 1st mill. BC (Carrasco Gómez/Vera Cruz 2000; 2001; Pérez Macías et al. 2005). According to Hunt Ortiz, the findings corresponded to a Bronze Age open site, composed of huts distributed along the flat areas of the hilltop. Two of these huts were excavated, showing an elliptic shape of approximately 8m in diameter (Hunt Ortiz 2012). Some evidence of silver metallurgy (slags) was also found in these domestic contexts, along with fireplaces and pottery fragments spread along the surface (Hunt Ortiz 2012).

Next to the settlement, a cist necropolis was found. It was divided into three inhumation areas. The first, excavated in 2006, had twelve tombs containing twelve individuals. The second, excavated between 2009 and 2010, had 18 tombs containing 22 individuals. The third, 300m southeast of SE-B, had 27 tombs containing 39 individuals. This last inhumation area was separated into a new context named SE-K.

Two types of inhumations were identified during the excavation campaigns: round pits, some covered with stone slabs and rectangular cists

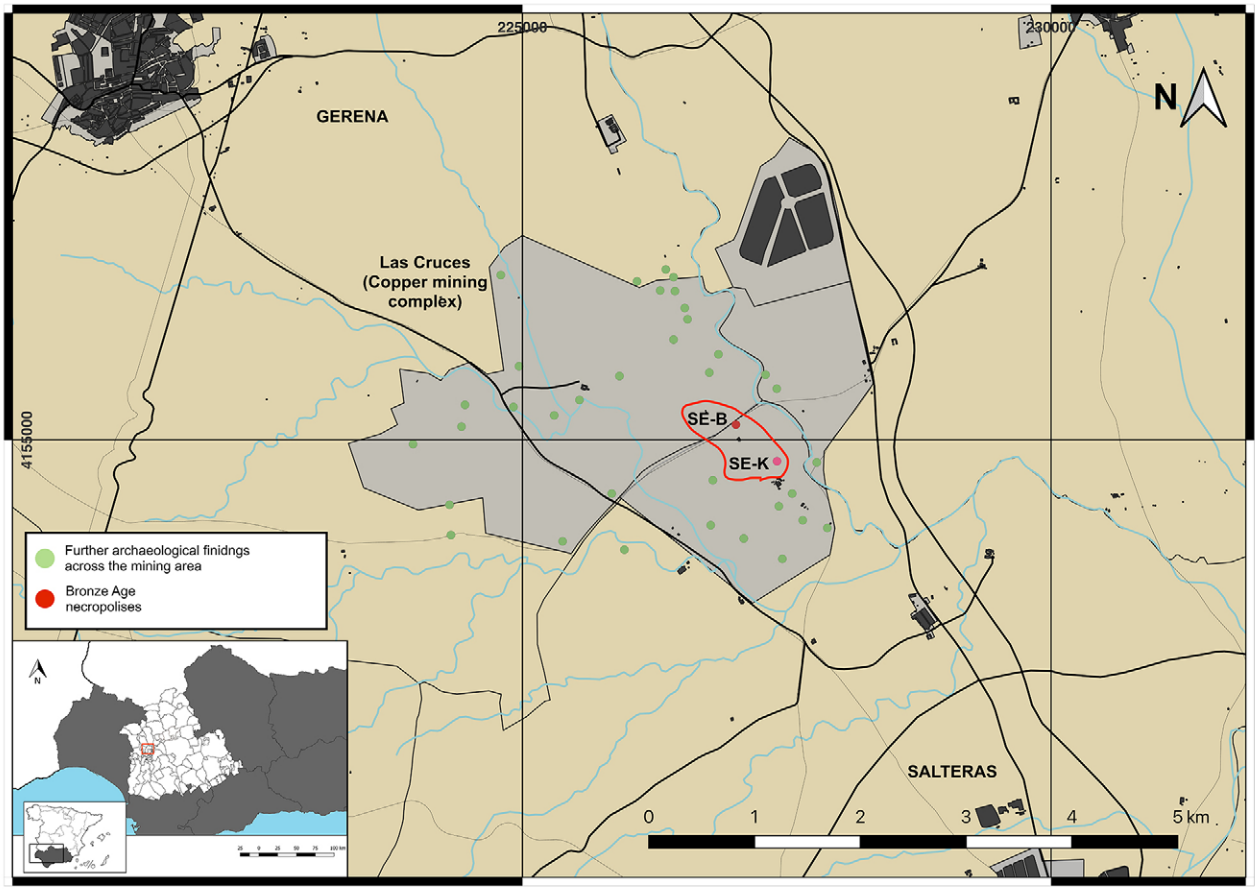


Fig. 86. Location of the SE-B and SE-K sites (red ellipse) in the affected area of Cobre las Cruces mine expansion.

made of slate stone slabs. The tombs are mostly individual burials, but in SE-K, two collective burials (T-19 with six individuals and T-23 with three) were identified (Hunt Ortiz 2012).

All bodies (100%) were found in a hyperflexed (foetal) position (Hunt Ortiz 2012). Physical anthropologists observed that the assignation of body position was done according to sex, with 100% of individuals identified as women being buried in right lateral decubitus position, and 100% of men being buried in left lateral decubitus position (Vázquez Paz/Hunt Ortiz 2009).

Regarding the grave goods (*table 13*), most of the individuals were inhumated with pottery, especially undecorated ellipsoidal and ½ sphere bowls, as well as bottles. Female burials were mostly accompanied by shells (*Glycymeris insubrica*, *Glycymeris glycymeris*, *Melanopsis cariosa and Pecten maximus*) as well as marine (*Unionidae*) and fluvial (*Melanopsis cariosa*) molluscs (Hunt Ortiz 2012). Metal goods such as points and daggers were also identified.

6.1.1 Radiocarbon Dates

Along with Cerro San Juan (2057–1767 calBC, n=10) (García Rivero/Escacena Carrasco 2015), Cobre las Cruces provided enough radiocarbon dates to determine the span of occupation of this part of the Low Guadalquivir Valley. 44 dates were obtained from human bone remains excavated in the SE-B and SE-K necropolises (*fig. 87*). Collagen from bone samples was extracted in the Biogeology Laboratory of the University of Tübingen and submitted to the Centre for Isotope Research (CIO) in the University of Groningen for dating.

According to the radiocarbon dates obtained (*table 15*), both burial sites were used during the same span of time, from the end of the 3rd mill. BC to the first quarter of the 2nd mill. BC (*fig. 87*). These dates also overlap with the span of occupation reported for sites such as Cerro San Juan (2146–1734 calBC, n=10; García Rivero/Escacena Carrasco 2015), Valencina de la Concepción (in its Bronze Age Phase, 2133–1520 calBC, n=4; Castro et al. 1996; Nocete et al. 2011; García Sanjuán et al. 2018), Cerro del Berrueco (2201–1422 calBC, n=2; Escacena Carrasco/Berriatúa Hernández 1985), Setefilla (2134–1533 calBC, n=2; Aubet et al. 1983), El Trastejón (2470–1520 calBC, n=9; García Sanjuán/Hurtado Pérez 2011) and La Traviesa (1975–1529 calBC, n=2; García Sanjuán 1998).

The set of dates from these six sites is one of the main pieces of evidence for demonstrating the occupation of the Middle and Low Guadalquivir Valley during the Full Bronze Age (Bartelheim et al. 2021). Areas surrounding the *Lacus Ligustinus* or the Sierra Morena were suitable for human occupation; the lack of surveying is probably the main explanation for the low number of sites identified compared to other areas in the southeast (see chapter 2.2.4).

Besides radiocarbon dating, human remains from Cobre las Cruces also provided information regarding diet and mobility, thanks to δ^{13}C, δ^{15}N, and δ^{18}O, ^{87}Sr/^{86}Sr isotopic analyses. Information obtained through isotopic analyses also allowed for the assessment of elements such as the use of resource soil, the interactions across the landscape and the social organisation.

Individuals from the first inhumation area of SE-B (n=12) and SE-K (n=38) necropolises were analysed for diet and mobility. Bone and teeth samples (*table 14*, *16*) were submitted to the Biogeology Laboratory of the University of Tübingen for collagen extraction as well as extraction of carbonates in dental enamel.

6.1.2 Diet

Of the 50 samples, 46 had good collagen preservation (*table 14*) and were sent to the Centre for Isotope Research (CIO) in the University of Groningen for isotopic analyses of carbon and nitrogen.

Regarding carbon and nitrogen isotope diet analyses at Cobre las Cruces, the δ^{13}C of human individuals ranged between -20.18‰ (min.) and -18.34‰ (max.) (mean -19.30±0.38 [1σ] n=45), whereas δ^{15}N ranged between 6.98‰ (min.) and 11.48‰ (max.) (mean 8.07±0.88 [1σ] n=45) (*fig. 88*).

It was not possible to collect bone and dental samples from faunal remains in Cobre las Cruces; therefore, in order to develop a proper diet

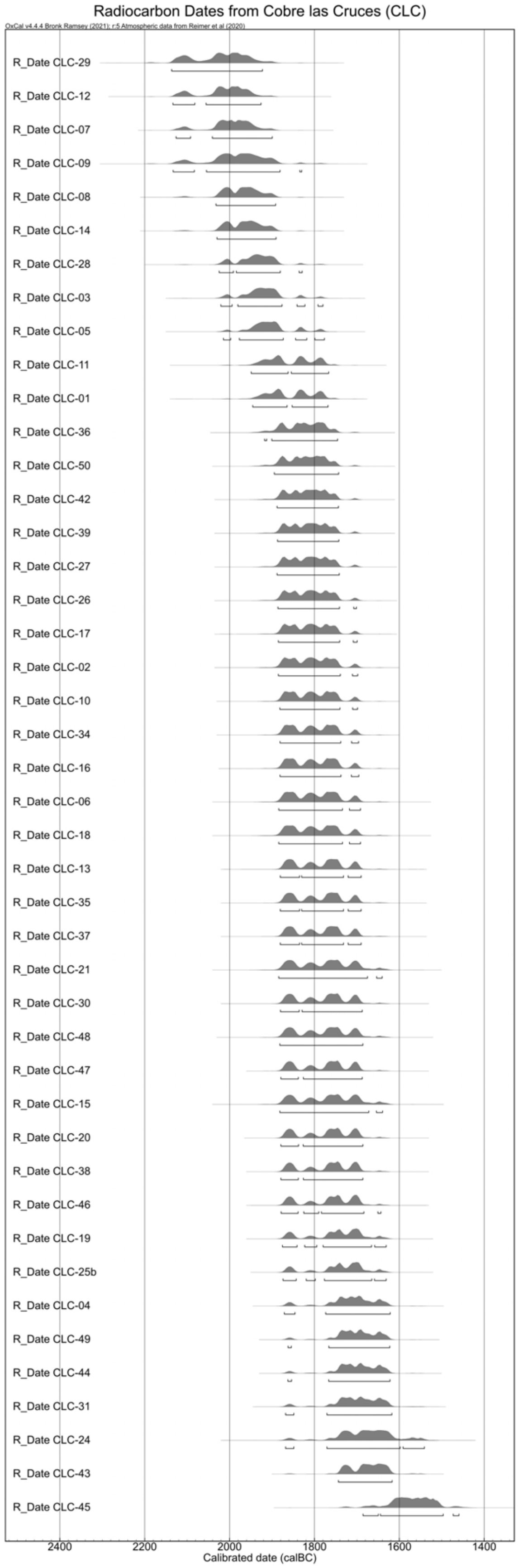


Fig. 87. Radiocarbon dates from Cobre las Cruces (CLC) SE-B and SE-K necropolises. See the dates obtained in table 15.

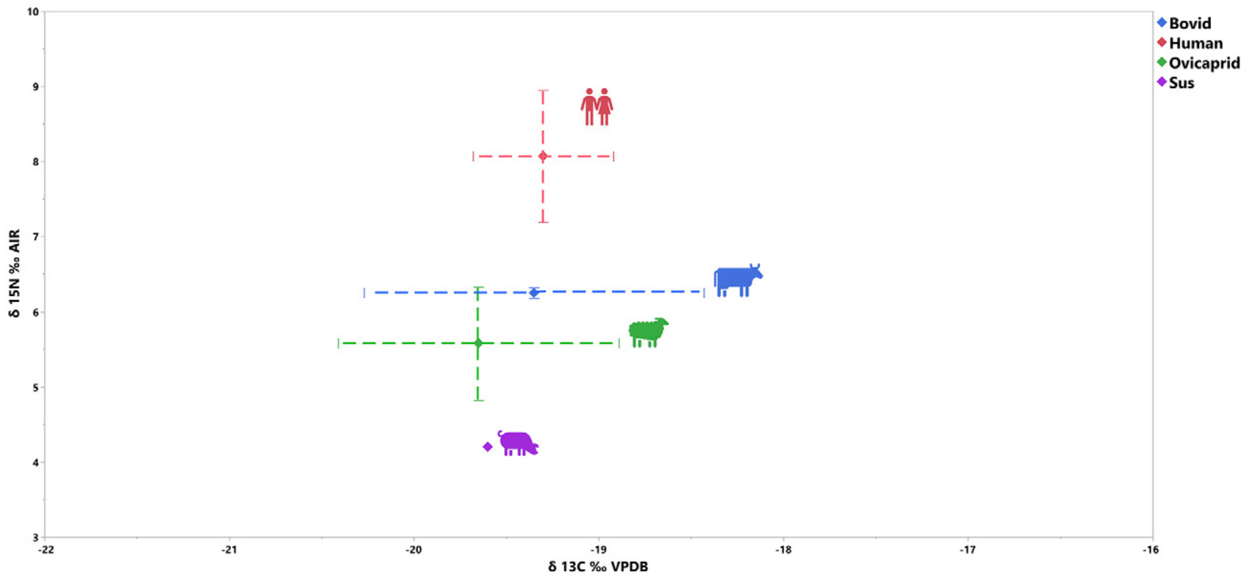


Fig. 88. δ^{13}C and δ^{15}N in human individuals of Cobre las Cruces (in red) vs. Fauna from Valencina de la Concepción.

analysis, it was decided to compare the data obtained in humans with faunal data (n=2 bovids, n=1 porcine and n=4 ovicaprids) from the site of Valencina de la Concepción, which is only 7km south from Cobre las Cruces (the data was taken from Díaz-Zorita Bonilla 2013; Fontanals-Coll et al. 2015). Despite belonging to the Copper Age site of Valencina, the fauna could still provide reliable data for comparing and obtaining information regarding diet in Bronze Age humans from Cobre las Cruces. In the end, both sites are very near and likely shared the same kind of environment (marshes next to the *Lacus Ligustinus*), therefore people may have had a similar behaviour with domestic animals. All resulting comparisons must be taken carefully and just as a temporary solution, until proper isotopic data from faunal individuals in Cobre las Cruces is obtained.

Considering the trophic level enrichment between humans and herbivores (about 1‰ for δ^{13}C values and 3–5‰ for δ^{15}N; Bocherens/Drucker 2003) and after comparing human and faunal means, values are consistent with a typical scenario of C_3 herbivores consumption by human individuals from Cobre las Cruces (*fig. 88*). The range of human values also indicates a very low (or non-existent) input of protein from marine sources, according to the marine theoretical value of 12±1‰ (estimated from Francalacci 1989; Jennings et al. 1997; Richards/Hedges 1999). As mentioned above, these results must be taken with care and need to be integrated with further analysis of faunal remains from the same site and period.

The moderated difference in δ^{15}N values (2.16‰) between humans from Cobre las Cruces and herbivores from Valencina, compared with the difference observed between Copper Age humans and herbivores in Valencina (3.3‰) (Fontanals-Coll et al. 2015), could indicate that animal protein did not have the same weight in the diet of individuals of Cobre las Cruces as in Valencina individuals.

The δ^{13}C values in humans also indicate a generalised consumption of C_3 vegetation, likely related to the growing of cereals such as *Triticum aestivum* (wheat) and *Hordeum vulgare* (barley), documented since the Chalcolithic and also in Bronze Age southeast Iberian settlements (Knipper et al. 2020). There is no indication of the consumption of C_4 plant species.

From the δ^{15}N values obtained, the objective was to generate a model for discriminating the percentages of animal and vegetal protein intake. However, since no fauna from Cobre las Cruces was available for performing more accurate calculations (such as Bayesian models), two alternative models were generated based on two different sources of data: the first (Scenario A) with the $\delta^{15}N$ values of herbivores from Valencina (*fig. 89*; Díaz-Zorita Bonilla 2013; Fontanals-Coll et al. 2015) and the second (Scenario B) with herbivores from the Bronze Age sites of La Bastida and Gatas (*fig. 90*; Knipper et al. 2020) in southeast Iberia.

These models were elaborated based on the one made by Fraser et al. (2013; quoted by Fontanals-Coll et al. 2015, 164). From Fraser's model, and the one elaborated by Fontanals-Coll et al., the following lineal relationship was identified:

(1) $y = 4x + N$

Where:

- y = Estimated value in ‰ of the $\delta^{15}N$ in humans
- x = Animal protein fraction from the total dietary protein
- N = $\delta^{15}N$ average in ‰ from the herbivores analysed
- 4 = Average range of $\delta^{15}N$ enrichment in the trophic chain, which is between 3‰ and 5‰ for herbivores (Bocherens/Drucker 2003)

Since the sought value is x, a new equation (2) was defined departing from (1):

(2) $x = (N-y)/(-4)$

Considering the average $\delta^{15}N$ value in herbivores of N=5.91‰ for Valencina and N=7.54‰ for the Bronze Age sites of La Bastida and Gatas as well as the mean value obtained for the $\delta^{15}N$ of humans in Cobre las Cruces of y=8.07‰ two graphs were elaborated (*fig. 89*, *90*).

The two models provide very different results, which set two possible scenarios: the first is based on herbivores coming from a site that belongs to the same environment as Cobre las Cruces, despite not belonging to the same age (*fig. 89*); the second is based on herbivores coming from sites that belong to the same span of time as Cobre las Cruces, despite not being geographically close (*fig. 90*). Both results, and the assumptions made, must be taken with caution as they serve only as a guide to explore possibilities regarding diet in Cobre las Cruces. Further analyses with proper herbivores from Cobre las Cruces, along with palaeobotanical and anthracological analyses, must be performed in order to obtain more accurate data.

The scenarios proposed are described below:

Scenario A: Assuming that $\delta^{15}N$ values in herbivores from Valencina are suitable for this analysis, the model shows an equal contribution of both cereals and herbivores to the dietary protein of humans in Cobre las Cruces. This scenario is less likely, because it is not possible to be certain that the $\delta^{15}N$ values remained unaltered between the Chalcolithic and the Bronze Age, especially considering the ecologic and climatic changes that occurred between these two periods.

Scenario B: Assuming that $\delta^{15}N$ values in herbivores from the sites of La Bastida and Gatas are suitable, the model shows a bigger contribution of cereals to human dietary protein than herbivore meat. The model represents a scenario where people dedicated more time and space to growing cereals and, despite consuming animal meat, received less of their total dietary protein from it.

Additional data also supports the second scenario. After comparing the $\delta^{15}N$ values in humans from Cobre las Cruces with the values of people from contemporary sites in the southeast, it is possible to see that Cobre las Cruces humans have the lowest mean among the Bronze Age sites in southern Iberia (*fig. 91*).

Compared with other Bronze Age sites, these values suggest that Cobre las Cruces people practised extensive livestock farming, taking advantage of the open fields in the marshes around the Low Guadalquivir Valley. This would also be expressed in the settlement pattern, with several huts spread along the flatland as suggested by Hunt Ortiz (2012). In contrast, southeast higher $\delta^{15}N$ values are more indicative of manuring practices (Knipper 2020; with manure obtained from stabled animals, already evidenced in these sites), which, beyond improving the soils, could have increased the $\delta^{15}N$ value in the total human protein. The direct effects of manuring in the archaeobotanical and human $\delta^{15}N$ values are still matter of investigation (Treasure et al. 2016; Szpak 2014).

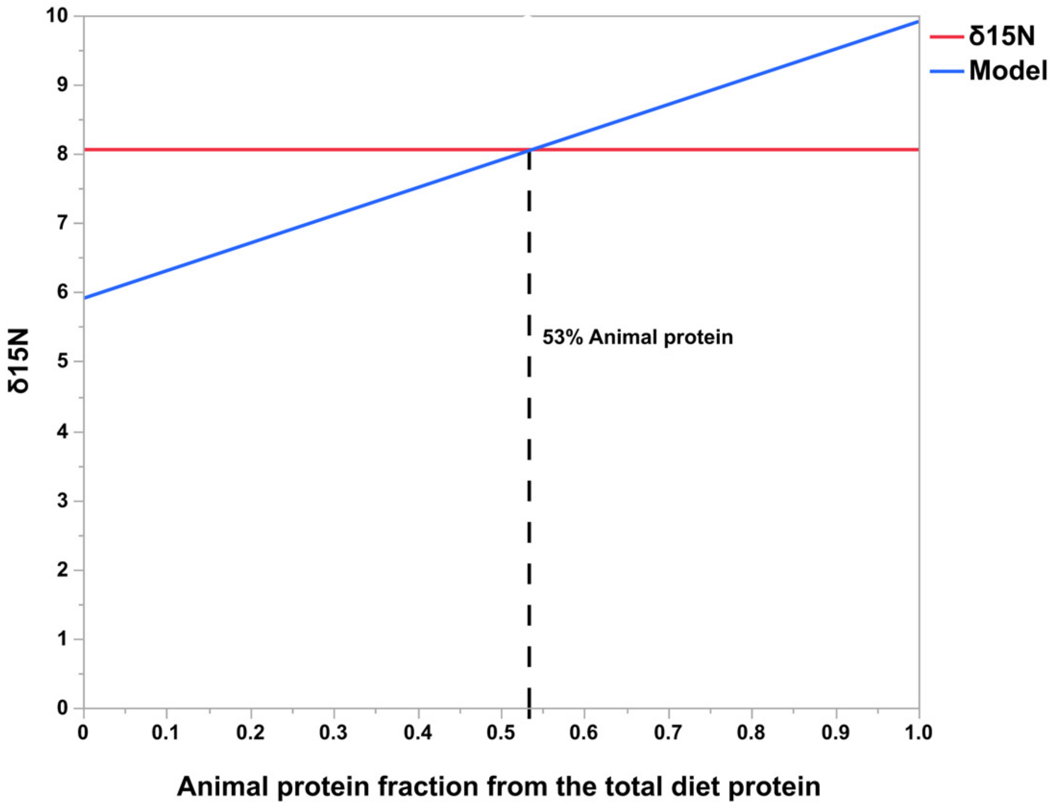


Fig. 89. Model of animal protein intake calculated with herbivores from Valencina (Scenario A).

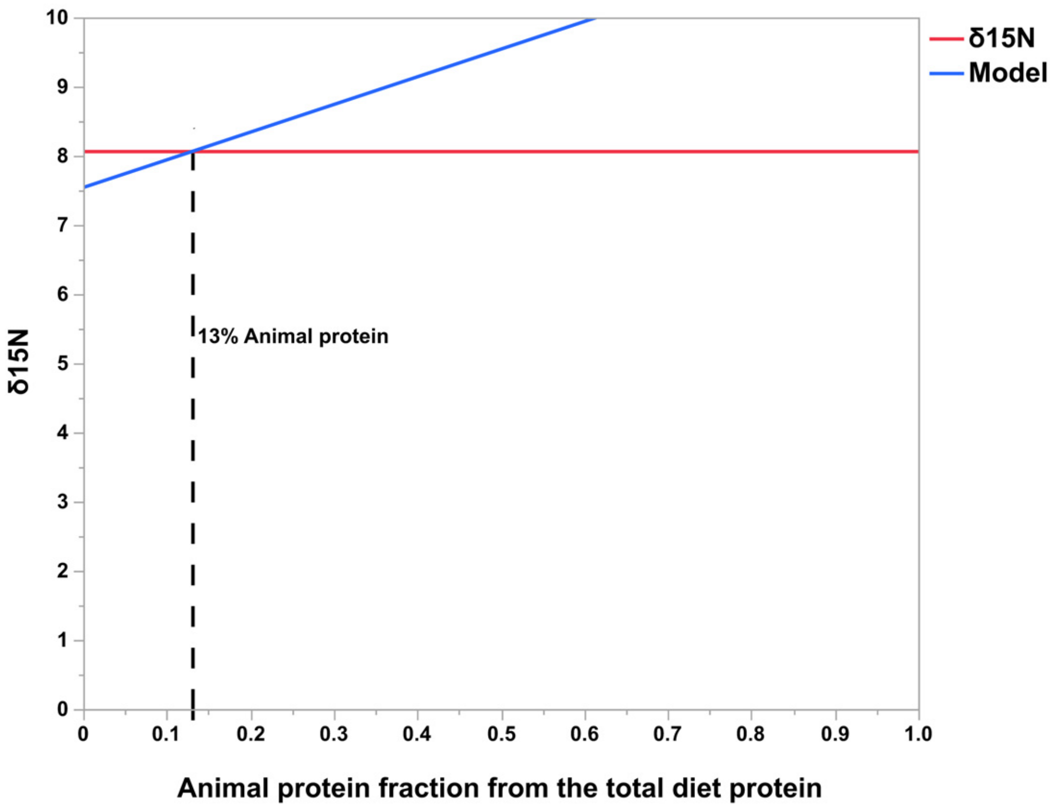


Fig. 90. Model of animal protein intake calculated with herbivores from La Bastida and Gatas (Scenario B).

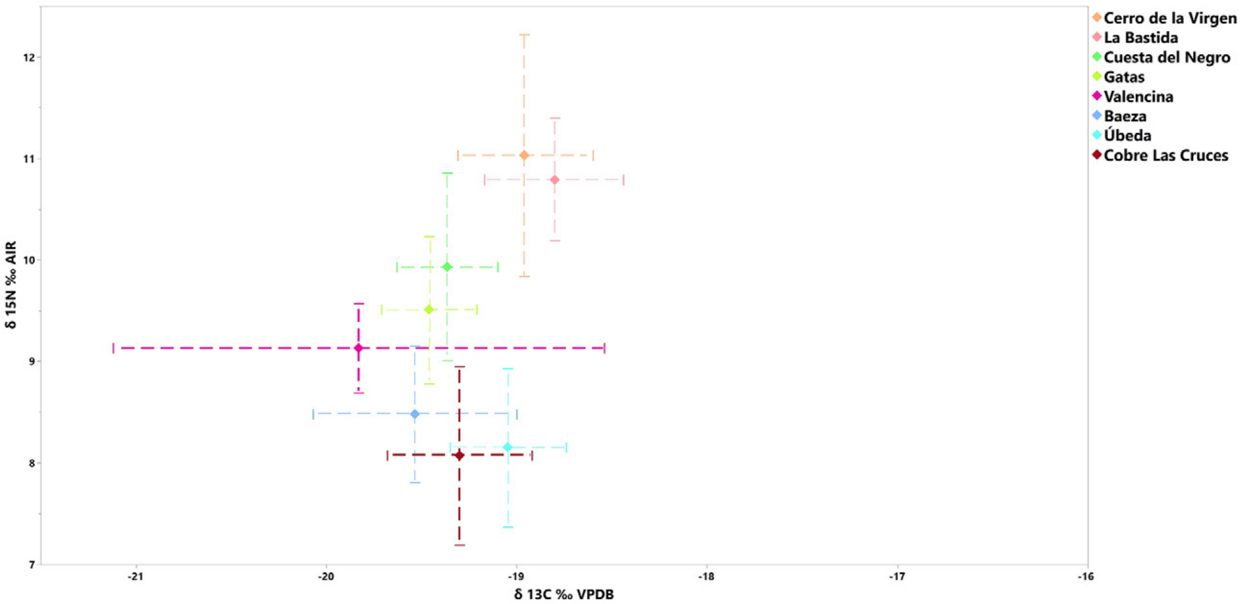


Fig. 91. δ^{13}C and δ^{15}N of humans from Cobre las Cruces vs. contemporary sites in southeast Iberia.

6.1.3 Mobility

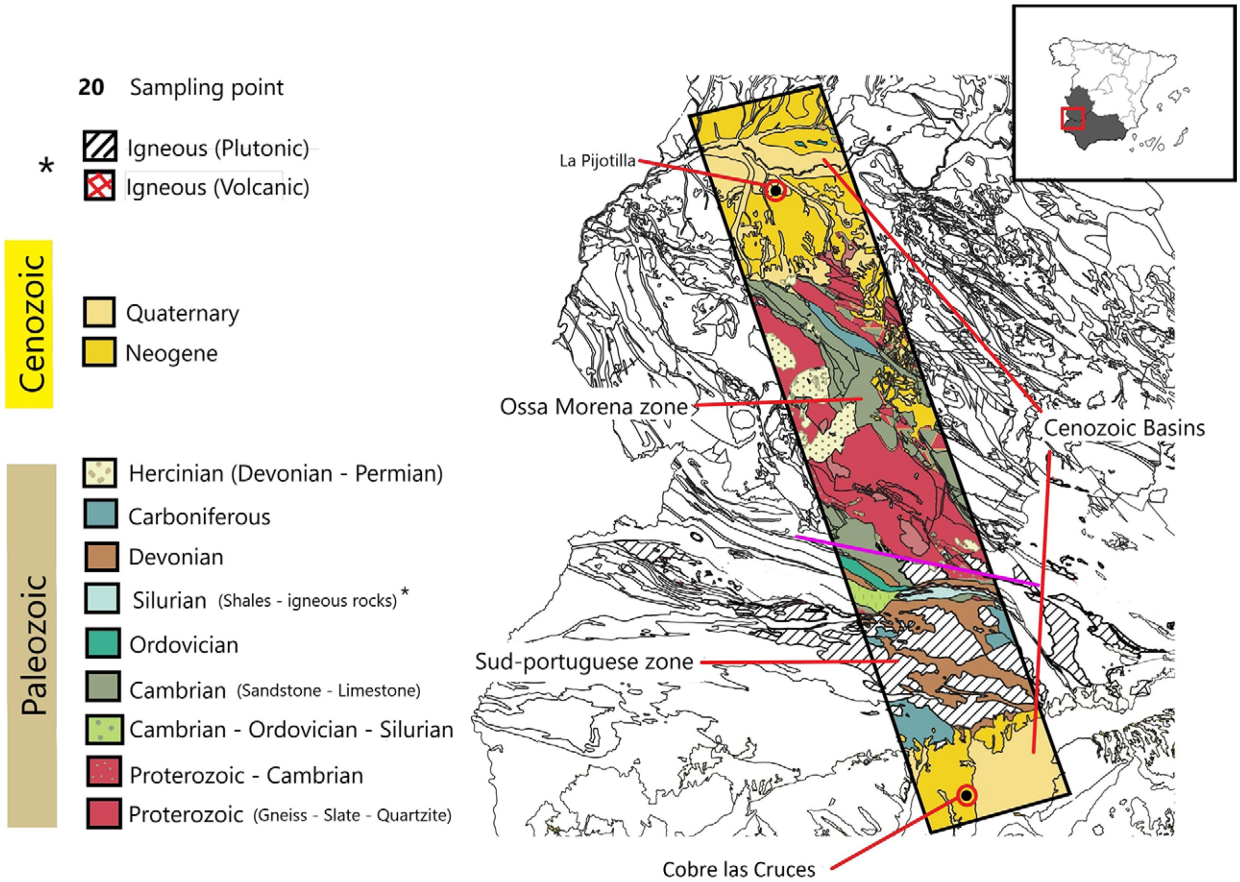
After looking at the cost surface maps obtained from sites coinciding in the pottery subtypes with the site of Cobre Las Cruces (see chapter 5.4.2), it is possible to see the potential areas of interaction between the Sierra Morena and the regions around the *Lacus Ligustinus*. The link between these mountains and the Guadalquivir Valley, and the mobility through corridors such as the Aljarafe–Rivera del Cala during the Bronze Age, is a possibility that could also be assessed from other proxies. Isotopes can be a suitable approach for analysing and confirming such a link.

Among 39 dental enamel samples collected (39 individuals among the 50 analysed), 37 were suitable for δ^{18}O and 38 for ^{87}Sr/^{86}Sr isotopic analyses (*table 16*). Carbonates from dental enamel were sampled in the laboratory of the Biogeology research group of the University of Tübingen and were submitted to the Curt-Engelhorn-Zentrum Archäometrie, Mannheim, for isotopic analyses.

The geology of the study area shows that Cobre las Cruces lies on quaternary deposits (*map 27*). These deposits are younger than all the formations present in the neighbouring Sierra Morena mountains, including the complex and intricated Ossa Morena zone, with several geologic units spanning from the Cambrian to the Devonian ages (Instituto Geológico y Minero de España 1976).

^{87}Sr/^{86}Sr ratios vary according to the age of the bedrocks where the humans settled and obtained their food: the younger the age of the deposits, the lower the ratios (Bentley 2006). According to the geological information obtained from the study area, the difference in age between the young quaternary deposits of the low Guadalquivir and the older ones from the Sierra Morena imply that ^{87}Sr/^{86}Sr ratios from Cobre las Cruces must be lower than the ratios already known from sites in the mountains. The only ratios reported for the study area come from the Copper Age sites of Valencina de la Concepción and La Pijotilla (Díaz-Zorita Bonilla 2013). The two sites are in quaternary deposits from different valleys: Valencina next to the Guadalquivir Valley and La Pijotilla in the Guadiana Valley, north of the Sierra Morena.

Although no ratios from archaeological sites in the Sierra are available, the ones published from these two sites can be used for determining the local available baseline (Price et al. 2002) for Cobre las Cruces. Valencina de la Concepción lies in the same geological zone as Cobre las Cruces, only 7km south of it; La Pijotilla, despite being on the other side of the Sierra Morena, is also situated on quaternary deposits (*map 27*). In order to confirm



Map 27. Geologic map of a transect between the Low Guadalquivir and the Guadiana Valley, through the Sierra Morena mountains. The transect covers the area of Ruta de la Plata, a very traditional livestock path that historically linked both valleys.

that data from Valencina could be trusted and not confused with the values from La Pijotilla, the means of their ratios were compared to identify statistically significant differences between the sets of data collected for each site (*fig. 92*).

After comparing the means of the sites, a statistically significant difference was found between the $^{87}Sr/^{86}Sr$ ratios from La Pijotilla and the ratios from Valencina and Cobre las Cruces, which clustered together and are therefore more similar. This similarity allowed the elaboration of the local biologically available baseline (Price et al. 2002) for Cobre las Cruces, based on the local fauna from Valencina.

The locally available baseline was defined with seven faunal samples from Valencina (Díaz-Zorita Bonilla 2013) and 15 environmental samples collected in the frame of a parallel investigation regarding mobility between the Low Guadalquivir and the Guadiana Valleys led by Díaz-Zorita Bonilla. The environmental samples came from four sites that share the same geological zone as Cobre las Cruces and Valencina (marshes and calcareous conglomerates from the tertiary with quaternary deposits; Instituto Geológico y Minero de España 1976). The local baseline was obtained by calculating the mean of both faunal and environmental ratios (0.70991) and setting ±2SD of range from the mean (0.70841 to 0.71001; Price et al. 2002; *fig. 93*).

After comparing the $^{87}Sr/^{86}Sr$ ratios from Cobre las Cruces with the baseline, two groups were identified:

– Locals: People with $^{87}Sr/^{86}Sr$ ratios clustered inside the range determined as baseline. During the formation of their dental enamel in childhood, they were settled within the geological area where Cobre las Cruces is located and consumed fauna and vegetables that grew there. The fact that their bodies were found in Cobre las Cruces indicates that, at least during the first and the last phases of their lives, they occupied this region.

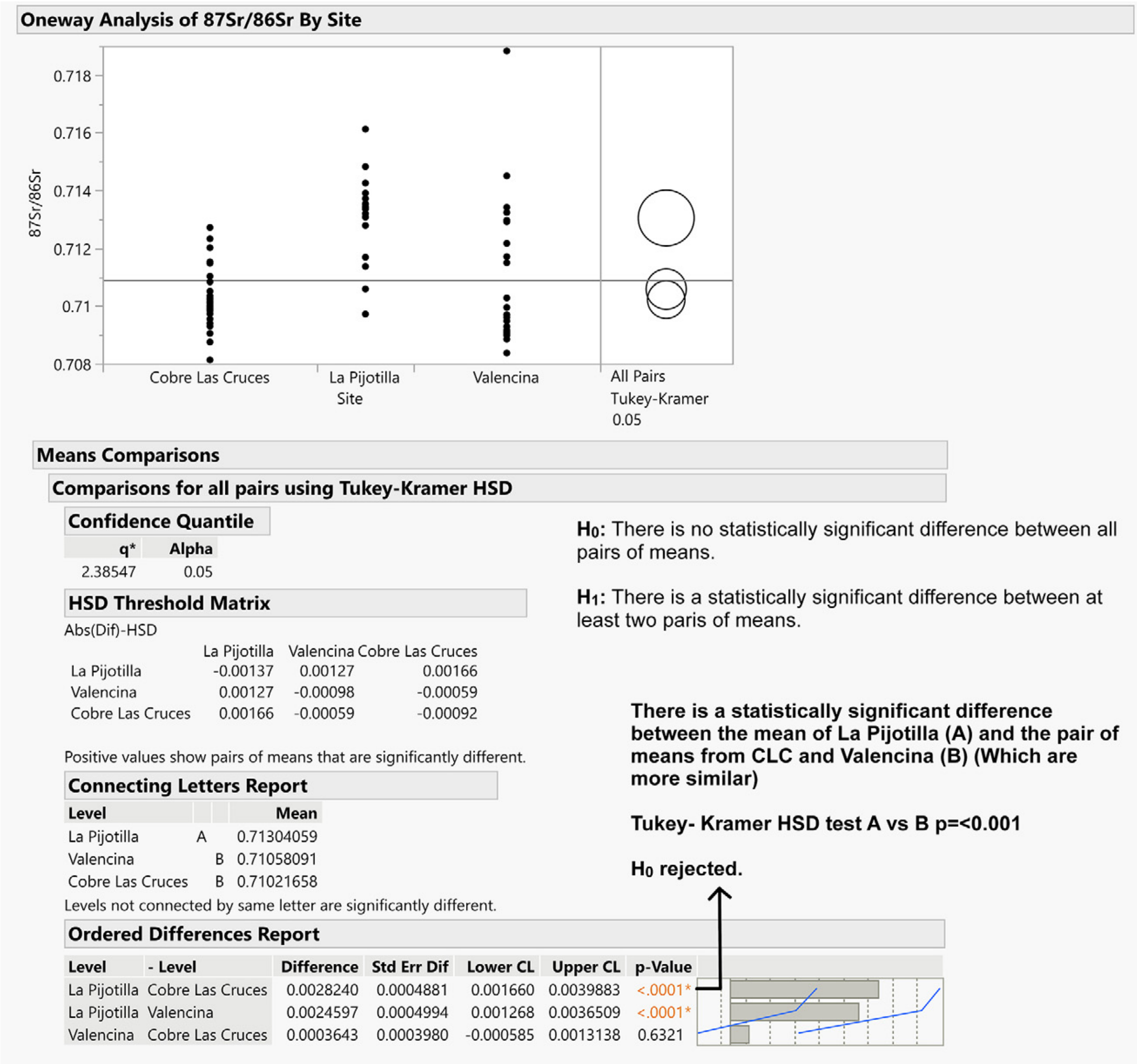


Fig. 92. Tukey post hoc test to determine statistically significant differences between the three sets of data (87Sr/86Sr ratios from Cobre las Cruces, Valencina de la Concepción and La Pijotilla).

– Non-locals: People with $^{87}Sr/^{86}Sr$ ratios outside the local baseline range, who, during childhood, consumed animals and vegetables from outside the geological zone where Cobre las Cruces belongs. It is remarkable that ratios outside the range are mostly higher, which indicates that these individuals come from sites with an older geological chronology. The closest region with such geological formations is the neighbouring Sierra Morena.

After comparing the distribution of the data in the boxplots (*fig. 93*), it is possible to identify a difference between the distribution of the ratios in Cobre las Cruces (with most of the data clustered around the mean) and the ratios from the Copper Age sites. The distribution in Cobre las Cruces could be indicative of a more restricted settlement pattern, with small villages, not extended as far along the space as the Chalcolithic settlements (with a wider distribution of the data).

Considering that along the whole study area, the mountains are geologically older than the valleys and therefore present higher $^{87}Sr/^{86}Sr$ ratios, the binary composition observed in the population of Cobre las Cruces (almost half into the local baseline and half outside) may correspond to a social organisation that links people from both valley and mountain regions. Mountains seem to have

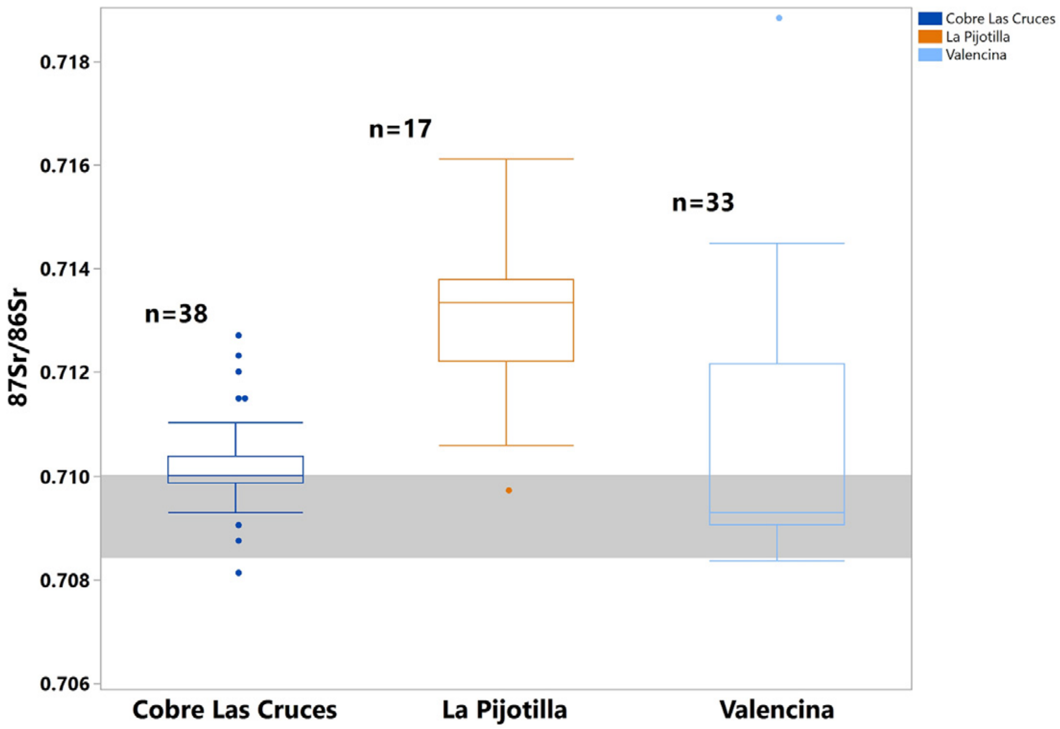


Fig. 93. $^{87}Sr/^{86}Sr$ ratios from Cobre las Cruces compared with the ratios from Valencina and La Pijotilla. Grey area indicates the biologically available Sr-isotopic local baseline for the study area.

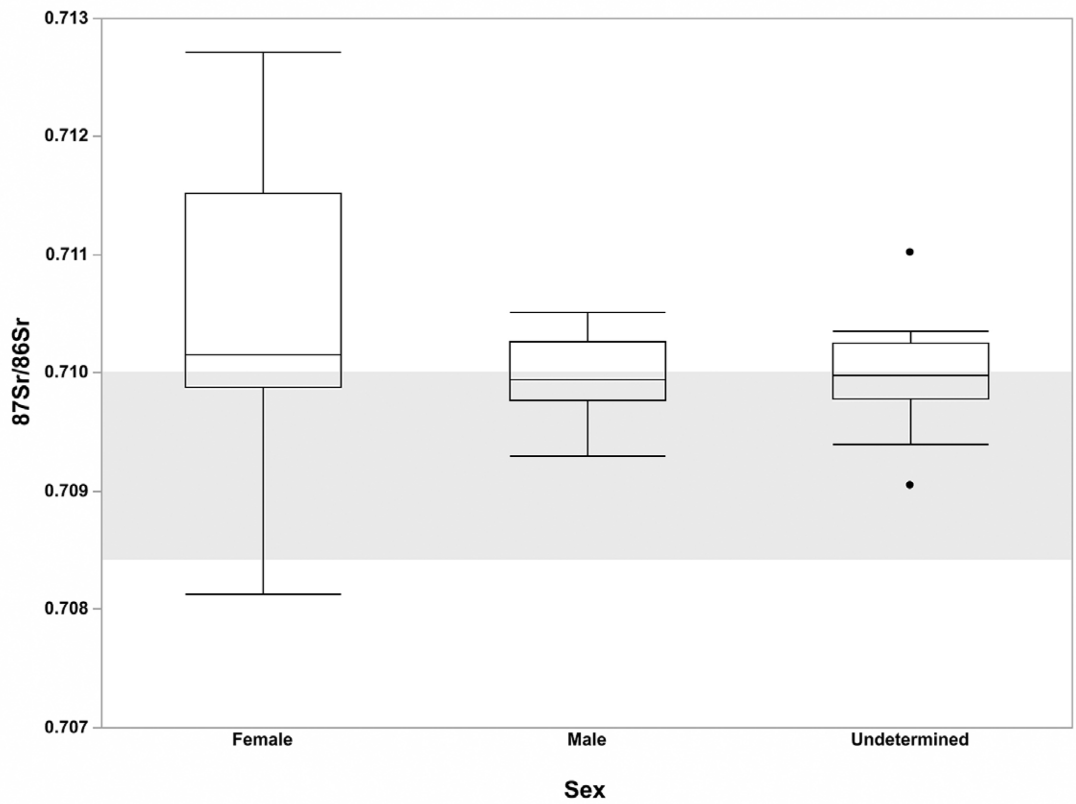


Fig. 94. $^{87}Sr/^{86}Sr$ ratios from Cobre las Cruces by sex. Grey area indicates the biologically available Sr-isotopic local baseline for the study area.

been highly integrated in the Bronze Age people's landscape as seen for example in the settlement patterns. Material resources such as hunting animals, fresh water or copper coming from the mountains could have been part of a Resource-Complex (Teuber/Schweizer 2020). This could also have included immaterial resources such as the parental, economic or sociocultural ties between valley and mountain people that ended up in the configuration observed in the population buried at Cobre las Cruces.

According to the $^{87}Sr/^{86}Sr$ ratios for Cobre las Cruces and the restricted settlement pattern observed, it can be considered that the origin of the individuals buried in the Cobre las Cruces necropolises is in settlements located in both the Guadalquivir Valley and the Sierra Morena region. The normal distribution of the data shows that people were not segmented (e.g. two different villages in one cemetery) but were integrated as the same people, regardless of their origin.

After comparing the $^{87}Sr/^{86}Sr$ ratios of Cobre las Cruces by sex (*fig. 94*), it can be observed that male individuals are closer to the local baseline whereas females are more dispersed, and the number of non-local women is higher than the number of local women. These data could be indicative of several types of social organisation. One of these could consist in men being 'less mobile' than women due to patrilocal practices. Patrilocality and female exogamy have also been claimed in sites contemporary to Cobre las Cruces in Europe (Mittnik et al. 2019). Further possibilities can also be considered, for example an economic model with women more focused on herding practices or settlement patterns not necessarily linked to patrilocality.

This segmentation of the group by sex seems to be reinforced by the position of the bodies mentioned above. Men in left lateral decubitus and women in right lateral decubitus position, along with the isotopic differences regarding sexes provenance and distribution towards the local baseline, could indicate that gender had a role in the community, although details of such roles are unknown. From the results of the isotopic analyses, mobility of women (triggered by particular social and cultural practices among Full Bronze Age human groups in this region) can be considered a resource used to establish parental, economic or sociocultural ties between valley and mountain settlements.

During the Chalcolithic, collective burials in megalithic sites integrated different segments of the community into the rituals. During the Bronze Age, the appearance of individual burials and the differentiation by sex (at least in Cobre las Cruces) can be read as evidence of a change in the way people perceived and integrated death into social life. Results suggest a rupture of the wide communal links existing during the Chalcolithic and the adoption of consanguinity as the new bonding element among Bronze Age people. At the same time, mobility of women and likely patrilocality seem to be new practices that differentiate Cobre las Cruces people from former traditions. With a new settlement pattern developing in the Bronze Age, villages reduced their size and separated from others; but they remained linked to each other thanks to the exchange of resources and the mobility of people between different regions, in this case, between the Valley and the Mountains.

After comparing the $^{87}Sr/^{86}Sr$ ratios by age (*fig. 95*), it can be observed that infants are distributed more towards the local baseline, indicating that childcare was linked to the obtention of 'local' resources coming from the surroundings. Adult non-local individuals seem to have arrived in the Low Guadalquivir after growing up somewhere else, integrating into the population from Cobre las Cruces at a later stage of their lives.

Comparisons between $^{87}Sr/^{86}Sr$ ratios and $\delta^{18}O_W$ (oxygen isotopes in drinking water) were also performed to identify possible different water sources for people during their childhood.

One of the characteristics of the $\delta^{18}O$ are its changing values according to phenomena such as latitude, height, air temperature, evaporation of the surface water and precipitation levels. Today, models based on values of $\delta^{18}O$ in precipitation are applied to provide information about the behaviour of our current climate. Such models have also been useful to distinguish different types of water sources and assess the behaviour of its isotopic values in the physical environment, according to the position where precipitated water was obtained and the type of water body where the samples were collected (Souchez et al. 2002).

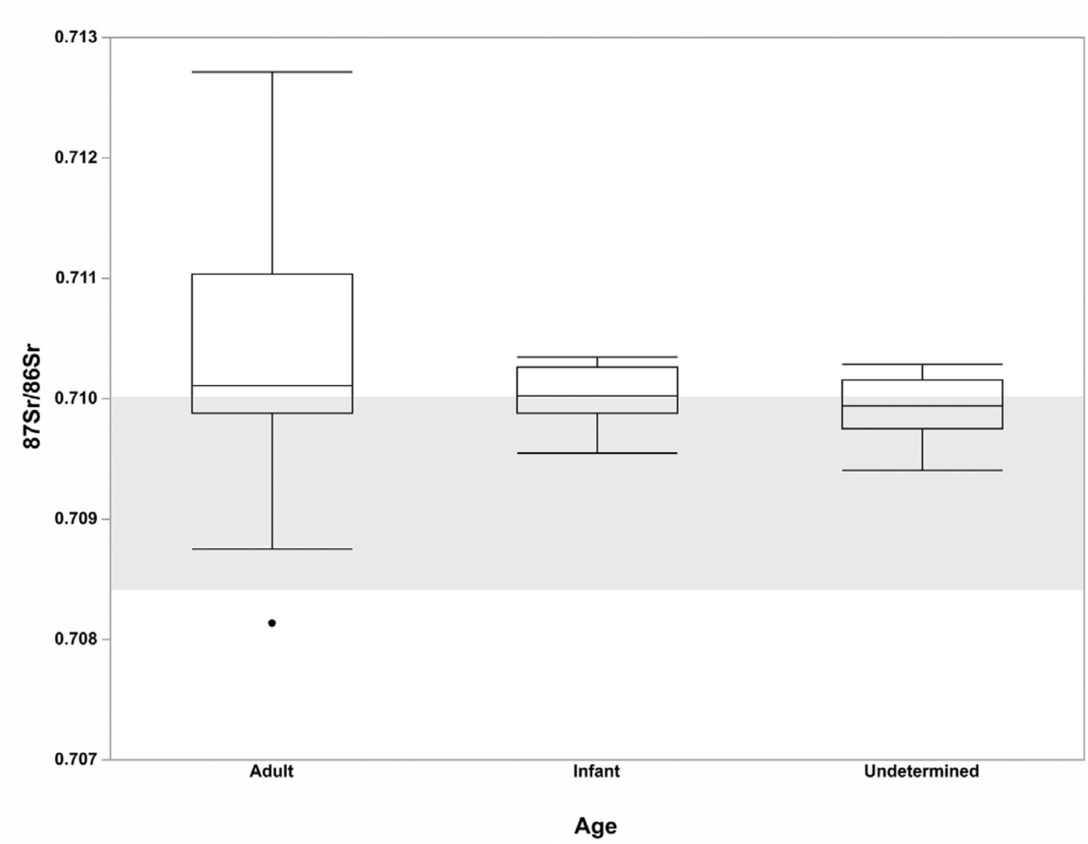


Fig. 95. $^{87}Sr/^{86}Sr$ ratios from Cobre las Cruces by age. Grey area indicates the biologically available Sr-isotopic local baseline for the study area.

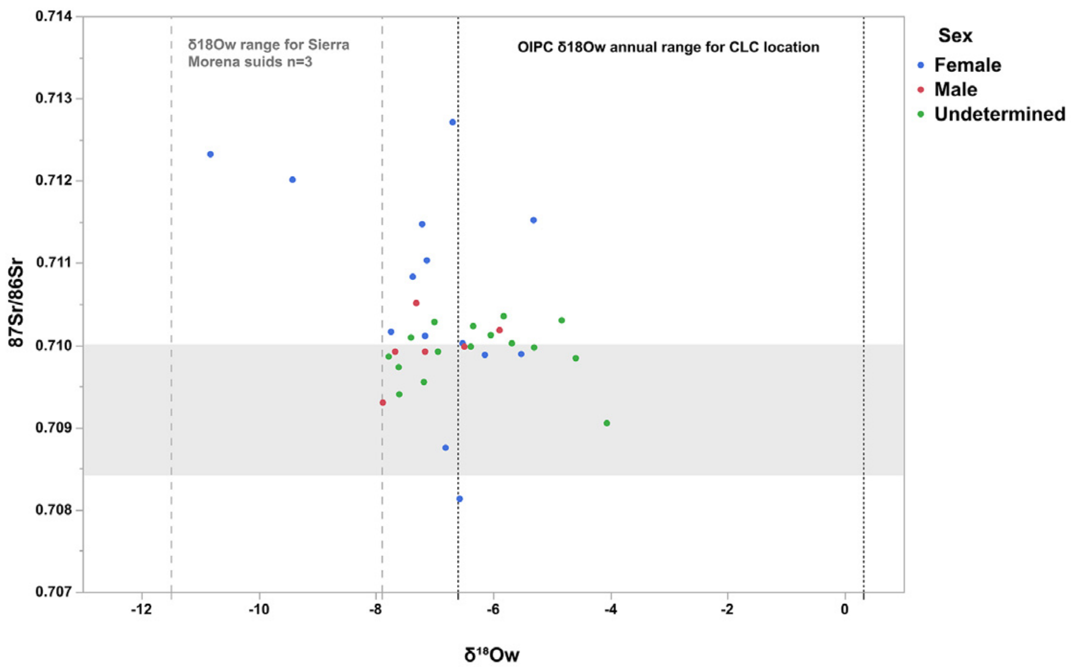


Fig. 96. Cobre las Cruces human δ^{18}OW values vs. $^{87}Sr/^{86}Sr$ ratios discriminated by sex. Grey area indicates the biologically available Sr-isotopic local baseline for the study area.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
$\delta^{18}O$ (‰ V-SMOW)	-6.6	-6.3	-6.1	-4.3	-2.6	-0.7	-0.3	-1.7	-2.2	-3.4	-5.2	-5.9

Table 12. OIPC annual range obtained for the coordinates of Cobre las Cruces.

An oxygen isotope in precipitation calculator (OIPC) provides monthly and annual $\delta^{18}O$ values from any position on earth. Such calculations are based on the model for obtaining $\delta^{18}O$ values in precipitated water elaborated by Bowen et al. (2005). Monthly values obtained after inserting the coordinates of Cobre las Cruces are listed in table 12.

From these values calculated by the OIPC in Cobre las Cruces, it is possible to define a range that shows the behaviour of oxygen isotopes in precipitation for this part of the Low Guadalquivir Valley. In this case, ranges fluctuate between -6.6‰ (during winter) and 0.3‰ (during summer; *table 12*).

Precipitated water intervenes with the hydrologic cycle when it falls into water bodies such as lagoons or rivers. Water from these bodies is then consumed by people and animals. Infants incorporate the oxygen isotopes into the carbonates of their dental enamel during its formation. Values of $\delta^{18}O$ change during the phases of the water cycle, from precipitation until the incorporation of drinking water into the human body. Therefore, $\delta^{18}O$ in dental enamel carbonates was first converted to $\delta^{18}O_{SMOW}$ and then to $\delta^{18}O_W$, according to the models elaborated by Bowen (1986), Iacumin et al. (1996) and Daux et al. (2008).

Additionally, in order to distinguish between the $\delta^{18}O$ range for the Cobre las Cruces location and the $\delta^{18}O$ from the Sierra Morena, three samples from modern suids (two *Sus domesticus* and one *Sus scrofa*) from the Natural Park Sierra Norte de Sevilla (in the Sierra Morena mountains) were added to the analysis. The bone samples were picked up during an archaeological survey developed in the first phase of project A 02. One of the criteria for including these samples is the fact that suids do not have large mobility patterns. These suids were moving freely inside the borders of the natural park, which guaranteed that the values of $\delta^{18}O_W$ obtained corresponded to the consumption of water from the Sierra. The $\delta^{18}O$ values of the suids were calculated by Meza Paggi (2020). From those values, a $\delta^{18}O_W$ range between -11.5‰ to -7.9‰ was obtained (*fig. 96*).

Differences in $\delta^{18}O_W$ values among people from Cobre las Cruces can be considered differences in the water sources consumed during childhood. Data distribution of $\delta^{18}O_W$ values against $^{87}Sr/^{86}Sr$ ratios (*fig. 96*) confirms that two adult women (CLC-13 and CLC-50) came from a place not only with different geological formations but also with lower $\delta^{18}O$ values than the rest of the people. These two women clustered next to the lower values of the $\delta^{18}O$ range calculated by the OIPC.

Values of $\delta^{18}O$ decrease when temperature is low (as in winter) or when the water sources are located in high elevations (where temperature and evaporation levels are lower). Despite OIPC values being calculated for the current climate, they allow for the definition of an approximate range with which to compare the people analysed in this study and to identify ostensible differences in their values, similar to the ones found with CLC-13 and CLC-50 samples. Additionally, despite not having a big *n*, the suid samples can be used as controls for the water values of the Sierra Morena. Results show that these two women (CLC-13 and CLC-50) moved from elevated regions to the Low Guadalquivir Valley, reinforcing the idea of parental, economic or sociocultural exchanges between the river valley and the mountain people.

These ideas are based on the approximations made with the OIPC approach but, in order to refine the analysis, it would be necessary to know the $\delta^{18}O$ values for different water bodies in the study area. Given the agricultural and industrial activities that have contaminated the water bodies next to the towns where Cobre las Cruces was found, these approximations are the closest that can be can achieved until clean water sources are found. One way of mitigating the lack of such samples consists in using local fauna, as it was done with the three suids included.

6.2 Concluding Remarks on the Diet and Mobility Analyses

Cobre las Cruces is, so far, one of the Full Bronze Age sites with the most complete material record available for the Middle and Low Guadalquivir Valley. This site has provided robust information about settlement and funerary contexts, as well as diet and mobility information, from the human population that inhabited the site. This is something that has not yet been possible for any of the other Bronze Age sites identified in the region.

Despite being a salvage activity, the excavation at Cobre las Cruces had systematic interventions which allowed for the analysis of its material record a decade after the last excavation campaign. Radiocarbon dating of the human remains from the necropolises of SEK and SEB confirmed, once again, that this region was not empty, but occupied continuously during the transition from Chalcolithic to Bronze Age.

Compared with the social and cultural practices identified for the Chalcolithic period in close sites such as Valencina de la Concepción, Cobre las Cruces already shows a transformed society. Individual cist burials are the main expression of such social and cultural transformations reported at the end of the 3rd and beginning of the 2nd mill BC (Del Amo 1975; Fernández Gómez et al. 1976; Pérez Macías 1997; García Sanjuán 1998; Belén et al. 2000; Gómez Saucedo 2003). But changes were not radical; Cobre las Cruces shows a variety in its funerary expressions during the whole chronological sequence. Among the collective burials identified, despite some of them indeed belonging to the transition period (e.g. tomb 10, CLC-08), some collective burials (tomb 23, CLC-26, CLC-36, CLC-37) are more recent and share the same date with all the individual cists (*fig. 87*).

The Cobre las Cruces necropolises show that old and new ways of burial rituals coexisted together. The same phenomenon can be seen in a wider regional context: Copper Age megalithic sites along the Low Guadalquivir were reutilised for individual burials (García Sanjuán 2005; Hurtado Pérez/Amores 1984), at the same time cist necropolises were established in Los Alcores and El Aljarafe.[18] The fact that such diversity existed, not only in the pottery production (see chapter 5.4.2) but also in the funerary practices, gives more empirical evidence to the idea of several human groups with different rituals sharing and interacting in the same landscape.

Regarding the Cobre las Cruces settlement, despite the location of the site providing visual control along the *Lacus Ligustinus* and the ancient delta of the Guadalquivir mouth, it presents different characteristics from the nearby sites placed on hilltops and with settlements made of stone. Visual control seems to have been one of the main criteria for establishing settlements; but the architectural styles and materials are again diverse. The sites must have taken advantage of the closest local materials, indicating that the use of stone, straw or mudbricks depended more on the availability of local resources than on the need to seek protection against external groups.

Additional analyses will provide more accurate information regarding paleoclimate and paleoenvironment; but C and N isotopic analyses already show that the growth of cereals was a widespread phenomenon in southern Iberia. The delta of the Guadalquivir, such as many deltas in the history of humanity, probably provided enough water and good enough soil conditions to develop extensive agriculture. Anthracological and palynological analyses are necessary to confirm this assumption. The lack of faunal remains in the necropolises of Cobre las Cruces makes it difficult to define the relationship between humans and domestic animals. Indeed, livestock economy existed and transhumance must have been one of the main activities of these groups; but further research is needed to identify enough faunal remains to study this phenomenon.

The role of Cobre las Cruces is linked to its geographic position next to the ancient debouche of

18 To identify the location of El Aljarafe and Los Alcores regions, see chapter 5.2.

the Guadalquivir River into the *Lacus Ligustinus*. As seen in chapter 5.4.1, the regions of El Aljarafe and Los Alcores create a converging area of several corridors linking different regions of southern Iberia. One of these corridors connects the mouth of the Guadalquivir (next to the CLC site) to the Sierra Morena, especially with the Rivera del Cala, which is halfway between the Guadalquivir and the Guadiana Valley, one of the geographic accesses to the southwest.

Cist necropolises are one of the main funerary expressions in southwest Iberia, something also shared with the regions of El Aljarafe and Los Alcores. The Cobre las Cruces site shows movements of material and immaterial resources around the funerary rituals. The fact that the same expressions are seen in sites in the Sierra Morena, such as El Trastejón or La Traviesa, is indicative of social and cultural interactions between the valley and the mountains. This is something that happened in former periods as well. Such interactions may have been framed by herding transhumance and exogamy practices.

Interactions were first identified with the help of coinciding pottery types. Afterwards, these coinciding types were represented cartographically, showing the spaces of interaction around the site of Cobre las Cruces and the routes connecting the site. One of the regions inside the spaces of interaction identified was the Sierra Morena. Isotopic analysis of Sr and O allowed to confirm such interactions, thanks to the identification of two non-local women (CLC-13 and CLC-50), whose provenance seems to be from the north, likely the Sierra Morena or, even farther, the Guadiana Valley. The fact that women had $^{87}Sr/^{86}Sr$ ratios more disperse from the local baseline than men, along to the presence of very low $\delta^{18}O_W$ values in two women, are indicative of female mobility.

Interactions shown here can also be read as evidence of the social transformations occurring during this period. Despite the settlements becoming more dispersed on the landscape, compared with the patterns observed for the Copper Age, parental links and female mobility (not necessarily linked to patrilocal practices) may have been used as a resource for maintaining structural, social, economic and cultural relationships among Bronze Age groups from the mountains and the valleys.

This idea obtains more empirical evidence when adding the diversity in the expressions outlined above. Several groups, with different parental affiliations and cultural expressions, probably shared the same landscape. They shared different materials and local knowledge as well as relatives. This organisation corresponds to a highly interconnected society, not necessarily implying the idea of a population living under the same standards and the same 'norms' and controlled by a small group of people.

Further research, including more findings, large scale excavations and systematic approaches along the Middle and Low Guadalquivir Valley, would help to confirm the expressions found in the CLC site on a regional level.

Sample	Sector	Tomb	Sex	Age	Burial type	Grave goods
CLC-01	B	5	-	Infant I	Pit	Shell
CLC-02	B	6	-	Infant I	Pit	-
CLC-03	B	7	-	Infant I	Cist	Shell
CLC-04	B	8	-	Infant I	Pit	Pottery/Metal
CLC-05	B	11	-	Infant I	Pit	Shell
CLC-06	B	1	-	Infant I	Pit	Pottery
CLC-07	B	4	Female	Adult	Pit	Pottery/Shell/Metal
CLC-08	B	10	Female	Adult	Pit	Shell
CLC-08a	B	10	Female	Adult	Pit	Shell
CLC-08b	B	10	Female	Adult	Pit	Shell
CLC-09	B	2	Female	Adult	Cist	Shell
CLC-10	B	9	Female	Adult	Pit	-
CLC-11	B	3b	-	Infant I	Pit	-
CLC-12	B	12b	Male	Adult	Pit	No
CLC-13	K	4	Female	Adult	Pit	-
CLC-14	K	21	Female	Adult	Pit	Pottery/Metal
CLC-15	K	6	Female	Adult	Cist	Pottery
CLC-16	K	2	-	-	Cist	-
CLC-17	K	8a	-	-	Pit	-
CLC-18	K	11	Male	-	Pit	-
CLC-19	K	15	-	-	Pit	-
CLC-20	K	8b	-	-	Pit	-
CLC-21	K	8c	-	-	Pit	-
CLC-22	K	8a/b	-	-	Pit	-
CLC-23	K	-	-	-	-	-
CLC-24	K	7	Female	Adult	Cist	Metal/Shell
CLC-24	K	25	Male	Adult	Cist	Pottery
CLC-25a	K	10	-	Infant I	Cist	Shell
CLC-25b	K	10	-	Infant I	Cist	Shell
CLC-25c	K	10	-	Infant I	Cist	Shell
CLC-26	K	23b	Female	Adult	Pit	Pottery/Metal/Shell
CLC-27	K	7	Male	Adult	Cist	Pottery
CLC-28	K	18	Male	Adult	Cist	Mill
CLC-29	K	17	Female	Adult	Pit	Pottery/Metal
CLC-30	K	3a	Male	Adult	Pit	Pottery
CLC-31	K	3b	Male	Adult	Pit	Pottery
CLC-32	K	5b	-	Infant I	Cist	Pottery/Metal
CLC-33	K	5d	-	Infant I	Cist	Pottery/Metal
CLC-34	K	14c	Female	Adult	Pit	Shell
CLC-35	K	26	Female	Adult	Cist	
CLC-36	K	23c	Female	Adult	Pit	Pottery/Metal/Shell
CLC-37	K	23a	Female	Adult	Pit	Pottery/Metal/Shell
CLC-38	K	19a	-	-	Pit	Metal
CLC-39	K	19b-2	-	-	Pit	Metal
CLC-40	K	5a	-	Adult	Cist	Pottery/Metal
CLC-41	K	1	-	Adult	Cist	Metal
CLC-42	K	22b	-	-	Pit	-
CLC-43	K	19d	-	-	Pit	Pottery/Metal
CLC-44	K	44	-	-	-	-
CLC-45	K	22c	-	-	Pit	-
CLC-46	K	13	-	Adult	Cist	Metal/Shell/Animal bone tool
CLC-47	K	14b	-	Infant I	Pit	Shell
CLC-48	K	19c	-	-	Pit	-
CLC-49	K	49	-	-	-	-
CLC-50	K	6	Female	Adult	Cist	Pottery

Table 13. Location, sex, age and type of grave and grave goods for each individual analysed from Cobre las Cruces.

Sample	Bone Element	Collagen Preservation	% C	% N	C:N
CLC-01	R Femur	Good Collagen	30.50	11.03	3.2
CLC-02	R Tibia	Small Sample	35.95	12.97	3.2
CLC-03	R Tibia	Good Collagen	26.80	9.79	3.2
CLC-04	R Tibia	Bad Collagen	39.15	14.20	3.2
CLC-05	R Tibia	Good Collagen	24.85	8.98	3.2
CLC-06	Skull	Good Collagen	35.30	12.73	3.2
CLC-07	Fibula	Bad Collagen	27.06	9.68	3.3
CLC-08	R Femur	Good Collagen	28.14	10.19	3.2
CLC-08a	R Femur	-	-	-	-
CLC-08b	R Femur	-	-	-	-
CLC-09	R Femur	Bad Collagen	27.06	9.73	3.2
CLC-10	R Tibia	Good Collagen	28.13	10.23	3.2
CLC-11	R Tibia	Bad Collagen	20.40	7.30	3.3
CLC-12	R Fibula	Bad Collagen	37.61	13.68	3.2
CLC-13	R Femur	Bad Collagen	31.12	11.28	3.2
CLC-14	Femur	Bad Collagen	38.31	13.92	3.2
CLC-15	R Femur	Small Sample	38.21	13.83	3.2
CLC-16	Femur	Good Collagen	28.74	10.34	3.2
(CLC-17)	Femur	Good Collagen	(16.26)	5.67	3.3
CLC-18	R Tibia	Good Collagen	27.00	9.75	3.2
CLC-19	Femur	Good Collagen	33.98	12.19	3.3
CLC-20	L Femur	Bad Collagen	37.99	13.56	3.3
CLC-21	R Femur	Bad Collagen	31.96	11.51	3.2
(CLC-22)	Long Bones	-	(2.7)	(1.0)	3.3
CLC-23	No	-	-	-	-
CLC-24	R Femur	Bad Collagen	23.03	7.84	3.4
CLC-24	No		-	-	-
CLC-25a	R Femur (prox)	Good Collagen	30.86	11.19	3.2
CLC-25b	R Femur (diaphysis)	Good Collagen	26.38	9.57	3.2
CLC-25c	R Femur (distal)	Good Collagen	45.82	16.75	3.2
CLC-26	Tibia	Bad Collagen	27.41	9.91	3.2
CLC-27	R Femur	Good Collagen	35.42	12.90	3.2
CLC-28	L Fibula	Good Collagen	29.81	10.87	3.2
CLC-29	R Femur	Bad Collagen	23.18	8.37	3.2
CLC-30	R Femur	Good Collagen	34.42	12.51	3.2
CLC-31	R Femur	Bad Collagen	34.38	12.56	3.2
CLC-32	No	-	-	-	-
CLC-33	No	-	-	-	-
CLC-34	R Femur	Good Collagen	35.64	12.95	3.2
CLC-35	R Femur	Good Collagen	33.72	12.31	3.2
CLC-36	R Femur	Good Collagen	33.93	12.39	3.2
CLC-37	R Femur	Good Collagen	33.99	12.42	3.2
CLC-38	R Femur	Good Collagen	32.81	11.90	3.2
CLC-39	R Tibia	Good Collagen	33.35	12.15	3.2
(CLC-40)	L Femur	Failed for dating	(16.25)	5.50	3.4
CLC-41	Skull	Failed for dating	29.69	10.77	3.2
CLC-42	R Humerus	Bad Collagen	29.70	10.85	3.2
CLC-43	R Femur	Good Collagen	27.84	10.15	3.2
CLC-44	R Femur	Bad Collagen	36.26	13.23	3.2
CLC-45	R Humerus	Good Collagen	31.68	11.49	3.2
CLC-46	R Femur	Good Collagen	35.71	13.07	3.2
CLC-47	R Femur	Good Collagen	36.29	13.25	3.2
CLC-48	Femur?	Good Collagen	32.53	11.68	3.2
CLC-49	R Ilium	Good Collagen	32.11	11.72	3.2
(CLC-50)	R Femur	Good Collagen	(12.55)	4.21	3.5

Table 14. Collagen preservation for every sample analysed from Cobre las Cruces necropolises. Values in brackets were excluded from any analysis.

Sample	^{14}C Age (yr BP)	1σ	95.4 % probability (cal BC)		1σ	$\delta^{13}C$ (‰ vs. VPDB)	$\delta^{15}N$ (‰ vs. N air)
CLC-01	3534	25	-1946	-1769	52	-19.56	8.77
CLC-02	3481	27	-1886	-1699	48	-18.34	11.48
CLC-03	3572	26	-2021	-1781	47	-19.77	8.46
CLC-04	3418	28	-	-	-	-19.73	8.21
CLC-05	3561	25	-2015	-1777	49	-19.52	7.53
CLC-06	3470	30	-1885	-1692	55	-19.62	7.50
CLC-07	3630	26	-2127	-1900	50	-18.63	10.27
CLC-08	3610	25	-2033	-1892	43	-18.99	8.43
CLC-08a	-	-	-	-	-	-	-
CLC-08b	-	-	-	-	-	-	-
CLC-09	3615	40	-	-	-	-19.72	7.47
CLC-10	3476	25	-	-	-	-19.27	8.34
CLC-11	3535	26	-1950	-1767	53	-19.43	7.70
CLC-12	3641	26	-2134	-1927	54	-19.47	7.58
CLC-13	3460	25	-2133	-1929	52	-19.89	7.41
CLC-14	3605	25	-2030	-1891	42	-20.18	7.58
CLC-15	3450	35	-1882	-1640	66	-19.23	7.24
CLC-16	3471	25	-1882	-1696	51	-19.57	7.26
CLC-17	3483	25	-1886	-1700	46	-	-
CLC-18	3470	30	-1885	-1692	55	-19.00	7.34
CLC-19	3437	27	-	-	-	-19.63	8.03
CLC-20	3450	25	-1880	-1687	60	-18.78	10.44
CLC-21	3455	35	-1885	-1641	64	-18.91	8.29
CLC-22	-	-	-	-	-	-	-
CLC-23	-	-	-	-	-	-	-
CLC-24	3390	40	-	-	-	-19.12	9.22
CLC-24	-	-	-	-	-	-	-
CLC-25a	-	-	-	-	-	-18.83	8.52
CLC-25b	3433	25	-1875	-1632	61	-19.07	8.20
CLC-25c	-	-	-	-	-	-18.93	8.59
CLC-26	3486	25	-1887	-1702	45	-19.34	8.41
CLC-27	3490	25	-1889	-1742	44	-18.91	8.46
CLC-28	3584	25	-2025	-1830	43	-18.86	8.40
CLC-29	3645	35	-2137	-1923	62	-19.07	7.66
CLC-30	3455	26	-1881	-1688	59	-19.30	7.85
CLC-31	3408	30	-1869	-1618	55	-19.42	7.37
CLC-32	-	-	-	-	-	-	-
CLC-33	-	-	-	-	-	-	-
CLC-34	3472	25	-1882	-1697	51	-19.13	8.14
CLC-35	3460	25	-1881	-1691	56	-19.16	7.77
CLC-36	3509	25	-1918	-1746	44	-19.26	8.14
CLC-37	3460	25	-1881	-1691	56	-19.56	7.82
CLC-38	3449	24	-1880	-1687	60	-19.38	7.47
CLC-39	3491	24	-1888	-1743	43	-19.50	7.73
CLC-40	-	-	-	-	-	-	-
CLC-41	-	-	-	-	-	-19.69	7.19
CLC-42	3495	24	-1889	-1744	43	-19.37	7.24
CLC-43	3389	24	-1744	-1618	41	-18.86	7.70
CLC-44	3409	25	-1863	-1623	49	-19.48	7.27
CLC-45	3300	40	-1686	-1460	49	-19.14	7.90
CLC-46	3446	24	-1879	-1644	61	-19.26	6.98
CLC-47	3453	24	-1880	-1688	59	-19.50	7.85
CLC-48	3455	30	-1882	-1687	61	-19.12	7.81
CLC-49	3410	24	-1863	-1623	48	-20.17	7.96
CLC-50	3502	25	-1895	-1744	43	-	-

Table 15. Radiocarbon dates, carbon and nitrogen isotopic values for every sample analysed from Cobre las Cruces necropolises.

Sample	Tooth	$\delta^{18}O$ (VPDB)	SMOW	$\delta^{18}Ow$	$^{87}Sr/^{86}Sr$	2std
CLC-01	11	-2.95	27.81	-4.83	0.71030	0.00001
CLC-02	75	-2.80	27.98	-4.59	0.70984	0.00002
CLC-03	36	-3.59	27.16	-5.82	0.71035	0.00001
CLC-04	-	-	-	-	-	-
CLC-05	36	-4.60	26.11	-7.40	0.71009	0.00002
CLC-06	-	-	-	-	-	-
CLC-07	37	-4.15	26.58	-6.69	0.71271	0.00002
CLC-08	-	-4.22	-	-6.81	-	-
CLC-08a	37	-4.07	26.51	-6.57	0.70875	0.00003
CLC-08b	38	-	26.66	-	0.70813	0.00001
CLC-09	37	-4.43	26.29	-7.13	0.71103	0.00004
CLC-10	37	-3.39	27.36	-5.52	0.70989	0.00003
CLC-11	36	-3.92	26.82	-6.34	0.71023	0.00003
CLC-12	47	-4.55	26.17	-7.31	0.71051	0.00002
CLC-13	48	-5.90	24.78	-9.42	0.71201	0.00003
CLC-14	36	-4.04	26.70	-6.52	0.71002	0.00002
CLC-15	37	-3.26	27.50	-5.31	0.71152	0.00001
CLC-16	48	-4.73	25.98	-7.60	0.70940	0.00001
CLC-17	-	-	-	-	-	-
CLC-18	47	-4.78	25.94	-7.67	0.70992	0.00002
CLC-19	48	-4.85	25.86	-7.78	0.70986	0.00002
CLC-20	-	-	-	-	-	-
CLC-21	-	-	-	-	-	-
CLC-22	-	-	-	-	-	-
CLC-23	36	-	-	-	-	-
CLC-24	48	-4.82	26.72	-7.74	0.70998	0.00004
CLC-24	37	-4.02	25.89	-6.49	0.71016	0.00002
CLC-25a	-	-3.50	27.25	-5.68	0.71002	0.00005
CLC-25b	-	-	-	-	-	-
CLC-25c	-	-	-	-	-	-
CLC-26	M2	-4.58	26.14	-7.37	0.71083	0.00001
CLC-27	-	-	-	-	-	-
CLC-28	17	-3.64	27.11	-5.89	0.71018	0.00001
CLC-29	37	-4.45	26.28	-7.16	0.71011	0.00001
CLC-30	46	-4.45	26.27	-7.16	0.70992	0.00004
CLC-31	37	-4.91	25.80	-7.88	0.70930	0.00004
CLC-32	17	-4.46	26.26	-7.18	0.70955	0.00001
CLC-33	17	-4.31	26.42	-6.94	0.70992	0.00002
CLC-34	37	-3.80	26.95	-6.14	0.70988	0.00003
CLC-35	-	-	-	-	-	-
CLC-36	37	-3.79	26.95	-6.14	0.70988	0.00002
CLC-37	37	-4.48	26.24	-7.21	0.71147	0.00002
CLC-38	-	-	-	-	-	-
CLC-39	-	-	-	-	-	-
CLC-40	46	-4.74	25.97	-7.61	0.70973	0.00001
CLC-41	17	-2.46	28.32	-4.06	0.70905	0.00001
CLC-42	37	-3.73	27.02	-6.04	0.71012	0.00002
CLC-43	-	-	-	-	-	-
CLC-44	-	-	--	-	-	-
CLC-45	36	-3.25	27.51	-5.30	0.70997	0.00002
CLC-46	Premolar	-	-	-	0.71102	0.00004
CLC-47	16	-3.95	26.79	-6.38	0.70998	0.00001
CLC-48	48	-4.35	26.38	-7.00	0.71028	0.00005
CLC-49	-	-	-	-	-	-
CLC-50	37	-6.81	23.84	-10.82	0.71232	0.00002

Table 16. Oxygen and strontium isotope values for every sample analysed from Cobre las Cruces necropolises.

7 Concluding Remarks (*Map 28*)

Map 28 shows a possible cartographic representation of the Middle and Low Guadalquivir Valley and some of its resources during the Full Bronze Age. This valley was selected as the study area after comparing the amount of research invested throughout southern Iberia and noticing that archaeologists had paid more attention to the southeastern and southwestern regions for the period between 2200 and 1550 BC (addressed here as the Full Bronze Age; see chapter 2).

The study area was addressed as a landscape. This helps to overcome culture-historical approaches that have ended up producing 'territorial' models for the Bronze Age in southern Iberia. 'Territorial' models are linked with the use of 'Western subsistence approaches' in archaeological research (see chapter 1), as they project a 'Western subsistence paradigm' onto the interpretations of the past. This imposition often ignores other attributes of the material record and may lead to an interpretative jump that affects how the empirical evidence is treated. The material record ends up seen as less important than supporting the already established discourse.

One of the main problems for the Middle and Low Guadalquivir Valley, is the lack of findings and material record that could empirically support any parallelism or comparison with the type of discussions and analyses conducted in its neighbouring regions. Current discussions are defined by a leading discourse that responds to the traditional perception of the Middle and Low Guadalquivir Valley as an unoccupied or poorly inhabited area (see chapter 2). Despite the archaeological survey and the characterisation of sites such as Mesa Redonda or Siete Arroyos, providing some possible explanations for the low amount of Full Bronze Age material record found in this region (see chapter 4), further surveys and long-term area excavation campaigns are needed.

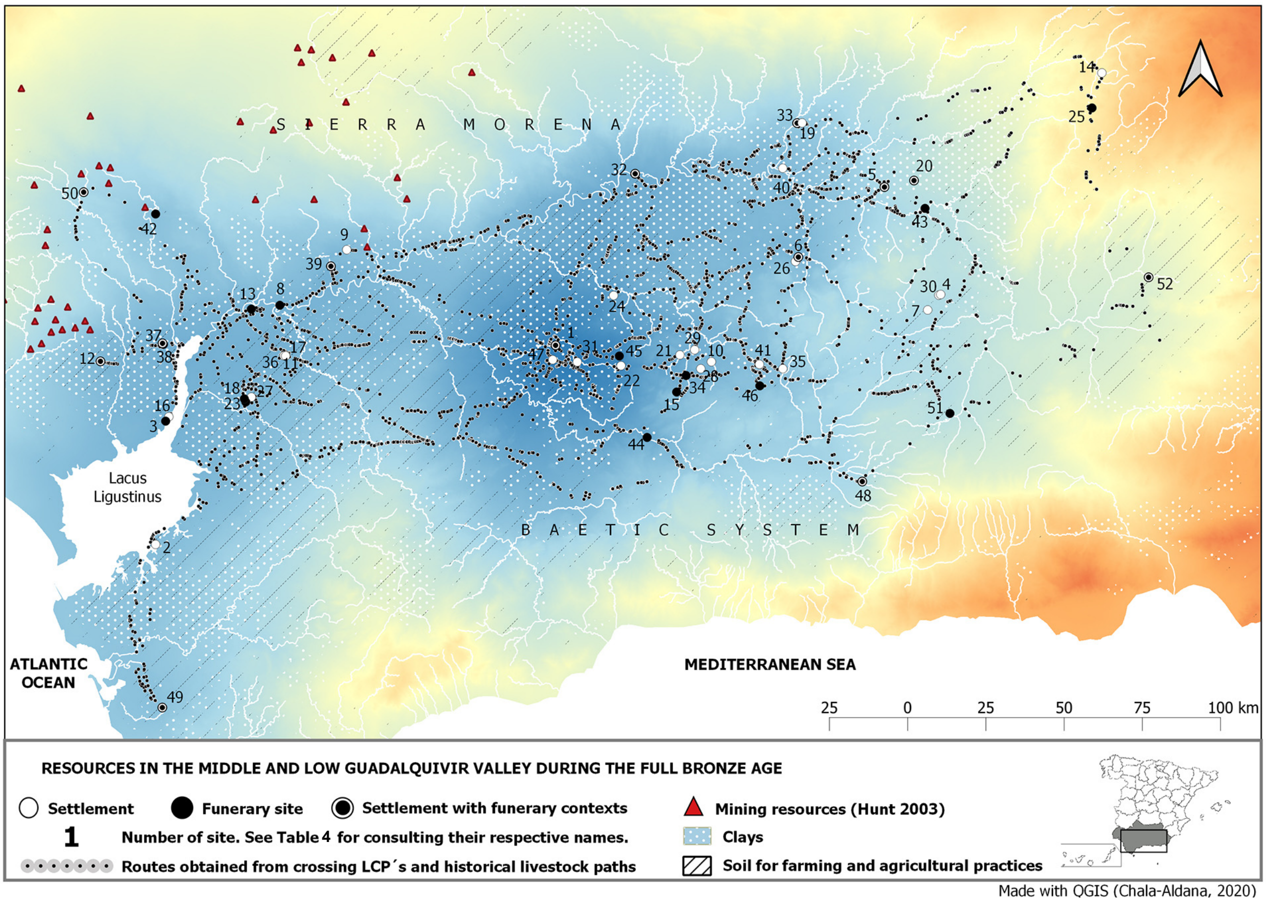
Additional to the survey and excavation campaigns, and as a contribution to the study of the Bronze Age in this region, this research used Geographical Information Systems combined with the typological analysis of pottery as a means of showing the movement of resources along the study area and its neighbouring regions (see chapter 5).

Map 28 shows the results of this approach. The gradient observed is an archaeotopogram, a model that uses both attributes of the terrain and the costs of walking distances for calculating the amount of energy needed to move across the landscape (see chapter 5). The archaeotopogram presented here was obtained by summing all the costs for moving between the 52 sites included in this study.

Such sums of costs resulted in a gradient that expresses the space of interaction between these sites. In this case, the darker the blue in the map, the higher the degree of interaction identified and the easier the access to these regions. Spatial interactions are key for the analysis of landscapes; they consider the relationship between human groups and the material and immaterial elements surrounding them.

Along with archaeotopograms, the spatial interaction along the Guadalquivir Valley may be detected as well by the corridors identified, thanks to the intersection between historical livestock paths and Least Cost Paths (LCPs) calculated between all the sites included in this study (see chapter 5). These identified corridors represent the potential interaction routes used by prehistoric people. These data may serve in the future to determine the location of other Bronze Age sites that have not yet been discovered and to consider the possibilities of future survey and excavation campaigns.

In this research, the Middle and Low Guadalquivir Valley is addressed as a landscape of resources. On map 28, it is possible to identify several resources used by the people. Such resources can be seen as interconnected in a ResourceComplex (see chapter 1), which means that the elements identified were not isolated but interlinked and participated in the conformation and development of several social and cultural relationships between Full Bronze Age people. All the resources



Map 28. Archaeotopogram expressing the elements interacting within the landscape of the Middle and Low Guadalquivir Valley.

identified in this complex probably compose just a small fragment of the material and immaterial world of the people that occupied this region during the Full Bronze Age.

The elements identified for the ResourceComplex are listed below.

Mining and metals:
These are represented in the prehistoric mining sites identified by Hunt Ortiz (2003) along the Sierra Morena. Metal goods have been found mainly in funerary contexts. This suggests a strong relationship between rituals around death and the use of metals during the Bronze Age. Such metal grave goods could have been used to express values surrounding the afterlife and are possibly linked to some kind of activity that implied the use of weapons, as most of the types identified are arrow points, halberds and daggers (e.g. the metal grave goods found in Setefilla, Cobre las Cruces and Mesa Redonda; see chapter 4).

The values expressed by the use of metal goods were probably not widespread shared by all the population, at least in the Middle and Low Guadalquivir region, according to the diversity in the funerary expressions found in the study area (Bartelheim et al. 2021).

Clay deposits:
These are found throughout the Guadalquivir Valley as well as in the lower elevations of the Sierra Morena. The area shown in the map covers lands with the presence of minerals such as granite, amphibolites, gneiss and quartz (Instituto Geológico y Minero de España 1976) which were identified in the pottery matrixes obtained on the survey campaigns (see chapter 4.1) and the intervention in the sites of Mesa Redonda, Siete Arroyos and Cobre las Cruces.

Water:
The map shows the Guadalquivir River as well as all other rivers and streams that discharge their waters in it. These rivers were probably routes of communication, signals for orienting and of course sources of hydration for people and animals. Water was also needed for the production of pottery, where it was combined with the clay obtained from the deposits next to the sites.

Wood:
The forests that existed in the valley and the Sierra provided fuel as well as material for building the dwelling structures people inhabited. Wood was used in the kilns for the production of pottery and metals and it has been identified in the combustion features observed in domestic spaces of sites such as Cobre las Cruces (Hunt Ortiz 2012).

Stone:
The main outcrops along the Sierra Morena provided – in the case of the Mesa Redonda and Siete Arroyos sites for example – the materials for the construction of walls around the terraces and the hilltop. This is similar to what was identified in sites such as Setefilla or Monturque. Stone tools, such as the hammers found in the survey campaign, were also used for prehistoric mining. Stone also served for the production of food; several millstones and grinders identified in the site of Siete Arroyos are evidence of this (see chapter 4). Therefore, this material was linked as well with the knowledge for processing cereals, which was crucial for the health and the subsistence of all the members of the groups inhabiting the settlements.

Soil:
The map shows the areas more suitable for dry farming (Junta de Andalucía 2020). The countryside was composed mainly of marls, sands and calcareous soils, which provided a substrate suitable for the extensive agriculture of cereals, something identified thanks to the isotopic analysis of carbon and nitrogen in the human remains from the Bronze Age site of Cobre las Cruces (see chapter 6).

Animals:
Despite no faunal remains being analysed from the site of Cobre las Cruces, the material record here and in other Bronze Age sites shows evidence of the use of livestock during this period. Current livestock paths represent some of the possible routes used by people for moving their cattle or herds of ovicaprids. The soils in the countryside are also suitable for pastures, which may have facilitated the combination of agricultural and farming activities (see chapter 6).

Knowledge:
The archaeotopograms express the space where people moved and interacted. Such interactions were identified according to the similarities in the pottery used (see chapter 5). The coinciding pottery types suggest a shared knowledge of the production and/or the use of several types of bowls and vessels. In the same way, knowledge about the use of other resources was probably also transferred by the same paths as the ones identified from the pottery typologies.

Kinship:
It was possible to identify group interactions between the Sierra and the valley thanks to the isotopic analyses of strontium and oxygen in human individuals from the site of Cobre las Cruces. Among those interactions (which were likely linked with movements for the obtention of resources from the Sierra, such as copper, clays or stones or the herding of ovicaprids), cultural practices such as female exogamy (Mittnik et al. 2019) seem to have been used in the Bronze Age to bring women from groups in the Sierra into the groups living in the valley. Further analyses in other contemporary sites must be performed to confirm or refuse such practice. Unfortunately, human bone remains from cist necropolises in the Sierra Morena do not have the same conditions of preservation (see chapter 6) that could have helped to explore such exchanges, for example through DNA analyses.

Hypothetical kinship relationships between the valley and Sierra could have motivated the movement of people and helped to promote interactions with other regions. Such interactions could have been moments for sharing knowledge as well as values around several aspects of life and death. In the archaeotopogram it is also possible to visualise the significant amount of interaction and the accessibility of several corners of the Sierra Morena and the High Guadalquivir Mountain regions from the valley.

Values around death:
Funerary contexts, found throughout the whole study area, provide evidence of how people also used death to interact with the landscape. A cist, a pit or a cave burial also became a landmark which may have connected people with the land they inhabited. These values probably integrated people into rituals that involved other material and immaterial elements referred to above.

Despite a change being evident in the funerary practices between the Megalithic societies of the Copper Age and the Bronze Age, the diversity in funerary expressions suggests that different beliefs and values around death coexisted in the Middle and Low Guadalquivir as well as in the whole of southern Iberia. Even values around death from the Megalithic period were still being expressed and shared between Bronze Age people, according to the evidence that shows the reusing of some megalithic structures for inhumating people.

Megalithism showed collective (and massive) activities around death. The shift to individual burials may correspond to a change in the way people perceived the afterlife and a fragmentation of the ideas about how to perform the rituals of death. Individual burials became a trend during the Full Bronze Age, suggesting that burial rituals may have become a matter for more reduced groups, for example the relatives or the people linked to the dead by kinship or other daily activities.

Despite the knowledge of 'how' to bury people (most of the times individually) being widespread during the Bronze Age, the values and perceptions regarding afterlife may have varied according to the differences evident in the expression and type of burials found (cists, pits, caves or reused dolmens and mounds). Likewise, despite the probable existence of a generally shared knowledge about the 'type' of materials that must (or could) be used in the funerary ritual (e.g. hemispheric bowls, seashells or metal weapons or the use of bottles; see chapter 5), no regional norm or standard ruling the way of performing the burial ritual or expressing values around death could be identified.

Networks:
The map shows both corridors and spaces of interaction. These elements cartographically express a resource that was crucial for the development of several social and cultural practices during the Full Bronze Age. Networks were resources that allowed people in the Middle and Low Guadalquivir Valley to share information, materials, ideas, values and knowledge as well as to establish kinship relationships.

Networks connected different types of landscapes, especially mountains with valleys, permitting the flow of resources with different origins into the same circuit.

The trace left by such networks could be present in the livestock corridors identified with possible prehistoric origins (see chapter 5) as well as in the coinciding types of materials used (see chapter 5). Such coincidences are expressions of a shared knowledge. Some of these networks certainly helped people to communicate ideas, for example regarding construction techniques, processing of cereals and meat, values around death and, most importantly, contributed to the conformation of a heterogenous context, identified in the different expressions observed at the material levels. Such networks were probably neither restricted nor controlled; people may have moved and interacted, regardless of their possible social or cultural differences.

Further research could bring forward new types of interactions and networks that existed during this period.

Many other elements might be identified with the analyses of new sites and the use of other techniques. The approach presented here is cumulative, which means that it is neither drawing any borders that impose geographic restrictions nor providing any general statements that impede further considerations. New regions, beyond the study area, can be included at any time to understand new types of interactions or phenomena. Likewise, new analyses can help to properly address other discussions regarding the sociocultural changes occurring between the 3rd and the 2nd mill. BC.

As mentioned above, the elements identified here represent just a small part of the possible new sites, resources and phenomena that can be studied in the future. Once further research is developed, and enough sequences with radiocarbon dates are available for the region, it will be possible to explore other types of questions that cannot be answered properly yet.

The Middle and Low Guadalquivir Valley was neither unoccupied nor consisted of low ranked sites. The sites and networks of interactions identified in this research (see chapter 5), and expressed cartographically in map 28, are evidence that this region, during the transition from the 3rd to the 2nd mill. BC, was active and interconnected with the southeast and southwest regions. Although the Meseta region and the coastal portions of the Mediterranean were not included in this study, similar connections can be expected for these areas as well.

Interconnections were fundamental for the transmission of knowledge, values and ideas, some expressed in the material record, others impossible to trace and know. The evidence of these interactions does not necessarily imply the occurrence of processes of conflict, acculturation, territorial expansion or control of production by power centres. As mentioned above, a bigger investment of research is necessary before claiming or discussing any of these hypotheses.

Territorial models considering ‘centres’ and ‘peripheries’ or centralised territorial control ignore the fact that once the peripheries show evidence of significant activity and a diversity in their expressions, the model itself no longer works.

Instead of borders between culture areas with autonomous political entities, archaeotopograms show a highly interconnected landscape, with some areas possibly more interactive than others. Such a grade of interactivity was evident with the network of relationships, elaborated from simply looking at coinciding pottery types (see chapter 5). If more regions and other types of networks, based on different types of information, such as coincidences in funerary expressions, architecture, diet etc., would have been included in the archaeotopogram model, the results may have shown even more connections and new spaces of interaction, which would probably give more accurate representations than the one offered by arbitrary territorial borders.

These cartographical representations have implications on the understanding of the wider scale of Full Bronze Age phenomena. On map 28, the region around Monturque, Zóñar and Castillo de Aguilar is the most interactive (according to the intensity in the blue gradient) (see chapter 5.4.2). If we added information coming from further ‘Argaric’ sites or sites from the Alentejo region, it would be interesting to see how interactive these sites were between them and what other types of phenomena, such as movements between more landscapes and wider circuits of resources, can be identified.

All the areas with high interactivity can be also considered as large population nuclei or areas with more aggregated settlements. Such aggregations of people must have implied organisation models with social differentiation practices, likely based on specialised labour, kinship, rank or status. In the southeast, archaeologists characterised these practices under the perspective of classism, centralised control and conflict. But the diversity of expressions found in the Middle and the Low Guadalquivir, along with the high interactivity of the countryside, does not suggest disaggregation or separation of territories, but rather shows a high connectivity with other population nuclei such as the ones identified in the High Guadalquivir, the Guadix, the Baza Valleys or even the Almanzora Valley.

In a regional perspective, the Bronze Age phenomena could be studied by considering the diversities, the mixes of traits and the patches, rather than characterising nomothetic culture areas and the conflicts between them. On the Iberian Peninsula, the cultural and social changes that occurred at the end of the 3rd mill. BC affected the whole population, and the material record obtained so far is showing only the expressions of how people dealt with such changes.

The southeast dealt with these changes by producing the settlements and materials known today, as did the people who occupied the Middle and Low Guadalquivir, the Meseta, the Levante region, the Alentejo, the Guadiana and the Algarve. There are differences in all the expressions identified but there are also coincidences and the fact of their coexistence in the same chronological period is indicative of phenomena that are beyond the models of social organisation and the categories of social complexity that are leading the discussion today (Bernabeu Aubán et al. 2013).

Indeed, for the Middle and Low Guadalquivir, further research is needed at many levels; the approach presented here intends to provide a first characterisation and systematic treatment of the material record available for this region. It also intends to direct attention to the need for a change of perspective. Bronze Age archaeology, and the scientific field of archaeology in general, persists in discussions that end up in the representations of the past we see today in the media and in the general public (see chapter 1). All these representations show us values that simply seem to replicate the conflict and the power relationships we live in today.

Imposing our worldview on the descriptions of the past ends up biasing the whole field, and shadows alternative points of view, which may be more cautious in their statements, but closer to the empirical evidence. The Middle and Low Guadalquivir landscape offers a unique opportunity for the development of new research projects oriented not to the delimitation of the western border of El Argar or finding evidence of an autochthonous culture but to think about the past in a way that makes us aware that interactions, landscape and resources had a significant impact.

Such awareness is crucial for the world we live in today. Archaeology cannot exist as a restricted scientific field with authorities replicating the classism and violence they observed in their studies. It is possible, from the models we generate, to show people (or whoever we reach with our labour) other types of values and ideas that may help us look at the planet and the material world in a different way. In the end, a change of subsistence paradigm is needed, not only in the field of archaeology, but in the way we, as part of Western society, are approaching and using our resources. This only shows that archaeology has everything to do with the past, but also with the present and the future.

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Appendixes

Appendix I: Pottery Typology Elaborated for the Study Area

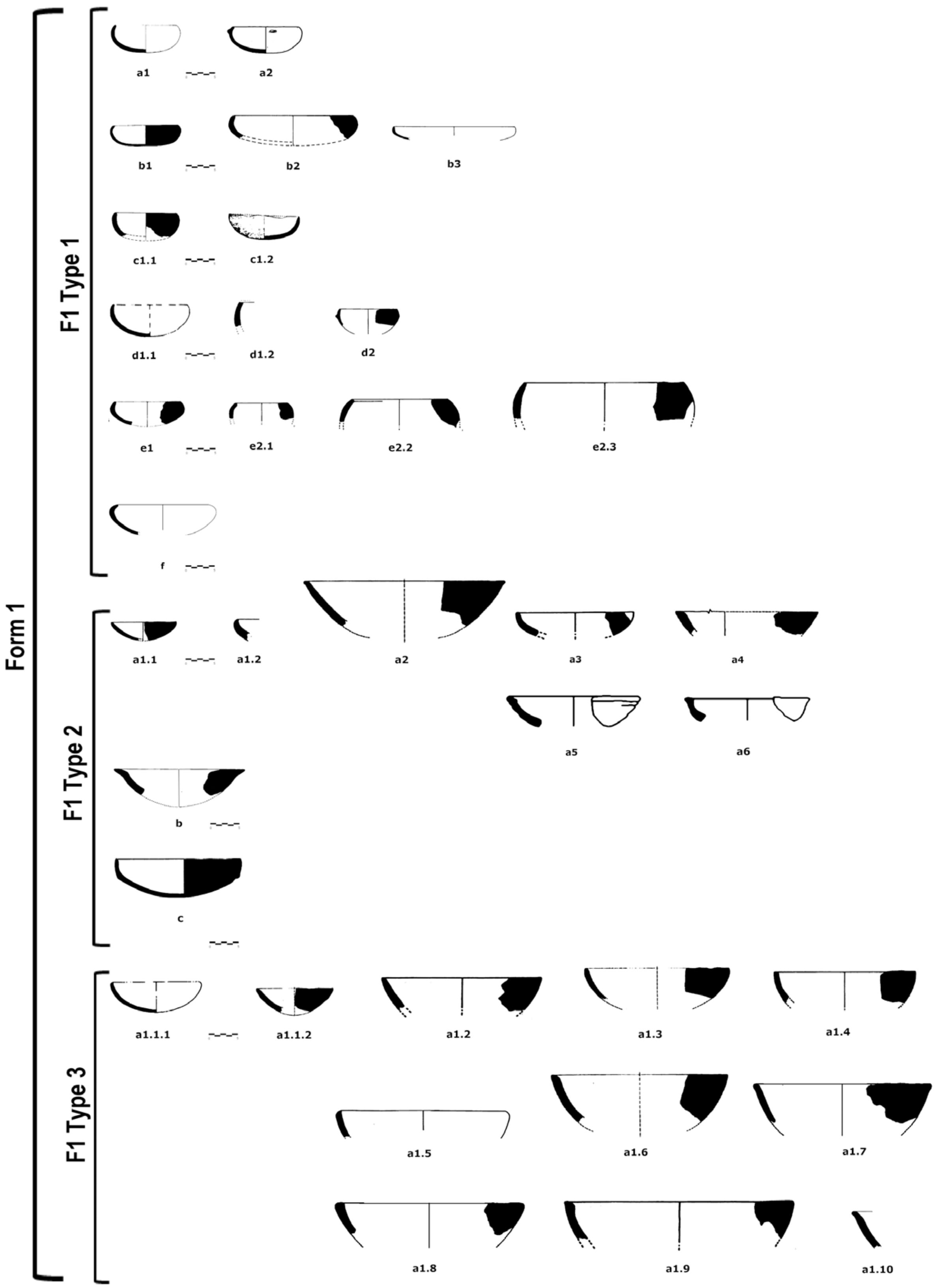


Fig. A1. Form 1, Types 1, 2 and 3.

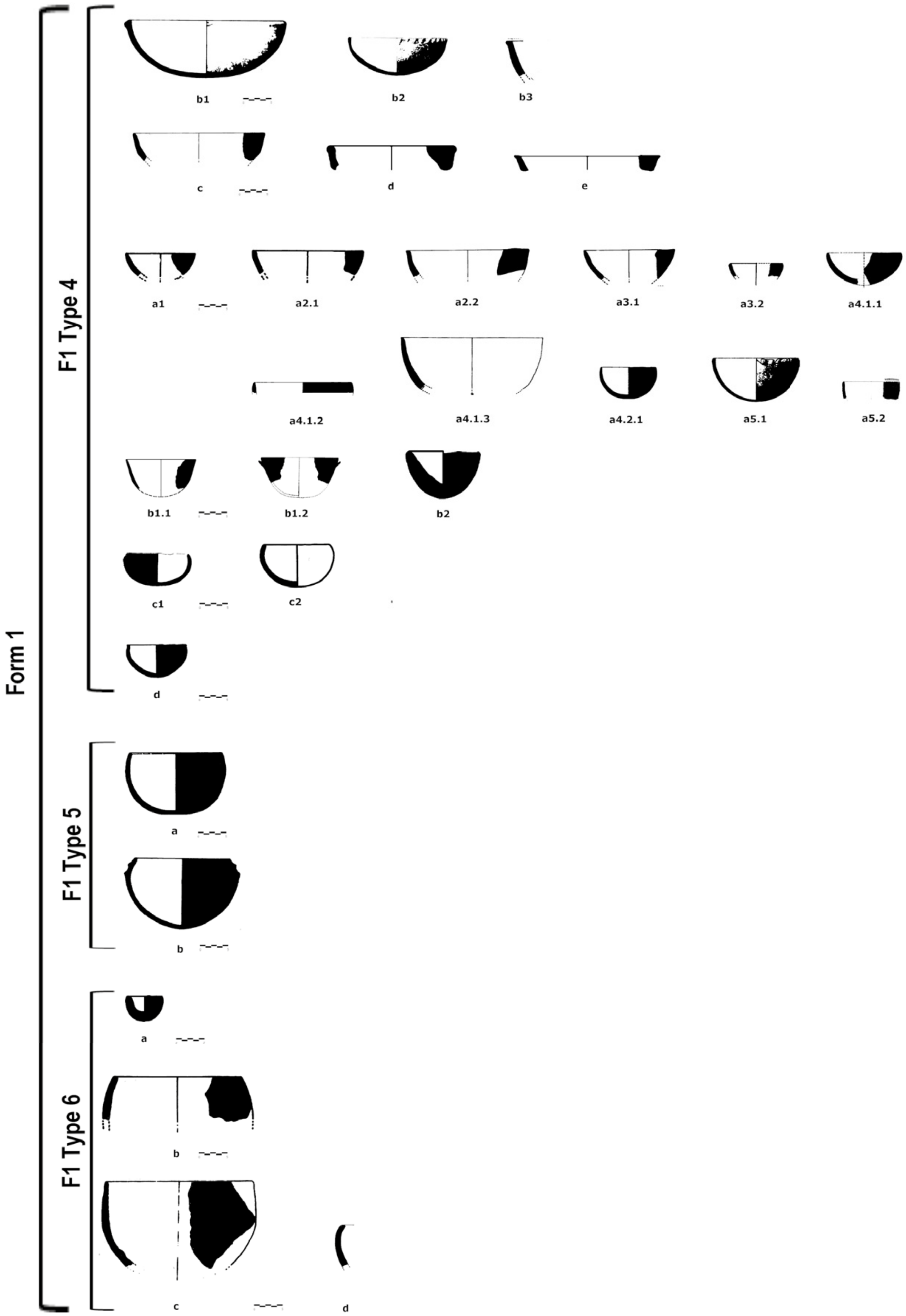


Fig. A2. Form 1, Types 4, 5 and 6.

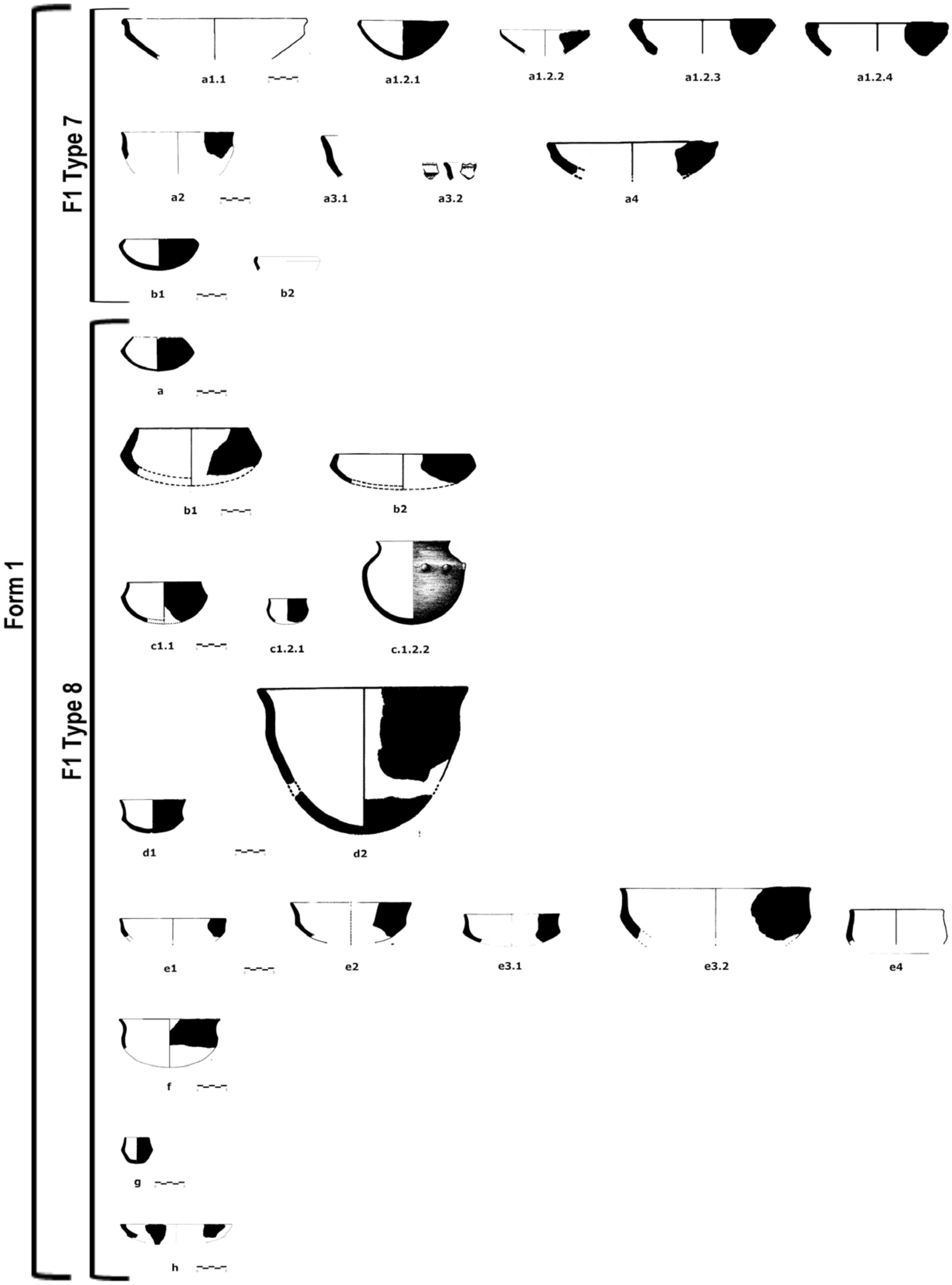


Fig. A3. Form 1, Types 7 and 8.

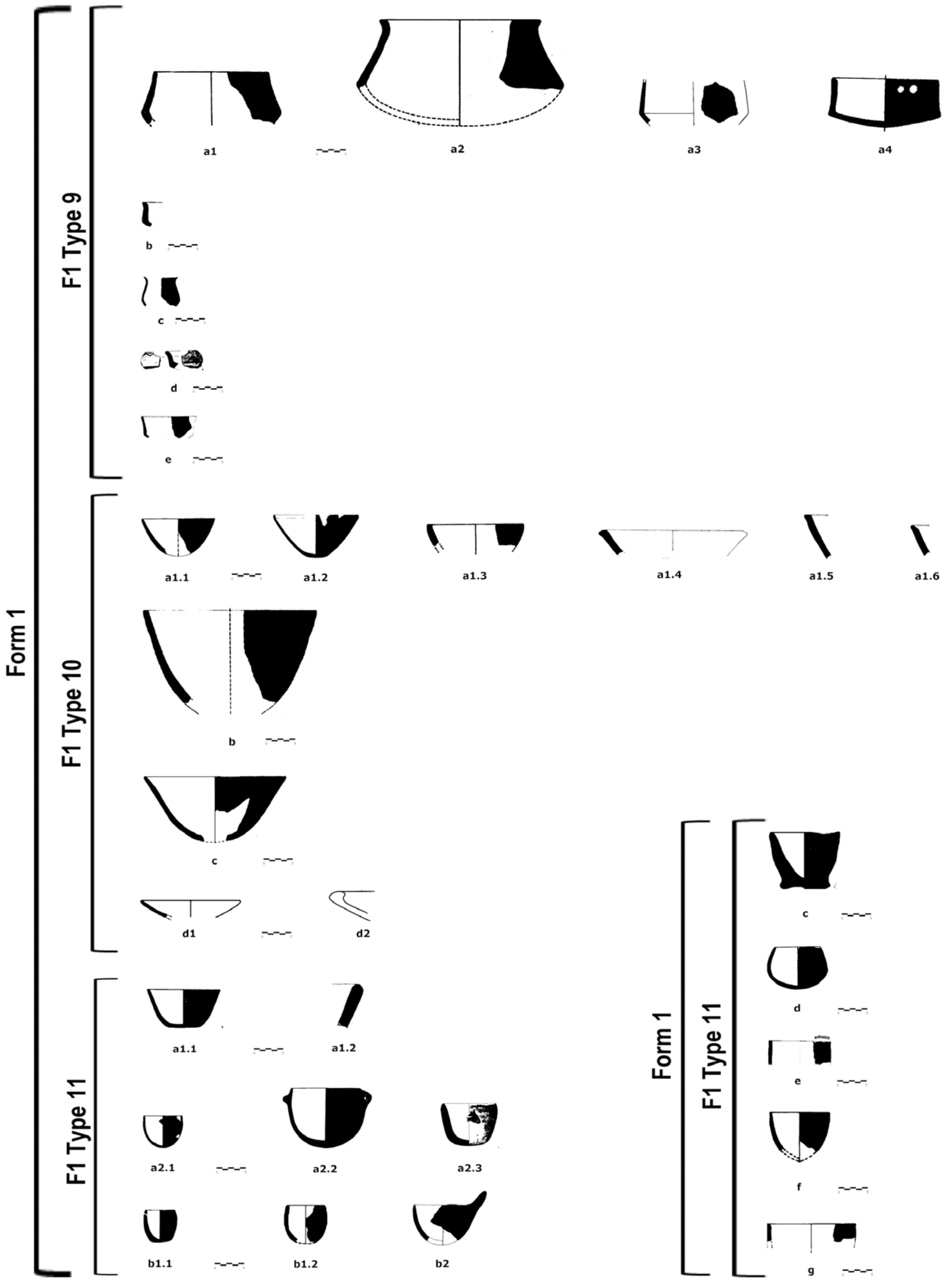


Fig. A4. Form 1, Types 9, 10 and 11.

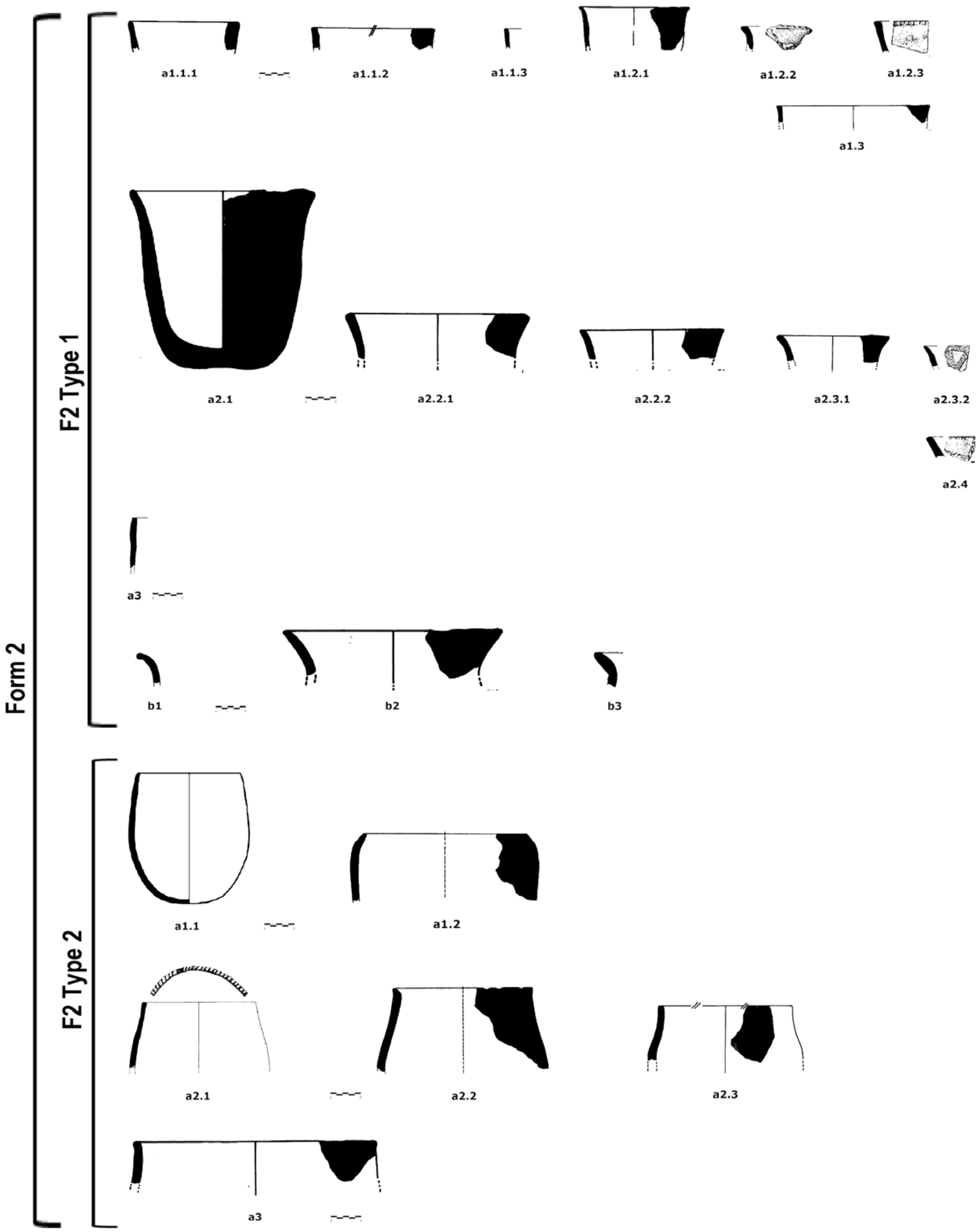


Fig. A5. Form 2, Types 1 and 2.

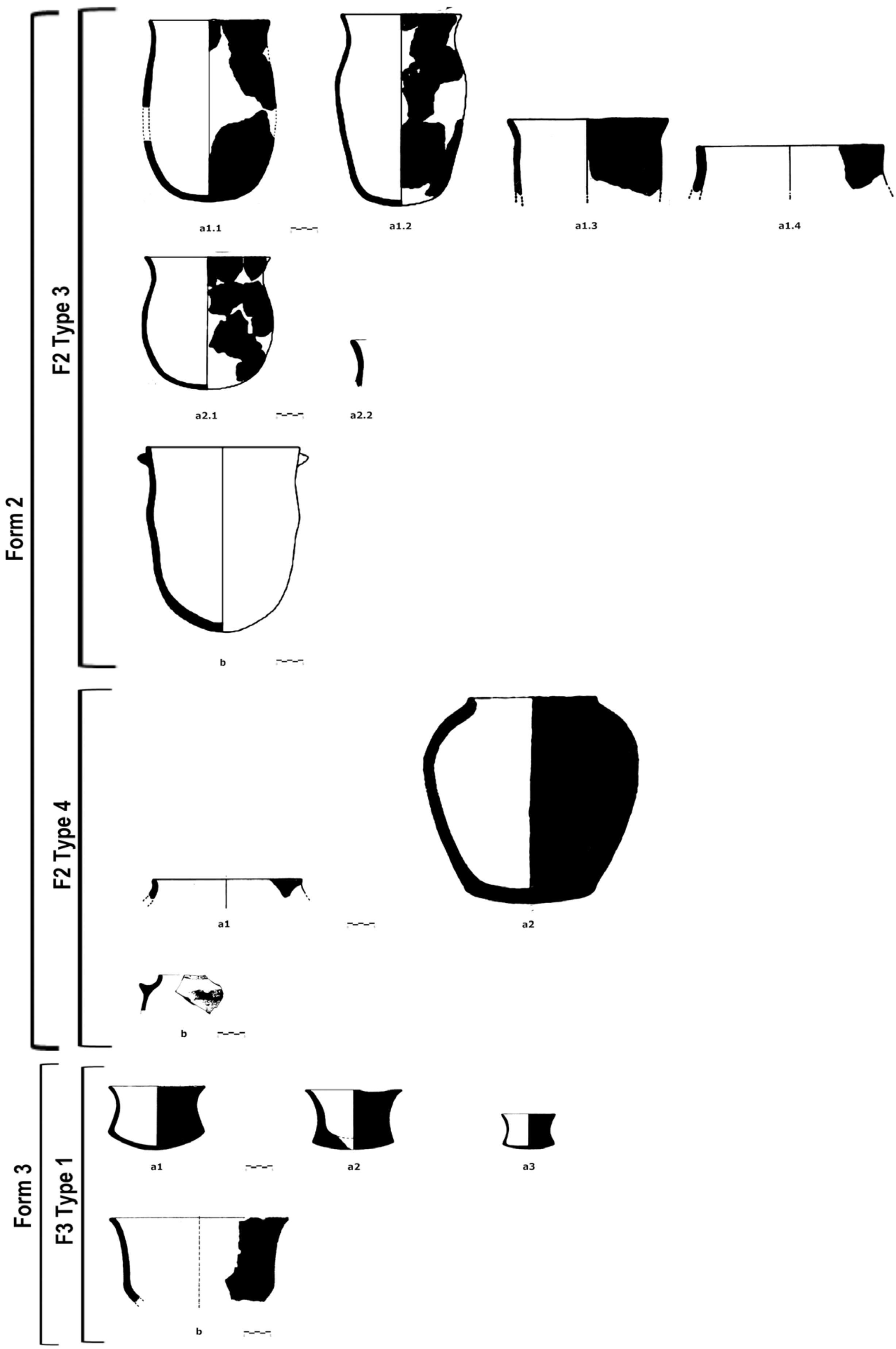


Fig. A6. Form 2, Types 3 and 4 and Form 3, Type 1.

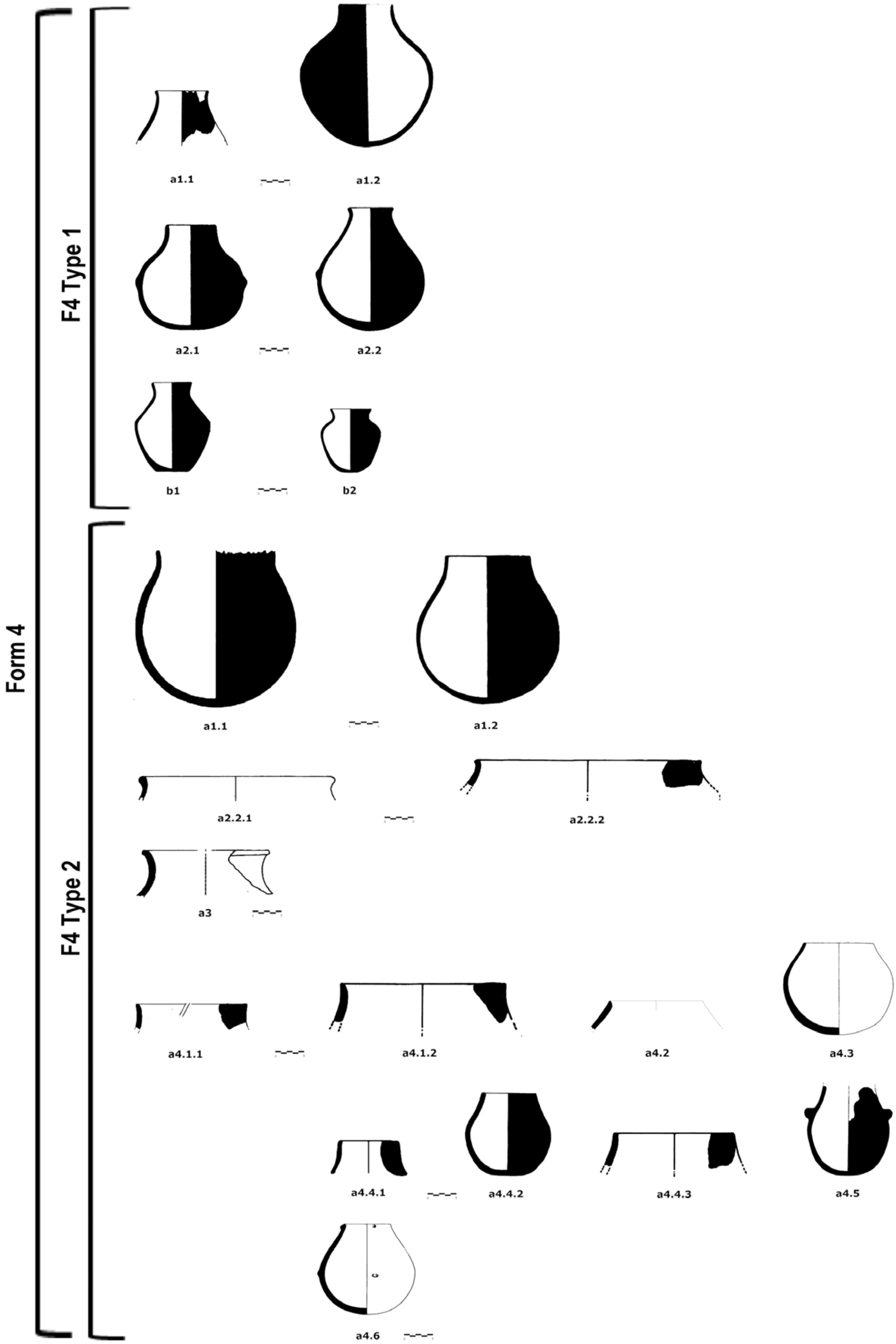


Fig. A7. Form 4, Types 1 and 2a.

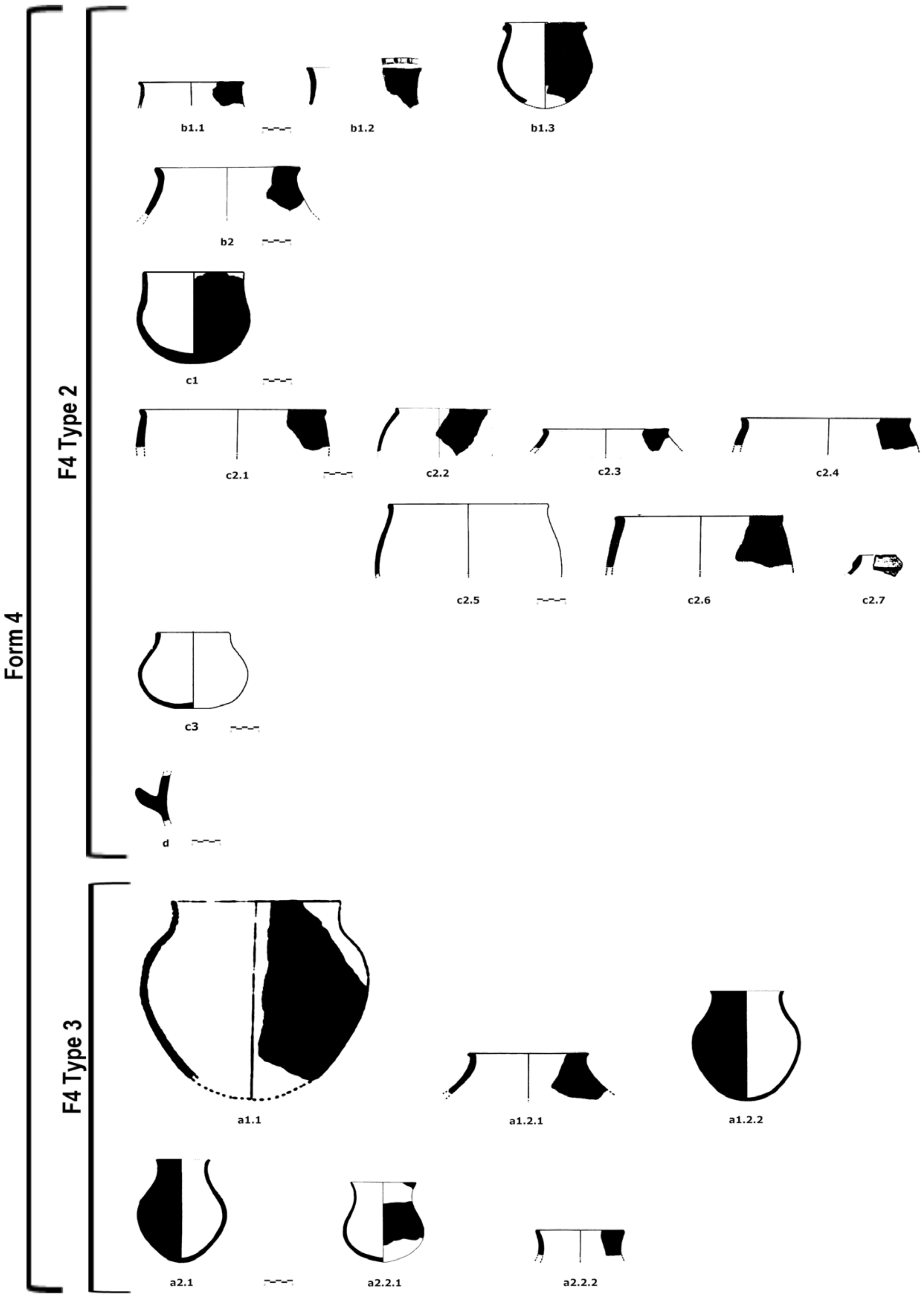


Fig. A8. Form 4, Types 2b to 2d and 3.

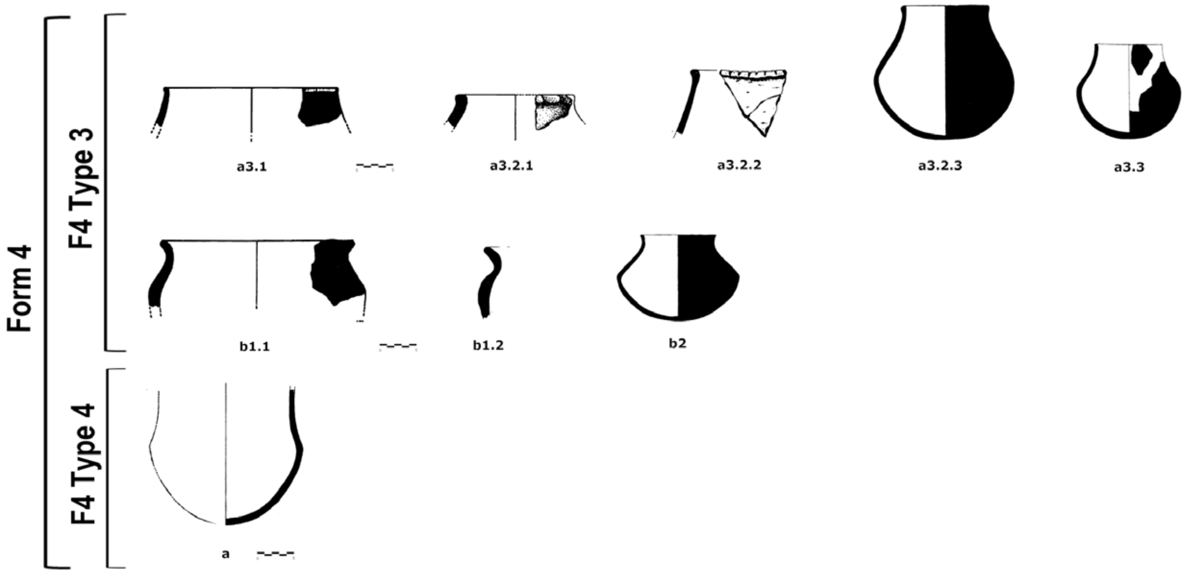


Fig. A9. Form 4, Types 3 and 4.

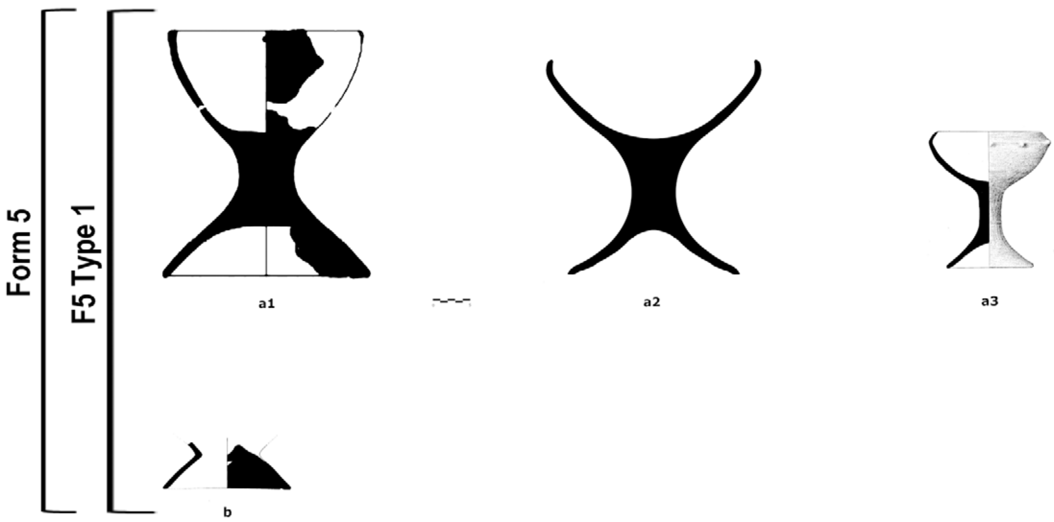


Fig. A10. Form 5, Type 1.

Appendix II: Pottery Catalogue

Form 1, Type 1
Ellipsoidal Bowls/Platters

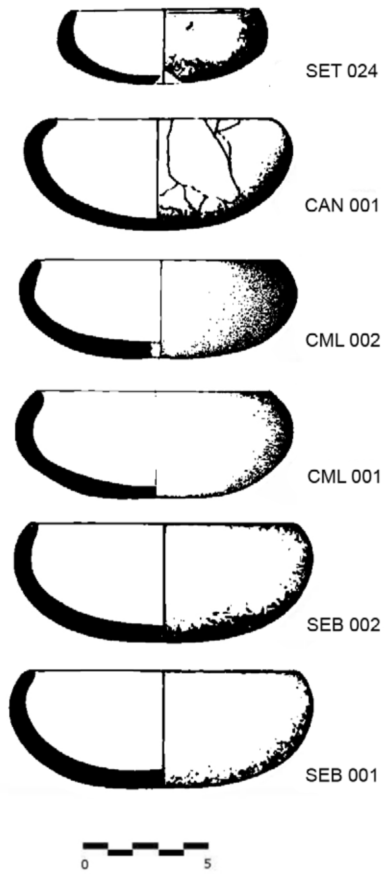
Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
1	1	a1	SET 024	fragment	bowl	semi-ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	a1	SEB 002	entire	bowl	semi-ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	a1	SEB 001	entire	bowl	semi-ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	a1	CML 002	entire	bowl	semi-ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	a1	CML 001	entire	bowl	semi-ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	a1	CAN 001	entire	bowl	semi-ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	a2	SAN 005	entire	bowl	semi-ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	*mamelón*, above the body
1	1	b1	CHI 001	entire	bowl	ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	b1	GAN 005	fragment	bowl	ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	b1	GAN 002	entire	bowl	ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	b1	GAN 003	entire	bowl	ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	b2	SET 011	fragment	platter	ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	b2	AGU 002	fragment	platter	ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	b2	AGU 001	fragment	platter	ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no
1	1	b3	TRA 009	fragment	platter	ellipsoidal	n/a	curved convergent	no	straight	rounded	no
1	1	c1.1	SET 025	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	semi-inwards	rounded	no
1	1	c1.1	SET 010	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	semi-inwards	rounded	no
1	1	c1.1	AGU 012	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	semi-inwards	rounded	no
1	1	c1.1	SET 028	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	semi-inwards	rounded	no
1	1	c1.1	MON 045	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	semi-inwards	rounded	no
1	1	c.1.2	CHI 003	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	straight	sharp	no
1	1	d1.1	SET 009	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	inwards	rounded	no
1	1	d1.1	SET 008	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	inwards	rounded	no
1	1	d1.1	SAN 007	entire	bowl	semi-ellipsoidal	convex	curved convergent	no	inwards	rounded	no

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
1	1	d1.1	SET 026	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	inwards	rounded	no
1	1	d1.1	TRA 016	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	inwards	rounded	no
1	1	d1.1	SAN 008	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	inwards	rounded	no
1	1	d1.1	MON 091	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	inwards	rounded	no
1	1	d1.2	MON 060	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	inwards	straight	no
1	1	d2	SMR 003	fragment	bowl	semi-ellipsoidal	convex	curved convergent	no	inwards	rounded	*mamelón* above the body
1	1	e1	SET 022	fragment	bowl	ellipsoidal	convex	curved convergent	no	inwards	rounded	no
1	1	e1	SET 007	fragment	bowl	ellipsoidal	convex	curved convergent	no	inwards	rounded	no
1	1	e1	TRA 006	fragment	bowl	ellipsoidal	n/a	n/a	no	inwards	rounded	no
1	1	e1	CSJ 009	fragment	bowl	ellipsoidal	n/a	n/a	no	inwards	rounded	no
1	1	e1	SET 023	fragment	bowl	ellipsoidal	n/a	n/a	no	inwards	rounded	no
1	1	e2.1	ARR 010	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	rounded	no
1	1	e2.1	MON 049	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	rounded	no
1	1	e2.1	MON 044	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	rounded	no
1	1	e2.1	BAJ 005	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	rounded	no
1	1	e2.1	BAJ 022	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	rounded	no
1	1	e2.1	MON 055	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	rounded	no
1	1	e2.1	MON 066	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	rounded	no
1	1	e2.1	MON 017	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	rounded	no
1	1	e2.2	ARC 002	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	straight	no
1	1	e2.2	RIB 002	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	straight	no
1	1	e2.2	MON 019	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	straight	no
1	1	e2.2	MON 021	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	straight	no
1	1	e2.2	MON 051	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	straight	no
1	1	e2.3	ZON 016	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	sharp	no
1	1	e2.3	ARR 004	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	sharp	no
1	1	e2.3	MON 117	fragment	bowl	ellipsoidal	n/a	curved convergent	no	inwards	sharp	no
1	1	f	CSJ 012	entire	bowl	ellipsoidal	convex elongated	curved convergent	no	inwards	rounded	no

Table A1. Form 1, Type 1 ellipsoidal bowls/platters. Site codes in Table 4 (page 122–123).

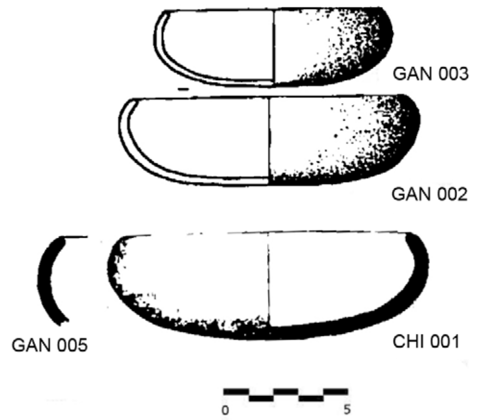
Form 1, Type 1
Ellipsoidal Bowls/Platters

a1

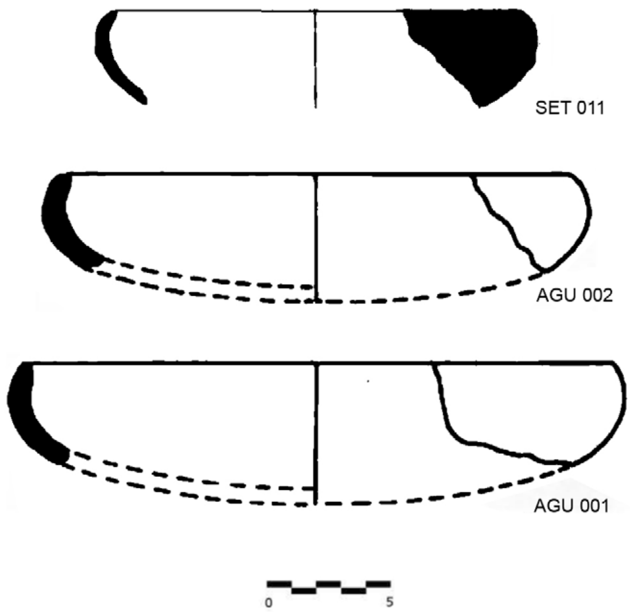


a2

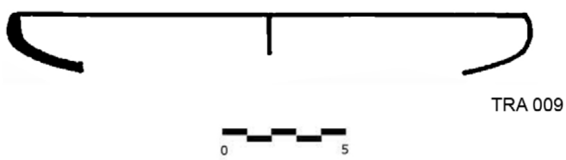
b1



b2

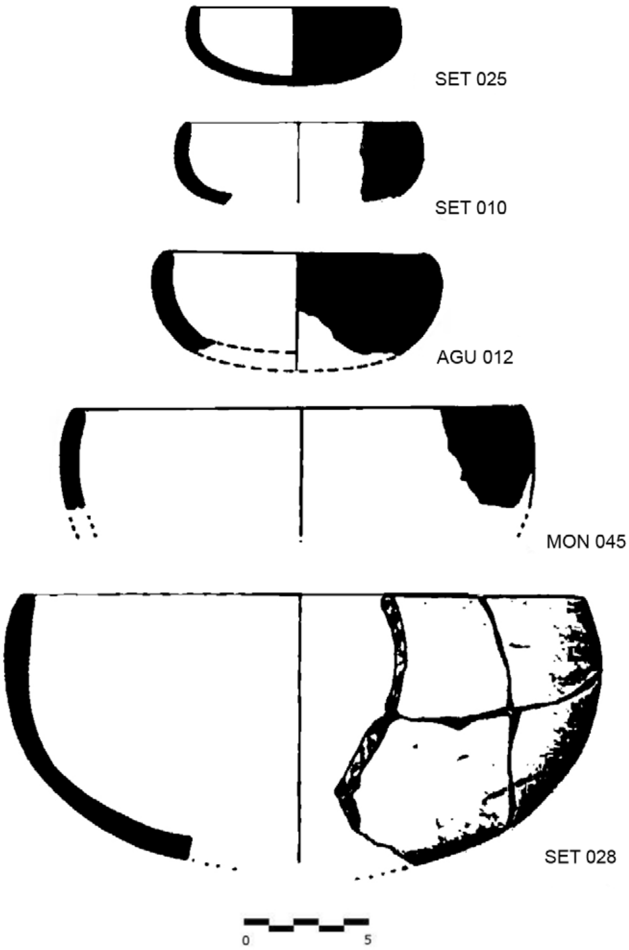


b3



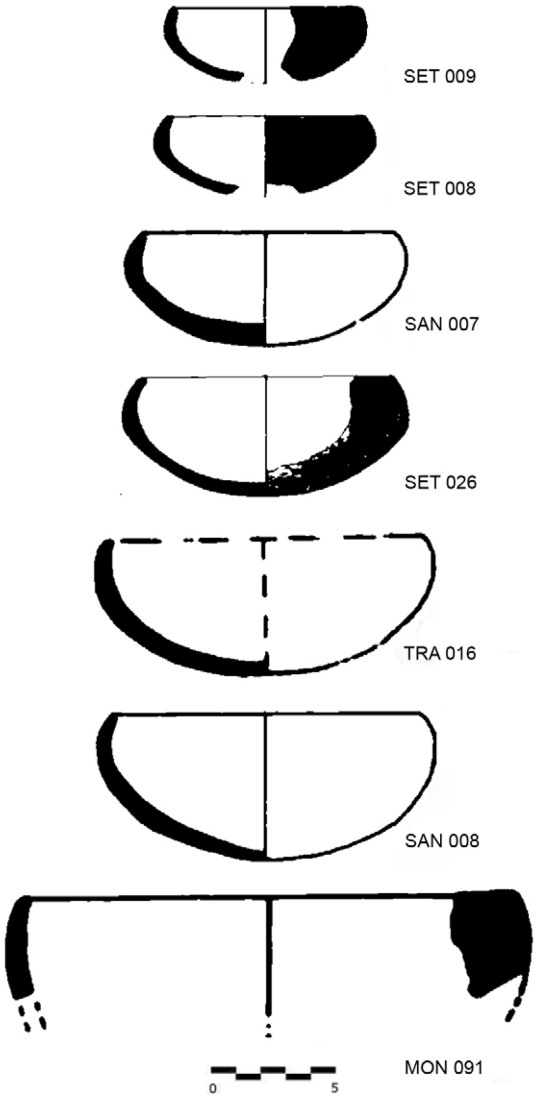
Form 1, Type 1
Ellipsoidal Bowls/Platters

c1.1

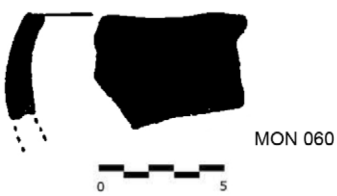


c1.2

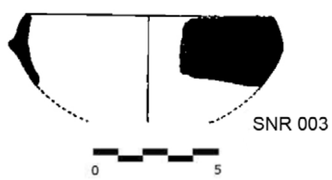
d1.1



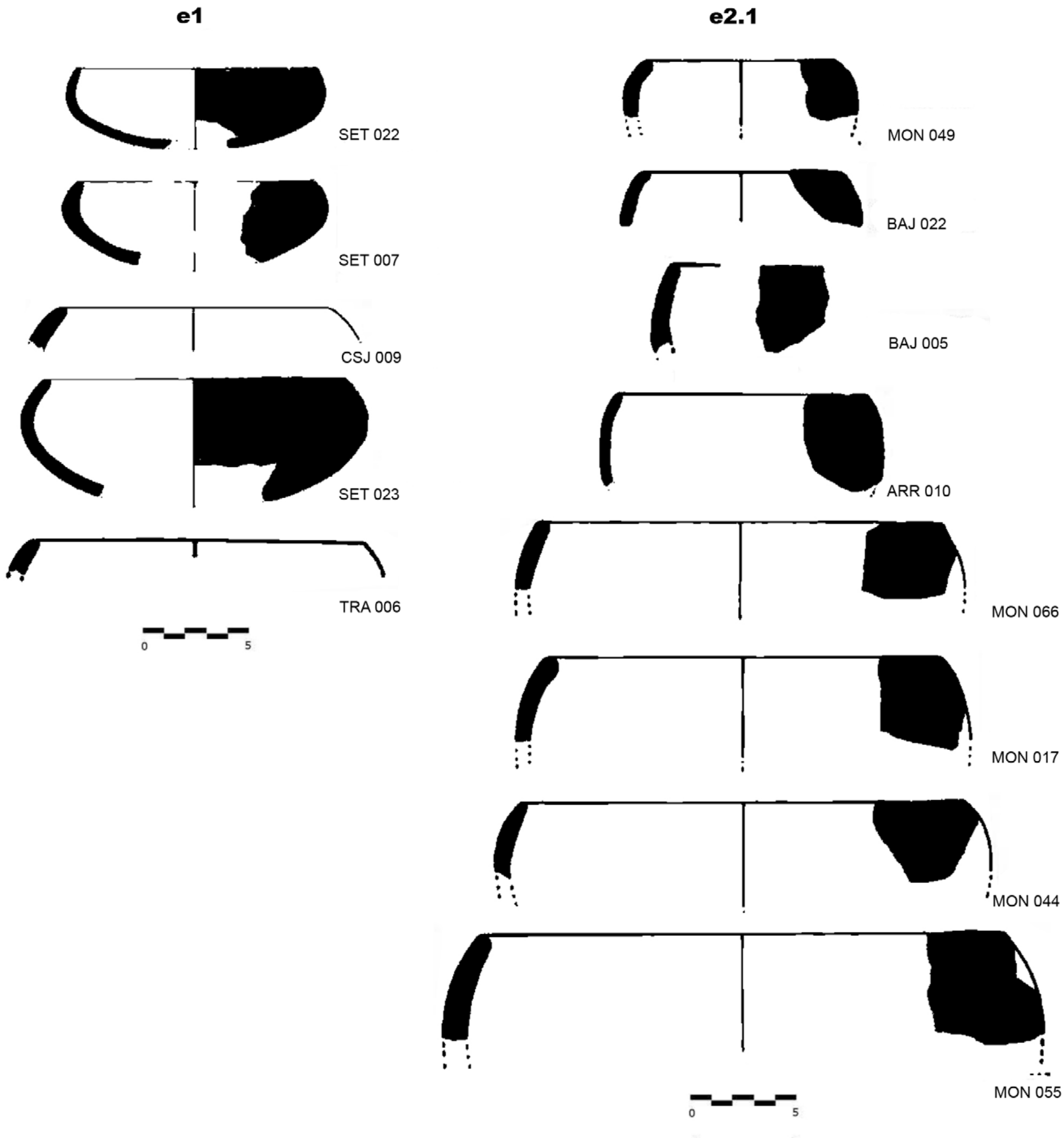
d1.2



d2

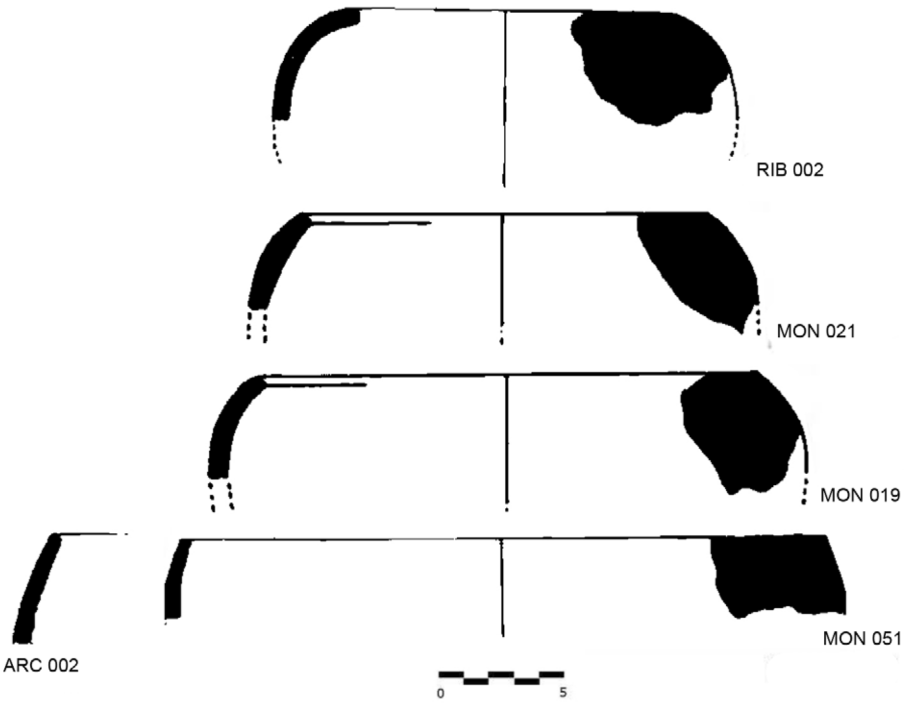


Form 1, Type 1
Ellipsoidal Bowls/Platters

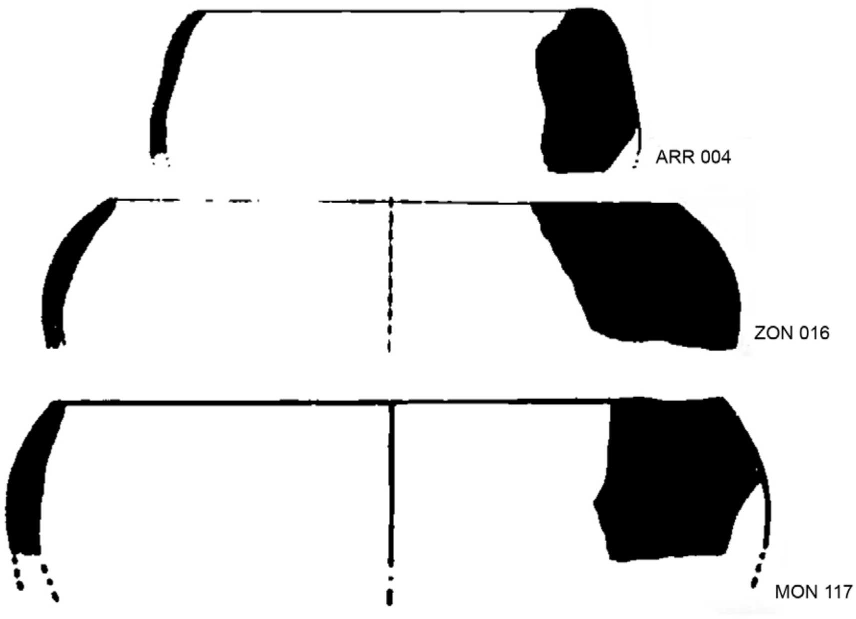


Form 1, Type 1
Ellipsoidal Bowls/Platters

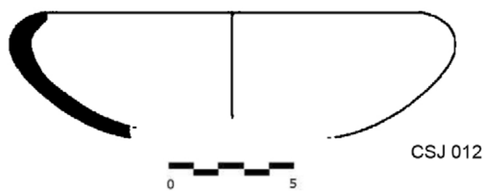
e2.2



e2.3



f



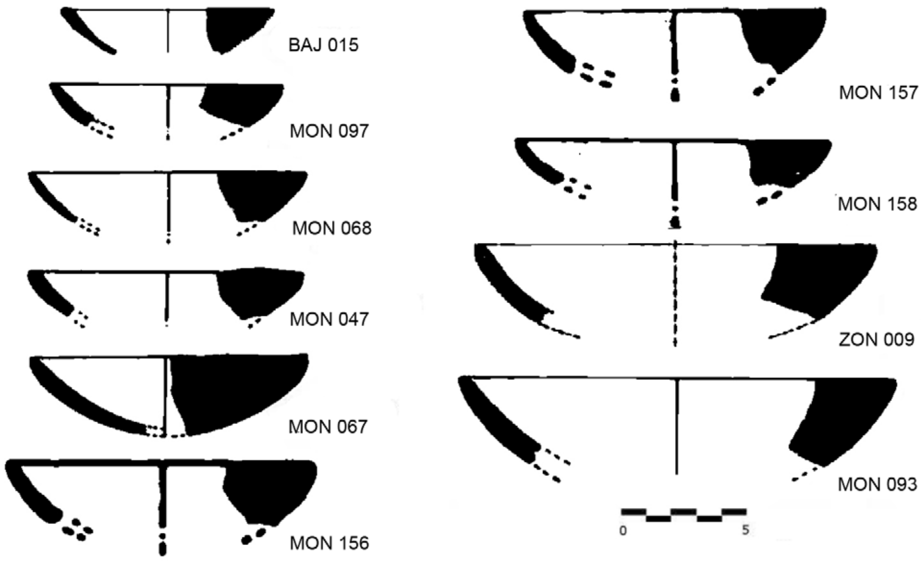
Form 1, Type 2
1/4 of Sphere Bowls/Platters

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
1	2	a1.1	MON 097	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	rounded	no
1	2	a1.1	MON 068	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	rounded	no
1	2	a1.1	MON 067	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	rounded	no
1	2	a1.1	MON 158	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	rounded	no
1	2	a1.1	MON 093	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	rounded	no
1	2	a1.1	ZON 009	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	rounded	no
1	2	a1.1	MON 047	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	rounded	no
1	2	a1.1	BAJ 015	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	rounded	no
1	2	a1.1	MON 157	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	rounded	no
1	2	a1.1	MON 156	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	rounded	no
1	2	a1.1	JUA 003	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	rounded	no
1	2	a1.2	ALC 005	fragment	bowl	1/4 of sphere	convex	divergent	no	inwards	sharp	no
1	2	a2	ZON 013	fragment	bowl/ vessel	1/4 of sphere	convex	divergent	no	everted	rounded	no
1	2	a2	BAJ 003	fragment	bowl/ vessel	1/4 of sphere	convex	divergent	no	everted	rounded	no
1	2	a2	MON 043	fragment	bowl/ vessel	1/4 of sphere	convex	divergent	no	everted	rounded	no
1	2	a3	MON 094	fragment	bowl	1/4 of sphere	convex	divergent	no	straight	rounded	no
1	2	a3	BAJ 016	fragment	bowl	1/4 of sphere	convex	divergent	no	straight	rounded	no
1	2	a3	MON 135	fragment	bowl	1/4 of sphere	convex	divergent	no	straight	rounded	no
1	2	a3	MON 072	fragment	bowl	1/4 of sphere	convex	divergent	no	straight	rounded	no
1	2	a3	MON 154	fragment	bowl	1/4 of sphere	convex	divergent	no	straight	rounded	no
1	2	a3	MON 092	fragment	bowl	1/4 of sphere	n/a	divergent	no	straight	rounded	no
1	2	a3	SEV 003	fragment	bowl	1/4 of sphere	n/a	divergent	no	straight	rounded	no
1	2	a4	FUE 005	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	internal bezel	no
1	2	a5	BAJ 010	fragment	bowl	1/4 of sphere	convex	divergent	no	divergent	rounded	elongated bump below the border
1	2	a6	BAJ 026	fragment	bowl	1/4 of sphere	convex	divergent	no	broaden	straight	no
1	2	b	MON 107	fragment	bowl/ vessel	1/4 of sphere	n/a	divergent-everted	no	everted	rounded	no
1	2	b	PIR 006	fragment	bowl/ vessel	1/4 of sphere	convex	divergent-everted	no	everted	rounded	no
1	2	b	RIB 006	fragment	bowl/ vessel	1/4 of sphere	convex	divergent-everted	no	everted	rounded	no
1	2	b	MON 163	fragment	bowl/ vessel	1/4 of sphere	n/a	divergent-everted	no	everted	rounded	no
1	2	c	PIR 001	entire	bowl	1/4 of sphere	convex	curved with an angle in the middle	no	straight	rounded	no
1	2	c	BAJ 021	fragment	bowl	1/4 of sphere	convex	curved with an angle in the middle	no	straight	rounded	no
1	2	c	PIR 002	entire	bowl	1/4 of sphere	convex	curved with an angle in the middle	no	straight	rounded	no

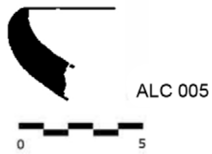
Table A2. Form 1, Type 2, 1/4 of sphere bowls/platters. Site codes in Table 4 (page 122–123).

Form 1, Type 2
1/4 of Sphere Bowls/Platters

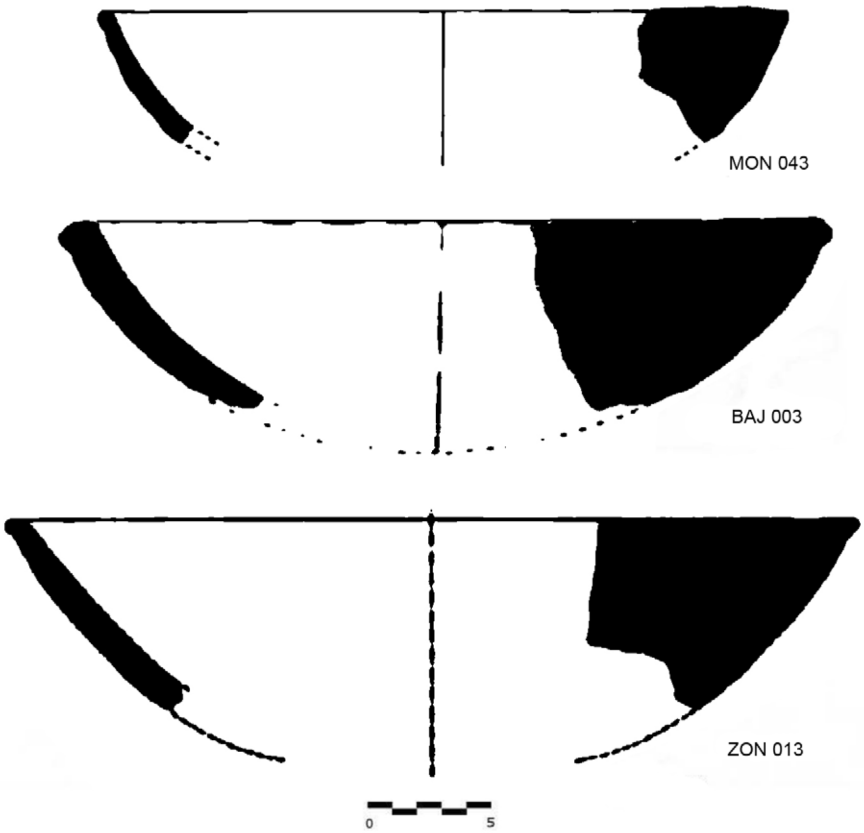
a1.1



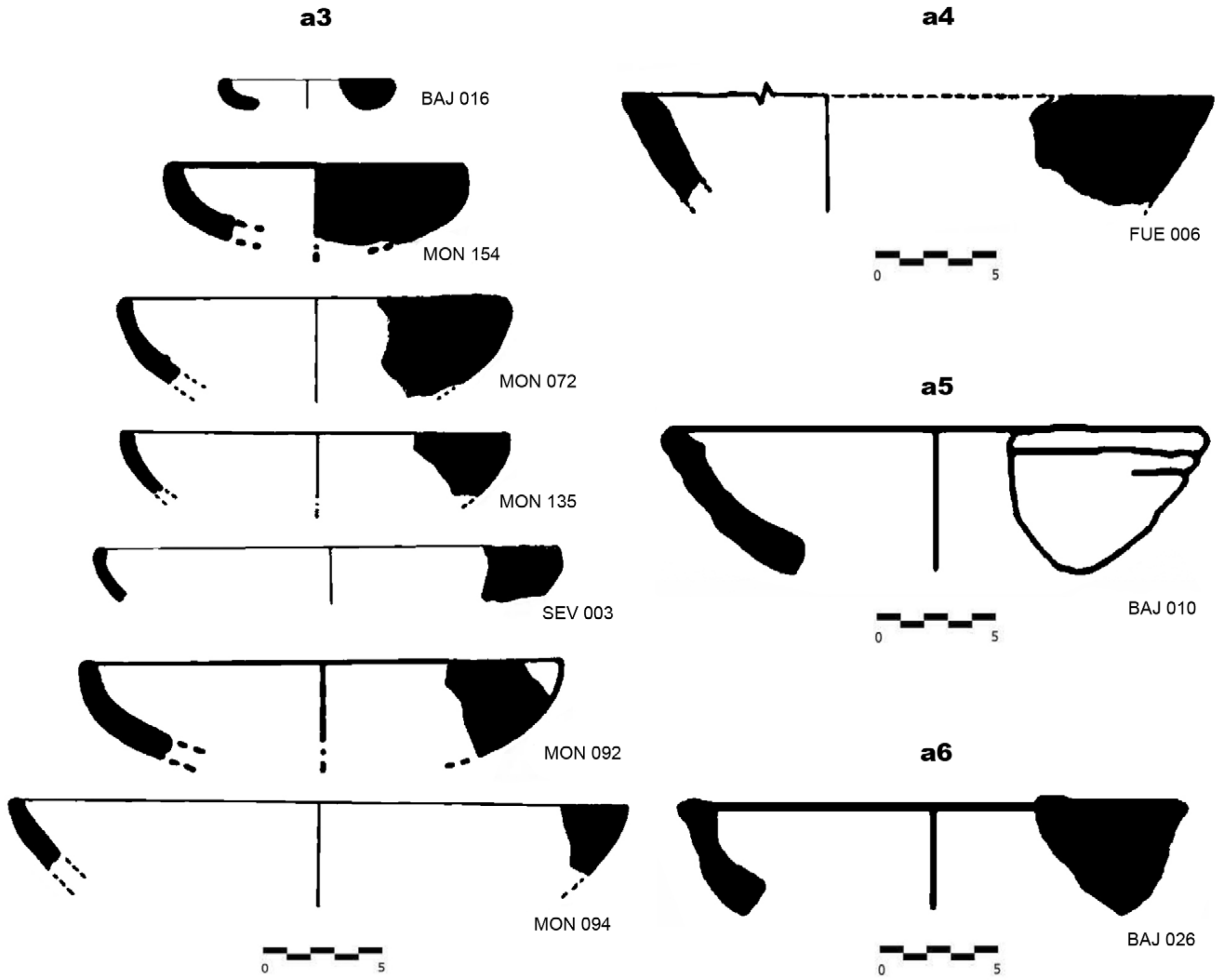
a1.2



a2

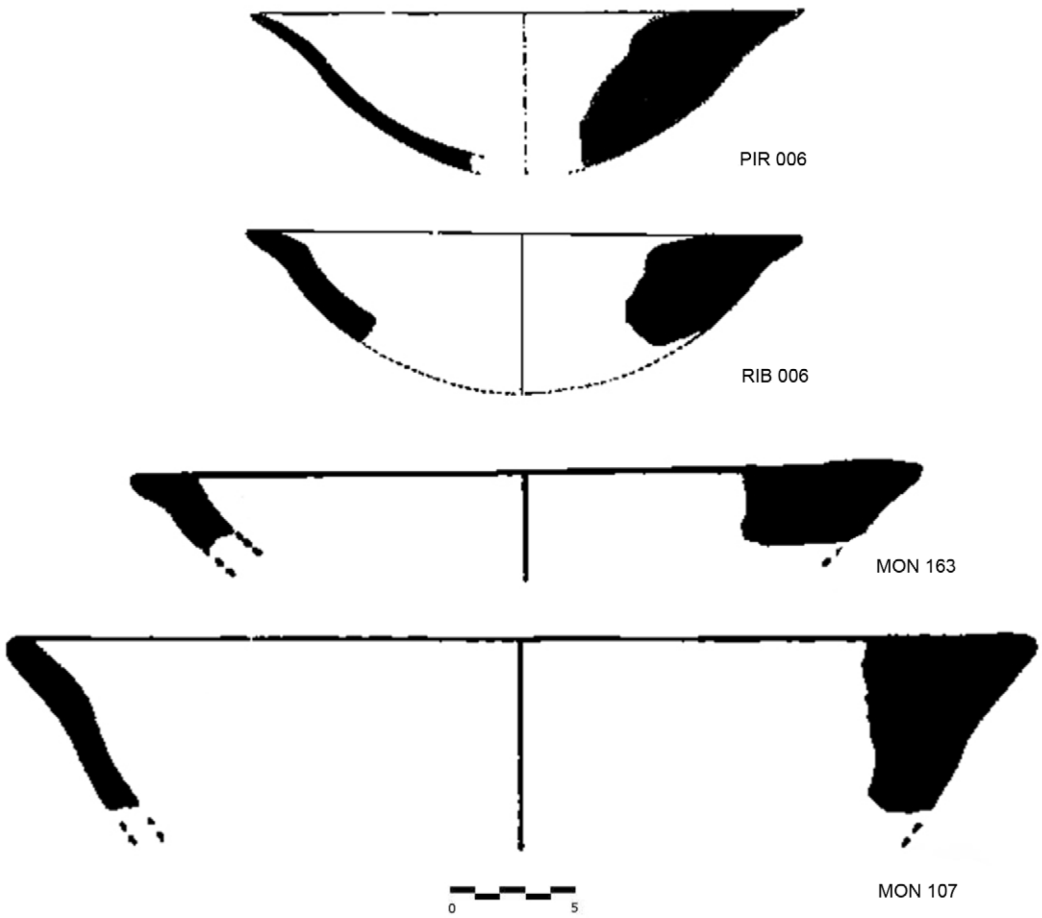


Form 1, Type 2
1/4 of Sphere Bowls/Platters

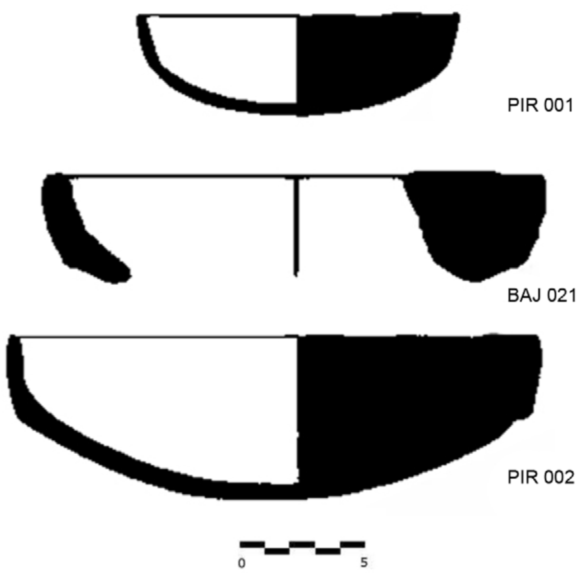


Form 1, Type 2
1/4 of Sphere Bowls/Platters

b



c



Form 1, Type 3
Bowls/Vessels (1/3 of Sphere)

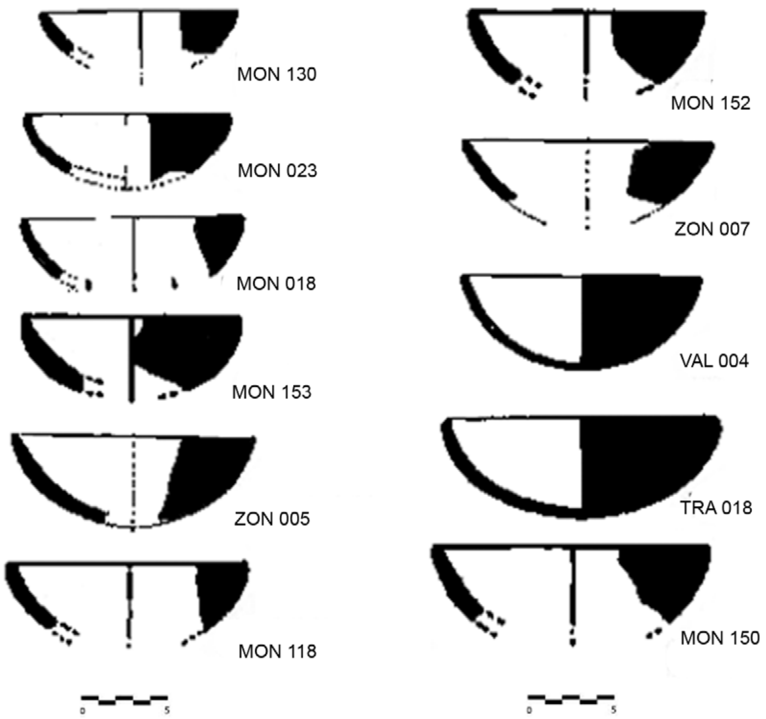
Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Deco-ration
1	3	a1.1.1	MON 130	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.1	MON 018	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.1	MON 153	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.1	ZON 005	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.1	MON 118	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.1	VAL 004	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.1	TRA 018	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.1	MON 150	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.1	MON 023	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.1	MON 048	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.1	MON 152	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.1	ZON 007	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.2	MON 129	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.1.2	ZON 006	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.2	MON 101	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	sharp	no
1	3	a1.2	ZON 008	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	no
1	3	a1.2	MON 011	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	sharp	no
1	3	a1.3	ZON 010	fragment	bowl	1/3 of sphere	convex	curved	no	straight	rounded	no
1	3	a1.3	ZON 011	fragment	bowl	1/3 of sphere	convex	curved	no	straight	rounded	no
1	3	a1.3	ZON 031	fragment	bowl	1/3 of sphere	convex	curved	no	straight	rounded	no
1	3	a1.3	CHI 005	fragment	bowl	1/3 of sphere	convex	curved	no	straight	rounded	no
1	3	a1.3	FUE 008	fragment	bowl	1/3 of sphere	n/a	curved	no	straight	rounded	no
1	3	a1.3	MON 003	fragment	bowl/ vessel	1/3 of sphere	convex	curved	no	straight	rounded	no
1	3	a1.3	MON 104	fragment	bowl/ vessel	1/3 of sphere	convex	curved	no	straight	rounded	no
1	3	a1.4	MON 099	fragment	bowl	1/3 of sphere	convex	curved	no	straight	straight	no
1	3	a1.4	FUE 012	fragment	bowl	1/3 of sphere	convex	curved	no	straight	straight	no
1	3	a1.4	FUE 007	fragment	bowl	1/3 of sphere	convex	curved	no	straight	straight	no
1	3	a1.5	TRA 007	fragment	bowl	1/3 of sphere	n/a	divergent	no	divergent	with outer bezel	no
1	3	a1.6	ZON 012	fragment	bowl/ vessel	1/3 of sphere	n/a	divergent	no	divergent	with inner bezel	no
1	3	a1.6	ALC 003	fragment	bowl/ vessel	1/3 of sphere	n/a	divergent	no	divergent	with inner bezel	no
1	3	a1.6	ZON 038	fragment	bowl/ vessel	1/3 of sphere	n/a	divergent	no	divergent	with inner bezel	no
1	3	a1.7	RIB 012	fragment	bowl/ vessel	1/3 of sphere	n/a	divergent	no	everted	rounded	no
1	3	a1.8	RIB 013	fragment	bowl/ vessel	1/3 of sphere	n/a	divergent	no	broaden	rounded	no
1	3	a1.8	MON 165	fragment	bowl/ vessel	1/3 of sphere	n/a	divergent	no	broaden	rounded	no
1	3	a1.9	MON 105	fragment	bowl/ vessel	1/3 of sphere	n/a	divergent	no	inner bump	with inner bezel	no
1	3	a1.9	MON 133	fragment	bowl/ vessel	1/3 of sphere	n/a	divergent	no	inner bump	with inner bezel	no
1	3	a1.10	ZON 035	fragment	bowl/ vessel	1/3 of sphere	n/a	divergent	no	divergent	rounded	no

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
1	3	b1	PEN 003	fragment	bowl	1/3 of sphere	convex	divergent	no	divergent	rounded	*mamelones* on both sides of the border
1	3	b1	CTO 003	entire	bowl	1/3 of sphere	convex	curved	no	straight	rounded	*mamelones* on both sides of the border
1	3	b2	VAL 003	entire	bowl	1/3 of sphere	convex	curved	no	straight	rounded	*mamelones* along the outer border
1	3	b2	VAL 001	entire	bowl	1/3 of sphere	convex	curved	no	straight	rounded	*mamelones* along the outer border
1	3	b3	MON 058	fragment	bowl	1/3 of sphere	n/a	curved	no	divergent	rounded	no
1	3	c	MON 029	fragment	bowl	1/3 of sphere	n/a	curved with angle in the middle	no	divergent	rounded	no
1	3	d	BAJ 012	fragment	bowl	1/3 of sphere	n/a	curved	no	divergent	rounded	no
1	3	e	BAJ 009	fragment	bowl	1/3 of sphere	n/a	curved	no	everted	rounded	no

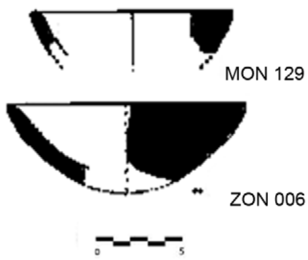
Table A3. Form 1, Type 3, bowls/vessels (1/3 of Sphere). Site codes in Table 4 (page 122–123).

Form 1, Type 3
Bowls/Vessels (1/3 of Sphere)

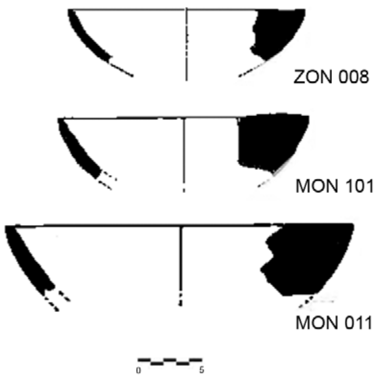
a1.1.1



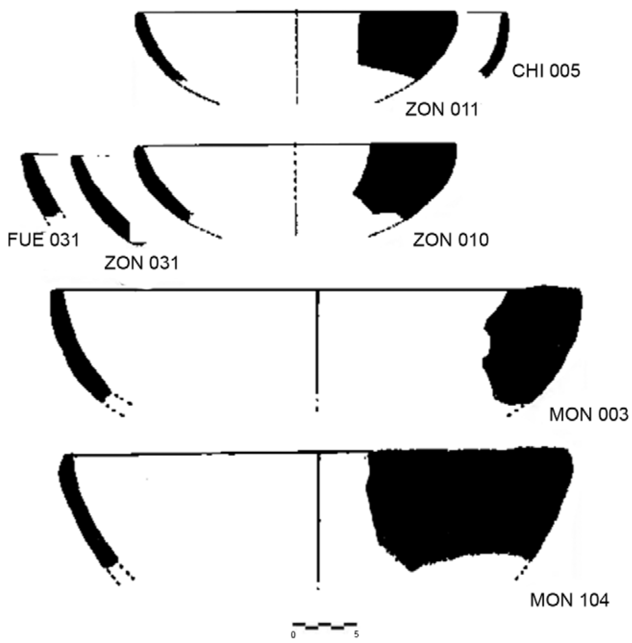
a1.1.2



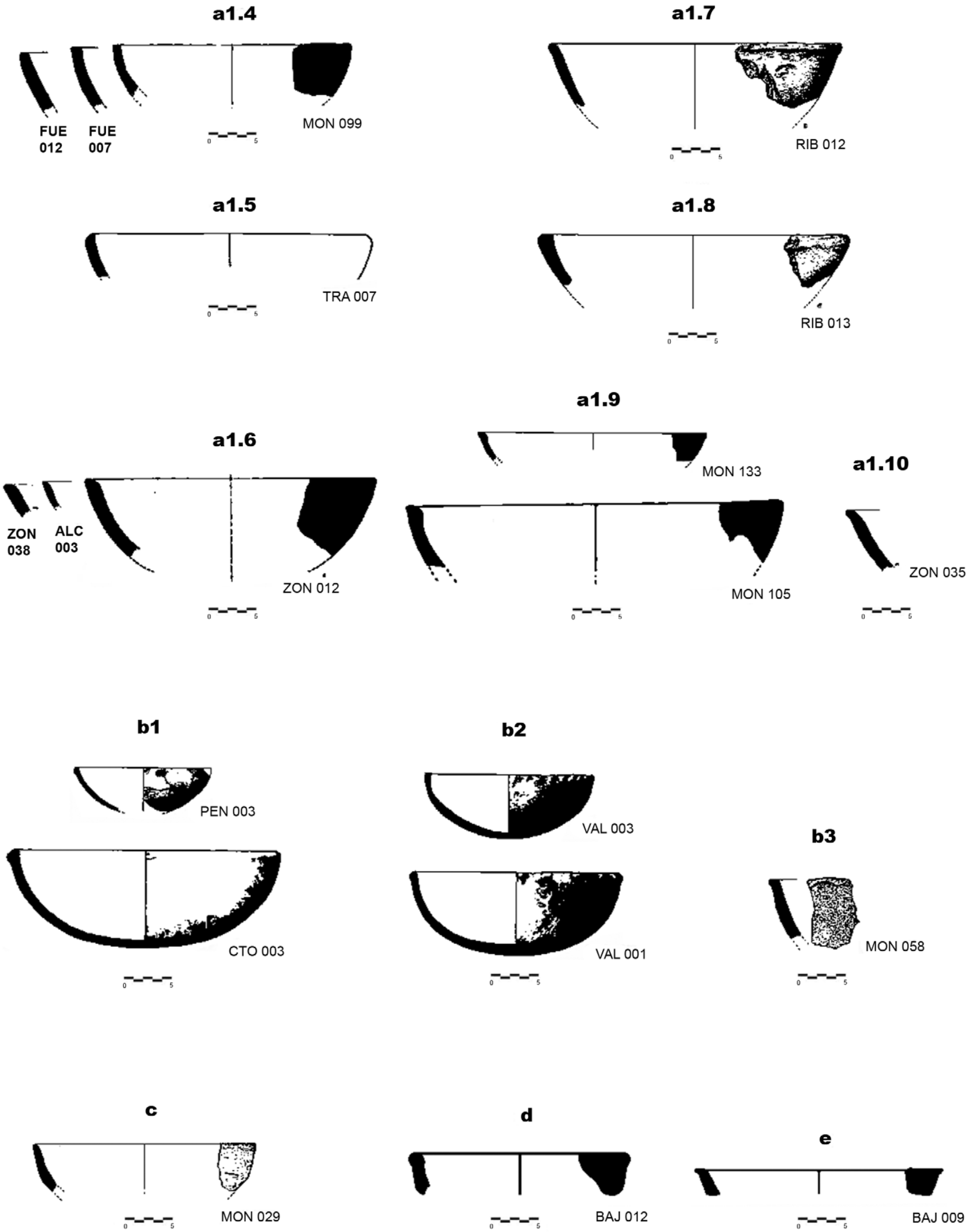
a1.2



a1.3



Form 1, Type 3
Bowls/Vessels (1/3 of Sphere)



Form 1, Type 4
Bowls/Vessels (1/2 of Sphere)

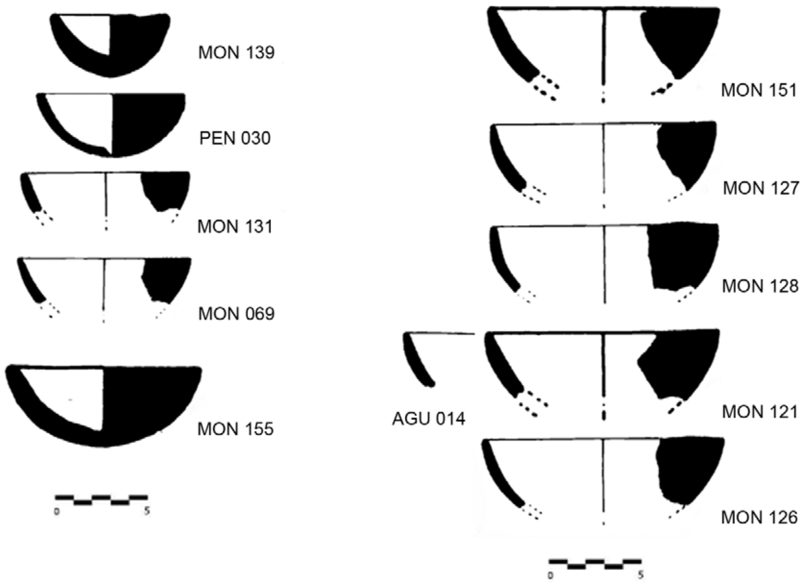
Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Deco-ration
1	4	a1	PEN 030	entire	bowl	1/2 of sphere	convex	curved	no	divergent	rounded	no
1	4	a1	MON 069	fragment	bowl	1/2 of sphere	convex	curved	no	divergent	rounded	no
1	4	a1	MON 155	entire	bowl	1/2 of sphere	convex	curved	no	divergent	rounded	no
1	4	a1	MON 151	fragment	bowl	1/2 of sphere	convex	curved	no	divergent	rounded	no
1	4	a1	MON 121	fragment	bowl	1/2 of sphere	convex	curved	no	divergent	rounded	no
1	4	a1	AGU 014	fragment	bowl	1/2 of sphere	convex	curved	no	divergent	rounded	no
1	4	a1	MON 126	fragment	bowl	1/2 of sphere	convex	curved	no	divergent	rounded	no
1	4	a1	MON 127	fragment	bowl	1/2 of sphere	convex	curved	no	divergent	rounded	no
1	4	a1	MON 128	fragment	bowl	1/2 of sphere	convex	curved	no	divergent	rounded	no
1	4	a1	MON 139	entire	bowl	1/2 of sphere	convex	curved	no	divergent	rounded	no
1	4	a1	MON 131	fragment	bowl	1/2 of sphere	convex	curved	no	divergent	rounded	no
1	4	a2.1	MON 125	fragment	bowl	1/2 of sphere	convex	divergent	no	divergent	rounded	no
1	4	a2.1	RIB 001	fragment	bowl	1/2 of sphere	convex	divergent	no	divergent	rounded	no
1	4	a2.1	MON 028	fragment	bowl	1/2 of sphere	convex	divergent	no	divergent	rounded	no
1	4	a2.1	MON 149	fragment	bowl	1/2 of sphere	convex	divergent	no	divergent	rounded	no
1	4	a2.1	AGU 011	fragment	bowl	1/2 of sphere	convex	divergent	no	divergent	rounded	no
1	4	a2.1	CAB 001	fragment	bowl	1/2 of sphere	convex	divergent	no	divergent	rounded	no
1	4	a2.1	MON 086	fragment	bowl/ vessel	1/2 of sphere	convex	divergent	no	divergent	rounded	no
1	4	a2.2	MON 057	fragment	bowl	1/2 of sphere	convex	divergent	no	divergent	straight	no
1	4	a2.2	MON 059	fragment	bowl	1/2 of sphere	convex	divergent	no	divergent	straight	no
1	4	a2.2	SMR 001	fragment	bowl	1/2 of sphere	convex	divergent	no	divergent	straight	no
1	4	a2.2	MON 016	fragment	bowl	1/2 of sphere	convex	divergent	no	divergent	straight	no
1	4	a2.2	MON 065	fragment	bowl	1/2 of sphere	convex	divergent	no	divergent	straight	no
1	4	a3.1	CAB 004	fragment	bowl	1/2 of sphere	convex	curved	no	divergent	with inner bezel	no
1	4	a3.1	MON 124	fragment	bowl	1/2 of sphere	convex	curved	no	divergent	with inner bezel	no
1	4	a3.1	MON 134	fragment	bowl	1/2 of sphere	convex	curved	no	divergent	with inner bezel	no
1	4	a3.2	FUE 004	fragment	bowl	1/2 of sphere	convex	curved	no	divergent	with outer bezel	no
1	4	a4.1.1	MON 120	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	AGU 010	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	MON 119	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	MON 136	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	ZON 003	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	ZON 004	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	MON 076	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	ALC 004	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	COJ 001	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	AGU 013	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	COR 003	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	MON 089	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	MON 090	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	COR 001	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	CHI 026	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.1	CHI 013	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	no
1	4	a4.1.2	ENC 002	fragment	bowl	1/2 of sphere	convex	curved	no	straight	sharp	no

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Deco-ration
1	4	a4.2.1	MON 145	fragment	bowl	1/2 of sphere	convex	curved	no	inwards	rounded	no
1	4	a4.2.1	SAN 009	fragment	bowl	1/2 of sphere	convex	curved	no	inwards	rounded	no
1	4	a4.2.1	SEB 003	entire	bowl	1/2 of sphere	convex	curved	no	inwards	rounded	no
1	4	a4.2.1	PEN 001	entire	bowl	1/2 of sphere	convex	curved	no	inwards	rounded	no
1	4	a4.2.1	CAR 001	entire	bowl	1/2 of sphere	convex	curved	no	inwards	rounded	no
1	4	a4.2.1	TRA 003	fragment	bowl	1/2 of sphere	convex	curved	no	inwards	rounded	no
1	4	a4.2.1	PIR 003	entire	bowl	1/2 of sphere	convex	curved	no	inwards	rounded	no
1	4	a4.1.3	MOR 025	fragment	bowl	1/2 of sphere	convex	curved	no	straight	with inner bezel	no
1	4	a5.1	VAL 007	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	small *mamel-ones* along the outer border
1	4	a5.2	ARR 012	fragment	bowl	1/2 of sphere	convex	curved	no	straight	rounded	digital incisions along the border
1	4	b1.1	BAE 007	fragment	bowl	1/2 of sphere	convex	divergent elongated	no	divergent	rounded	no
1	4	b1.1	SEV 004	fragment	bowl	1/2 of sphere	convex	divergent elongated	no	divergent	rounded	no
1	4	b1.1	ERA 001	fragment	bowl	1/2 of sphere	convex	divergent elongated	no	divergent	rounded	no
1	4	b1.1	PEN 032	fragment	bowl	1/2 of sphere	convex	divergent elongated	no	divergent	rounded	no
1	4	b1.1	MOR 030	fragment	bowl	1/2 of sphere	n/a	divergent elongated	no	divergent	rounded	no
1	4	b1.1	PEN 015	fragment	bowl	1/2 of sphere	convex	divergent elongated	no	divergent	rounded	no
1	4	b1.1	SMR 002	fragment	bowl	1/2 of sphere	n/a	divergent elongated	no	divergent	rounded	no
1	4	b1.2	ARC 003	fragment	bowl	1/2 of sphere	convex	divergent elongated	no	divergent	rounded	*mamelones* on both border sides
1	4	b2	PEN 039	entire	cruci-ble	1/2 of sphere	convex	divergent	no	divergent	rounded	no
1	4	b2	PEN 018	entire	cruci-ble	1/2 of sphere	convex	divergent	no	divergent	rounded	no
1	4	c1	CHI 010	fragment	bowl	1/2 of sphere	convex	curved convergent	no	inwards	rounded	no
1	4	c1	CHI 011	fragment	bowl	1/2 of sphere	convex	curved convergent	no	inwards	rounded	no
1	4	c2	SAN 002	fragment	bowl	1/2 of sphere	convex	curved convergent	no	inwards	rounded	no
1	4	c2	TRA 004	fragment	bowl	1/2 of sphere	convex	curved convergent	no	inwards	rounded	no
1	4	d	MON 123	entire	bowl	1/2 of sphere	convex	curved	no	straight with a slight eversion under the border	rounded	no
1	4	d	MON 137	fragment	bowl	1/2 of sphere	convex	curved	no	straight with a slight eversion under the border	rounded	no

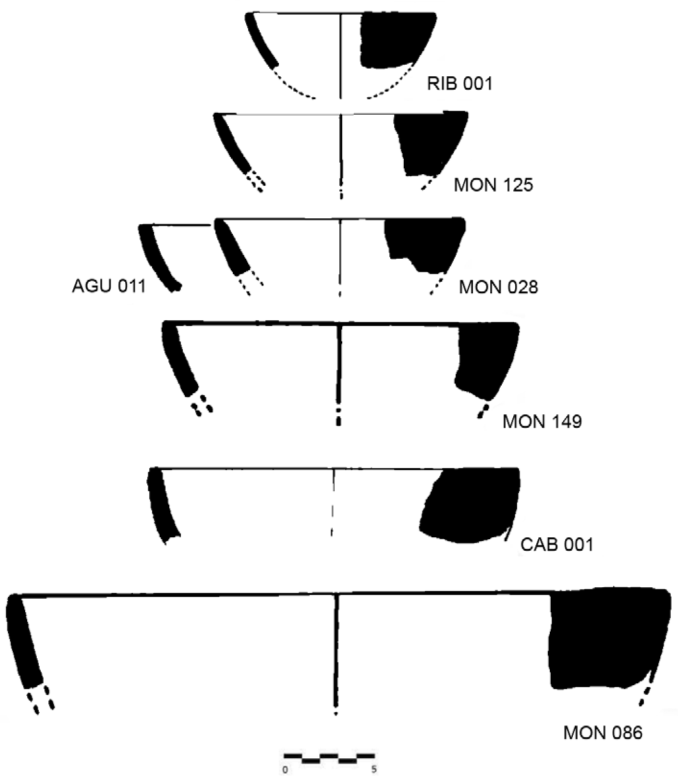
Table A4. Form 1, Type 4, bowls/vessels (1/2 of Sphere). Site codes in Table 4 (page 122–123).

Form 1, Type 4
Bowls/Vessels (1/2 of Sphere)

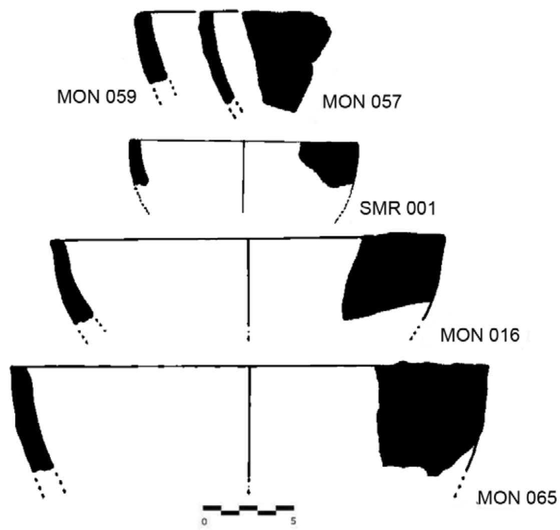
a1



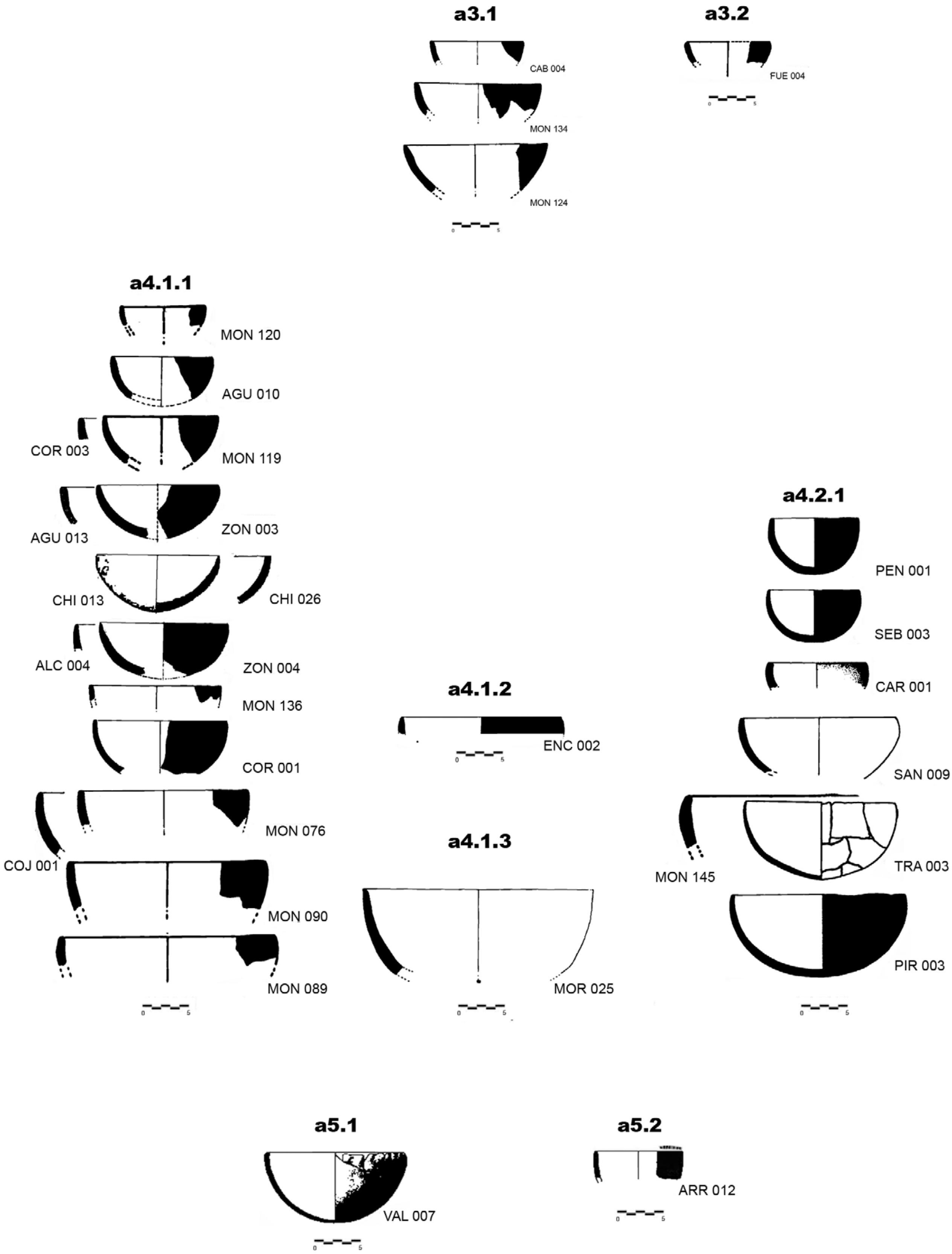
a2.1



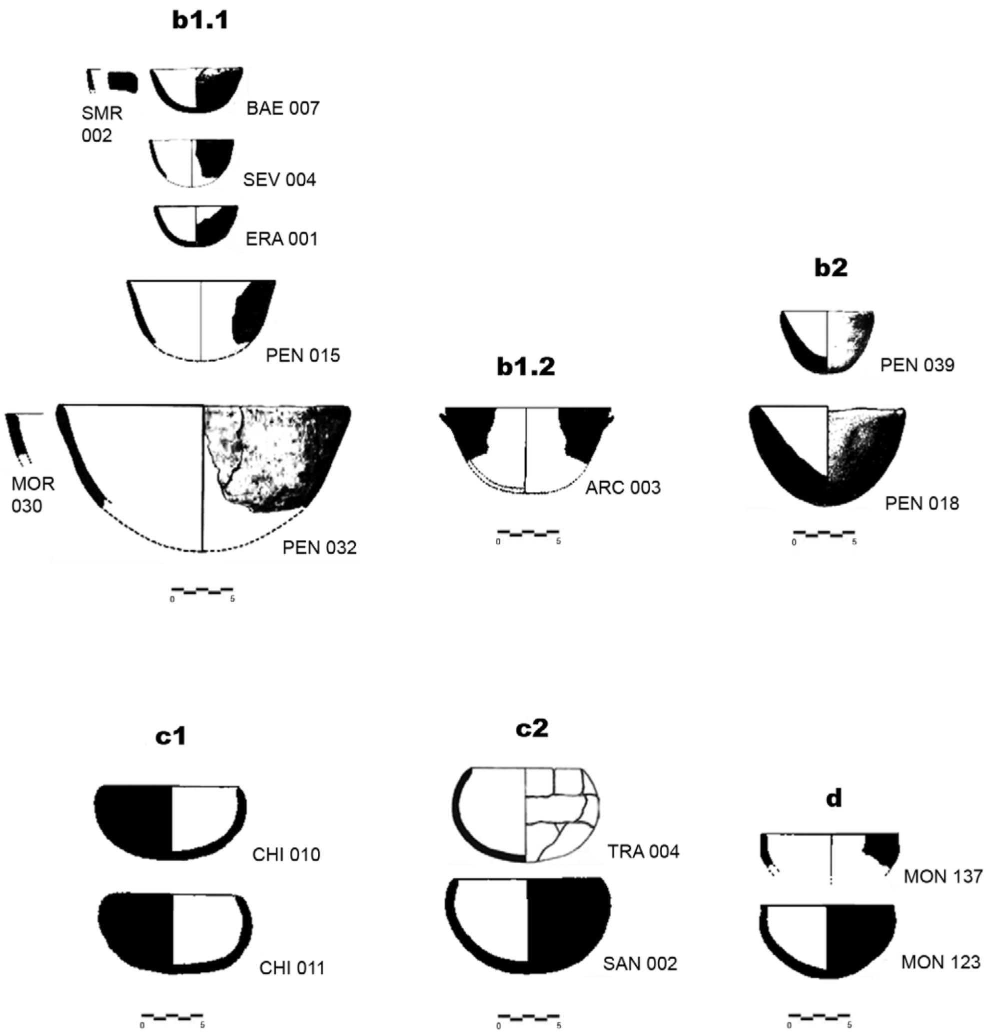
a2.2



Form 1, Type 4
Bowls/Vessels (1/2 of Sphere)



Form 1, Type 4
Bowls/Vessels (1/2 of Sphere)

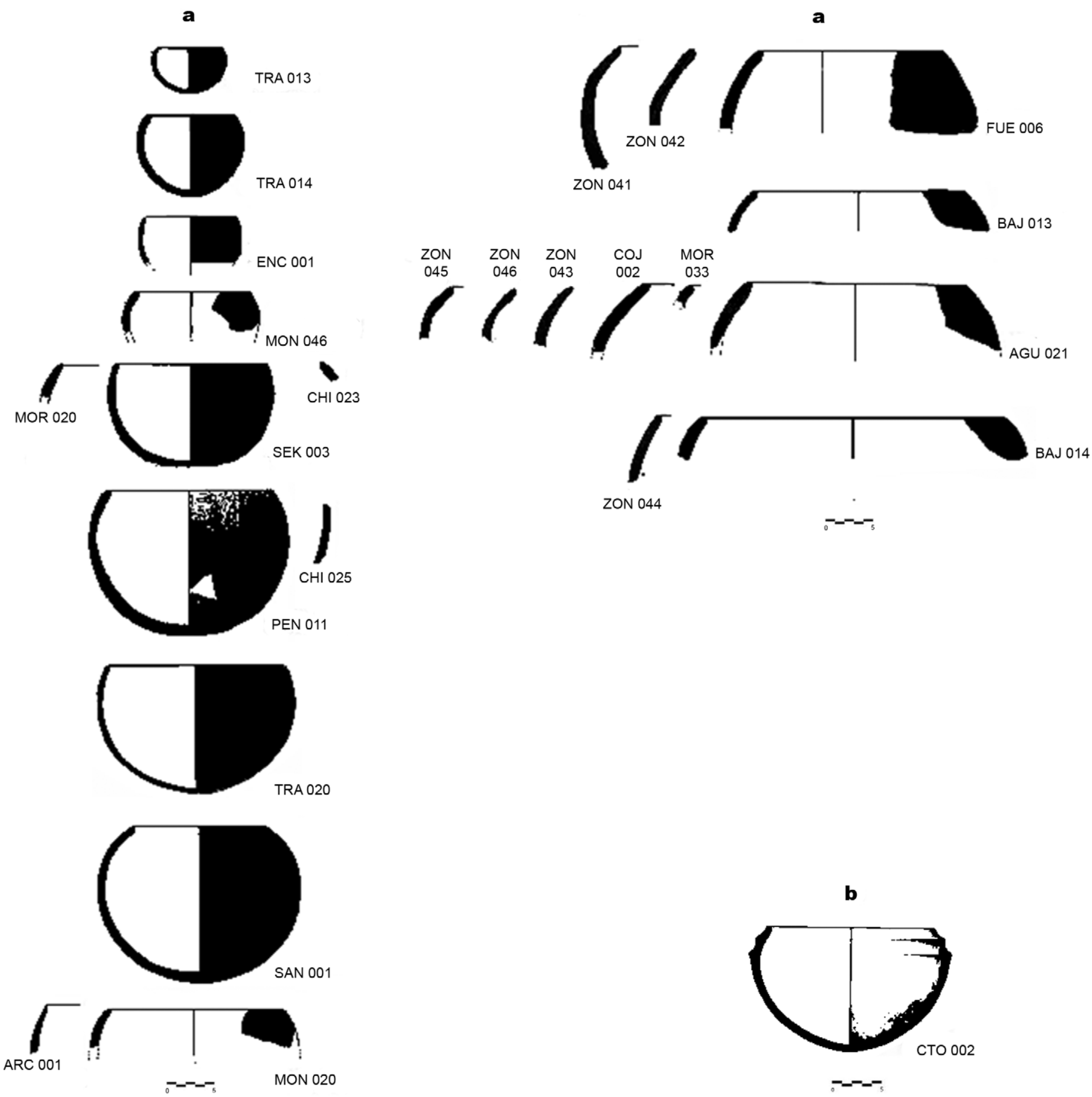


Form 1, Type 5
Bowls/Vessels (3/4 of Sphere)

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Deco-ration
1	5	a	ENC 001	fragment	bowl	3/4 of sphere	convex	curved convergent	no	inwards	rounded	no
1	5	a	TRA 013	fragment	bowl	3/4 of sphere	convex	curved convergent	no	inwards	rounded	no
1	5	a	TRA 014	fragment	bowl	3/4 of sphere	convex	curved convergent	no	inwards	rounded	no
1	5	a	MON 046	fragment	bowl	3/4 of sphere	convex	curved convergent	no	inwards	rounded	no
1	5	a	BAJ 013	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	AGU 021	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	FUE 006	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	MON 020	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	SEK 003	entire	bowl	3/4 of sphere	convex	curved convergent	no	inwards	rounded	no
1	5	a	PEN 011	entire	bowl	3/4 of sphere	convex	curved convergent	no	inwards	rounded	no
1	5	a	SAN 001	entire	bowl	3/4 of sphere	convex	curved convergent	no	inwards	rounded	no
1	5	a	TRA 020	entire	bowl	3/4 of sphere	convex	curved convergent	no	inwards	rounded	no
1	5	a	MOR 020	fragment	bowl	3/4 of sphere	convex	curved convergent	no	inwards	rounded	no
1	5	a	MOR 033	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	CHI 023	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	COJ 002	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	ZON 042	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	ZON 043	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	ZON 046	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	ZON 045	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	ZON 041	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	ARC 001	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	CHI 025	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	ZON 044	fragment	bowl	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	a	BAJ 014	fragment	bowl/ vessel	3/4 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	5	b	CTO 002	entire	bowl	3/4 of sphere	convex	curved convergent	no	inwards	rounded	two hori-zontal-parallel fittings under the border

Table A5. Form 1, Type 5, bowls/vessels (3/4 of Sphere). Site codes in Table 4 (page 122–123).

Form 1, Type 5
Bowls/Vessels (3/4 of Sphere)

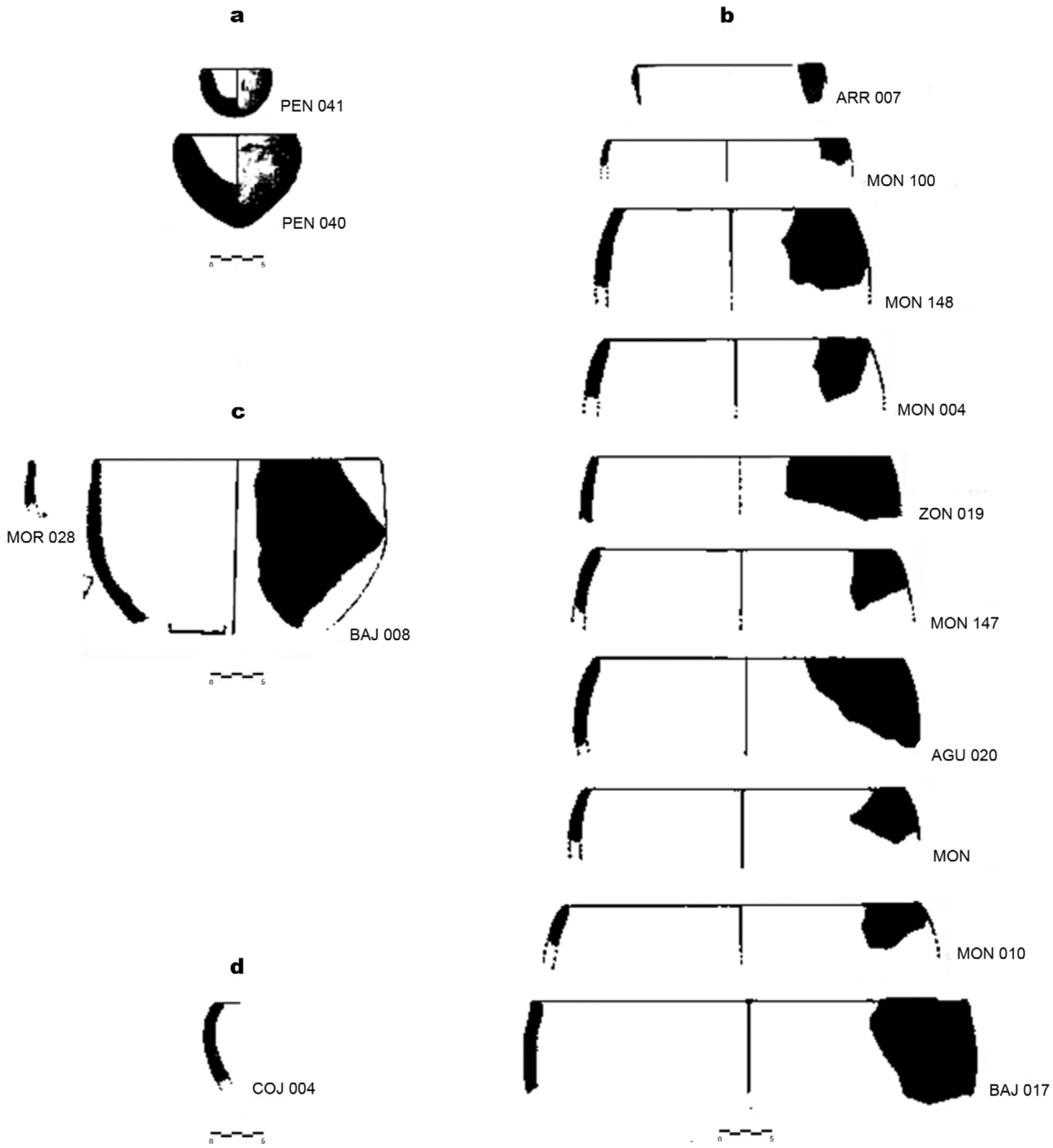


Form 1, Type 6
Bowls/Vessels (2/3 of Sphere)

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Deco-ration
1	6	a	PEN 040	entire	cruci-ble	2/3 of sphere	convex	curved	no	straight	rounded	no
1	6	a	PEN 041	entire	cruci-ble	2/3 of sphere	convex	curved	no	straight	rounded	no
1	6	b	MON 010	fragment	bowl/ vessel	2/3 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	6	b	MON 144	fragment	bowl/ vessel	2/3 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	6	b	BAJ 017	fragment	bowl/ vessel	2/3 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	6	b	AGU 020	fragment	bowl/ vessel	2/3 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	6	b	MON 147	fragment	bowl	2/3 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	6	b	ZON 019	fragment	bowl	2/3 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	6	b	MON 004	fragment	bowl	2/3 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	6	b	MON 100	fragment	bowl	2/3 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	6	b	ARR 007	fragment	bowl	2/3 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	6	b	MON 148	fragment	bowl	2/3 of sphere	n/a	curved convergent	no	inwards	rounded	no
1	6	c	BAJ 008	fragment	bowl	2/3 of sphere	n/a	curved convergent	no	straight	rounded	no
1	6	c	MOR 028	fragment	bowl	2/3 of sphere	n/a	curved convergent	no	straight	rounded	no
1	6	d	COJ 004	fragment	bowl	2/3 of sphere	n/a	curved convergent	no	inwards	rounded	no

Table A6. Form 1, Type 6, bowls/vessels (2/3 of Sphere). Site codes in Table 4 (page 122–123).

Form 1, Type 6
Bowls/Vessels (2/3 of Sphere)

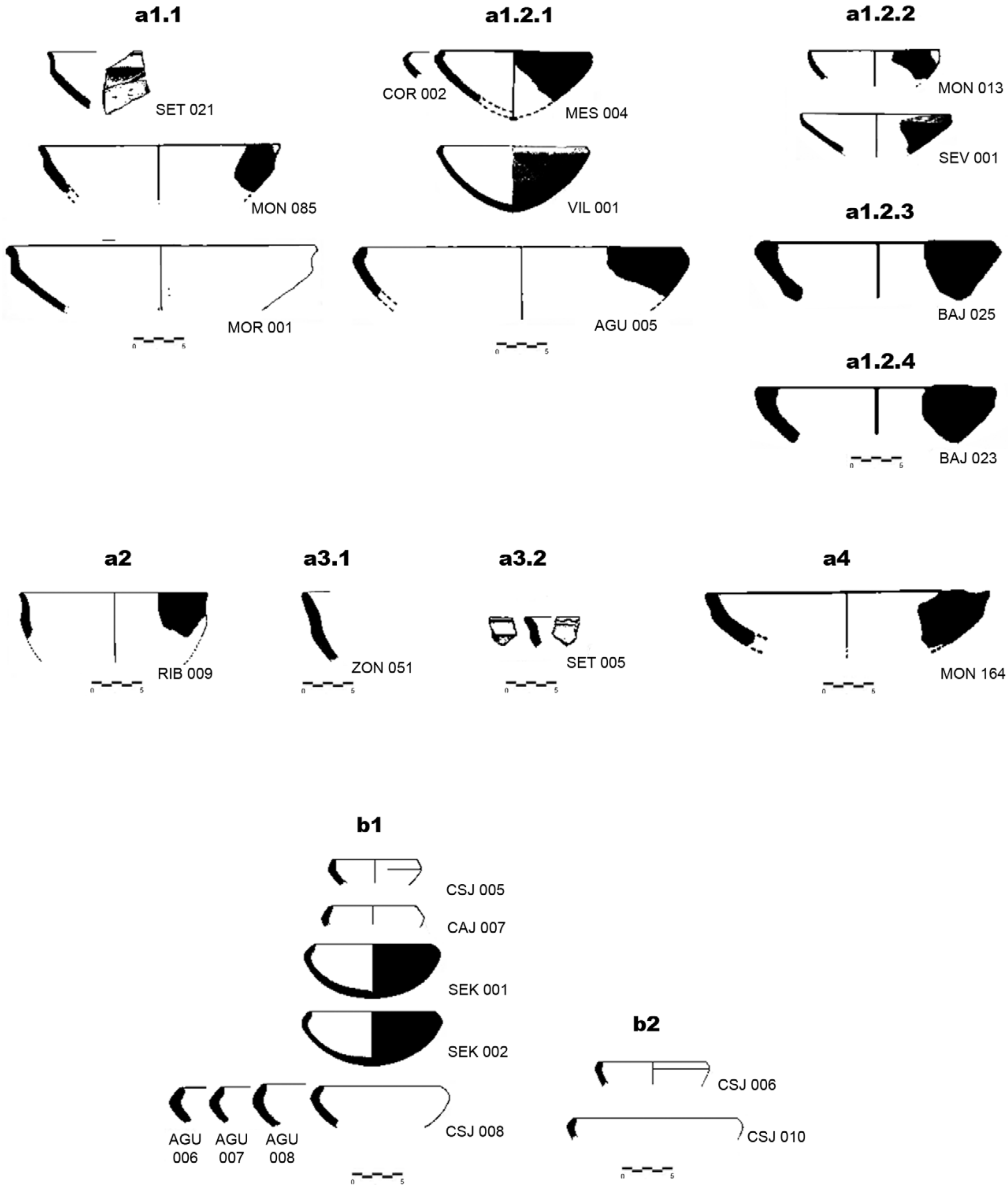


Form 1, Type 7
High Carinated Bowls/Vessels

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
1	7	a1	MON 085	fragment	bowl	carinated ('V')	n/a	high carinated	curved divergent	divergent	rounded	no
1	7	a1	SET 021	fragment	bowl	carinated ('V')	n/a	high carinated	curved divergent	divergent	rounded	no
1	7	a1	MOR 001	entire	bowl/ vessel	carinated ('V')	n/a	high carinated	curved divergent	divergent	rounded	no
1	7	a1.2.1	AGU 005	fragment	bowl/ vessel	carinated ('V')	convex	high carinated	no	inwards	rounded	no
1	7	a1.2.1	MES 004	fragment	bowl	carinated ('V')	convex	high carinated	no	inwards	rounded	no
1	7	a1.2.1	VIL 001	fragment	bowl	carinated ('V')	convex	high carinated	no	inwards	rounded	no
1	7	a1.2.1	COR 002	fragment	bowl	carinated ('V')	convex	high carinated	no	inwards	rounded	no
1	7	a1.2.2	MON 013	fragment	bowl	carinated ('V')	convex	high carinated	no	straight	sharp	no
1	7	a1.2.2	SEV 001	fragment	bowl	carinated ('V')	convex	high carinated	no	straight	sharp	no
1	7	a1.2.3	BAJ 025	fragment	bowl	carinated ('V')	n/a	high carinated	no	broaden	rounded	no
1	7	a1.2.4	BAJ 023	fragment	bowl	carinated ('V')	n/a	high carinated	no	broaden	straight	no
1	7	a2	RIB 009	fragment	bowl	carinated (hemispheric)	n/a	high carinated	straight	divergent	rounded	no
1	7	a3.1	ZON 051	fragment	bowl	carinated (hemispheric)	n/a	high carinated	divergent	divergent	rounded	no
1	7	a3.2	SET 005	fragment	vessel	carinated (hemispheric)	n/a	high carinated	divergent	divergent	rounded	zigzag marks under the inner border
1	7	a4	MON 164	fragment	bowl	carinated (ellipsoidal)	convex	high carinated	divergent	divergent	rounded	no
1	7	b1	CSJ 005	fragment	bowl	carinated (ellipsoidal)	convex	high carinated	no	inwards	rounded	no
1	7	b1	CSJ 007	fragment	bowl	carinated (ellipsoidal)	convex	high carinated	no	inwards	rounded	no
1	7	b1	SEK 001	entire	bowl	carinated (ellipsoidal)	convex	high carinated	no	inwards	rounded	no
1	7	b1	SEK 002	entire	bowl	carinated (ellipsoidal)	convex	high carinated	no	inwards	rounded	no
1	7	b1	CSJ 008	fragment	bowl	carinated (ellipsoidal)	convex	high carinated	no	inwards	rounded	no
1	7	b1	AGU 008	fragment	bowl	carinated (ellipsoidal)	convex	high carinated	no	inwards	rounded	no
1	7	b1	AGU 007	fragment	bowl	carinated (ellipsoidal)	convex	high carinated	no	inwards	rounded	no
1	7	b1	AGU 006	fragment	bowl	carinated (ellipsoidal)	convex	high carinated	no	inwards	rounded	no
1	7	b2	CSJ 006	fragment	bowl	carinated ('U')	n/a	high carinated	no	inwards	rounded	no
1	7	b2	CSJ 010	fragment	bowl	carinated ('U')	n/a	high carinated	no	inwards	rounded	no

Table A7. Form 1, Type 7, high carinated bowls/vessels. Site codes in Table 4 (page 122–123).

Form 1, Type 7
High Carinated Bowls/Vessels



Form 1, Type 8
Mid-Carinated Bowls/Vessels

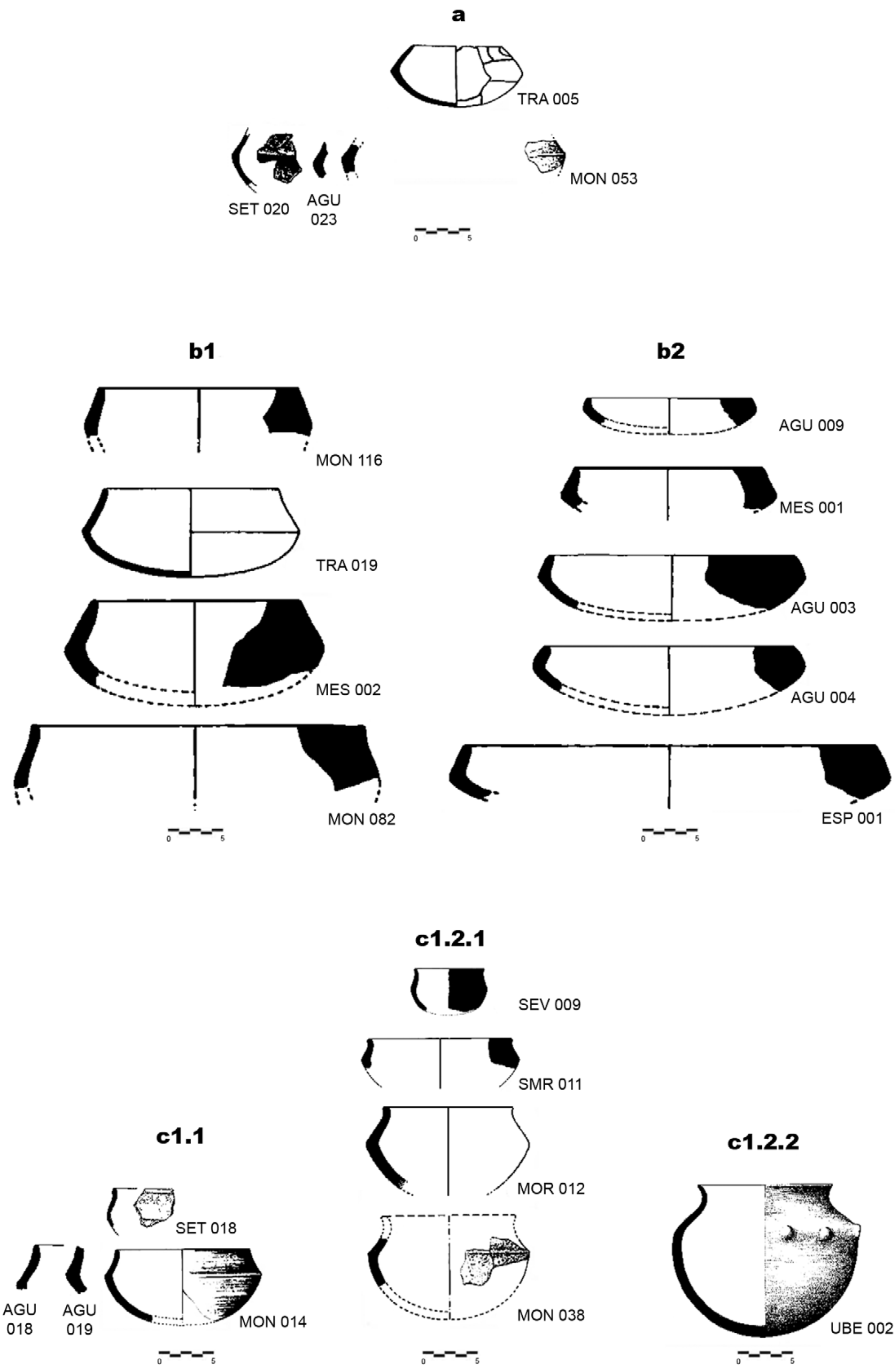
Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
1	8	a	TRA 005	fragment	bowl	carinated (ellipsoidal)	convex	mid-carinated	no	inwards	sharp	no
1	8	a	SET 020	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated	no	n/a	n/a	no
1	8	a	MON 053	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated	no	n/a	n/a	no
1	8	a	AGU 023	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated	no	n/a	n/a	no
1	8	b1	MON 116	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated	no	inwards	rounded	no
1	8	b1	MES 002	fragment	bowl	carinated (ellipsoidal)	convex	mid-carinated	no	inwards	rounded	no
1	8	b1	TRA 019	entire	bowl	carinated (ellipsoidal)	convex	mid-carinated	no	inwards	rounded	no
1	8	b1	MON 082	fragment	bowl/ vessel	carinated (ellipsoidal)	n/a	mid-carinated	no	inwards	rounded	no
1	8	b2	AGU 003	fragment	bowl	carinated (flattened)	convex enlarged	mid-carinated	no	inwards	rounded	no
1	8	b2	MES 001	fragment	bowl	carinated (flattened)	convex enlarged	mid-carinated	no	inwards	rounded	no
1	8	b2	AGU 009	fragment	bowl	carinated (flattened)	convex enlarged	mid-carinated	no	inwards	rounded	no
1	8	b2	AGU 004	fragment	bowl	carinated (flattened)	convex enlarged	mid-carinated	no	inwards	rounded	no
1	8	b2	ESP 001	fragment	bowl/ vessel	carinated (flattened)	convex enlarged	mid-carinated	no	inwards	rounded	no
1	8	c1.1	MON 014	fragment	bowl	carinated (hemispheric)	convex	mid-carinated	curved divergent (inwards)	straight	rounded	no
1	8	c1.1	AGU 019	fragment	bowl	carinated (hemispheric)	n/a	mid-carinated	curved divergent (inwards)	n/a	n/a	no
1	8	c1.1	AGU 018	fragment	bowl	carinated (hemispheric)	n/a	mid-carinated	curved divergent (inwards)	straight	rounded	no
1	8	c1.1	SET 018	fragment	bowl	carinated (hemispheric)	n/a	mid-carinated	curved divergent (inwards)	straight	rounded	no
1	8	c1.2.1	SMR 011	fragment	bowl	carinated (hemispheric)	n/a	mid-carinated	curved divergent (inwards)	divergent	rounded	no
1	8	c1.2.1	MOR 012	fragment	bowl	carinated (hemispheric)	n/a	mid-carinated	curved divergent (inwards)	divergent	rounded	no
1	8	c1.2.1	SEV 009	fragment	bowl	carinated (hemispheric)	convex	mid-carinated	curved divergent (inwards)	divergent	rounded	no
1	8	c1.2.1	MON 038	fragment	bowl	carinated (hemispheric)	convex	mid-carinated	curved divergent (inwards)	divergent	rounded	no
1	8	c1.2.2	UBE 002	entire	bowl	carinated (hemispheric)	convex	mid-carinated	curved divergent (inwards)	divergent	rounded	*Mamelones* along the body

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
1	8	d1	PEN 002	entire	bowl	carinated (hemispheric)	convex	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	d1	MON 083	fragment	bowl	carinated (hemispheric)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	d1	MON 079	fragment	bowl	carinated (hemispheric)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	d1	ZON 050	fragment	bowl	carinated (hemispheric)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	d1	HOR 001	entire	bowl	carinated (hemispheric)	convex	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	d1	MOR 002	entire	bowl	carinated (hemispheric)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	d1	MAR 004	fragment	bowl	carinated (hemispheric)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	d1	MAR 003	fragment	bowl	carinated (hemispheric)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	d1	GAN 008	fragment	bowl	carinated (hemispheric)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	d2	MON 103	fragment	bowl/ vessel	carinated (parabolic)	convex	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	d2	ZON 027	fragment	bowl/ vessel	carinated (parabolic)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	d2	ZON 029	fragment	bowl/ vessel	carinated (parabolic)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	d2	ZON 040	fragment	bowl/ vessel	carinated (parabolic)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	e1	MON 052	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	e1	SMR 008	fragment	bowl	carinated (ellipsoidal)	convex	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	e1	MOR 003	entire	bowl	carinated (ellipsoidal)	convex	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	e2	ZON 024	fragment	bowl	carinated (ellipsoidal)	convex	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	e2	ZON 051	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no
1	8	e2	SAN 003	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated	curved divergent (everted)	divergent	rounded	no

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
1	8	e2	ZON 052	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated	curved divergent (everted)	divergent	n/a	no
1	8	e3.1	SEV 005	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated	curved divergent (straight)	divergent	rounded	no
1	8	e3.1	SET 001	entire	bowl	carinated (ellipsoidal)	n/a	mid-carinated	curved divergent (straight)	divergent	rounded	no
1	8	e3.1	FUE 002	fragment	bowl	carinated (ellipsoidal)	convex	mid-carinated	curved divergent (straight)	n/a	n/a	no
1	8	e3.1	BAJ 006	fragment	bowl	carinated (ellipsoidal)	convex	mid-carinated	curved divergent (straight)	straight	rounded	no
1	8	e3.2	MON 007	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated	curved divergent (straight)	divergent	with inner bezel	no
1	8	e4	MOR 013	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated	curved divergent (inwards)	divergent	rounded	no
1	8	e4	MOR 014	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated	curved divergent (inwards)	divergent	rounded	no
1	8	f	SEV 008	fragment	bowl	carinated (ellipsoidal)	convex	mid-carinated (subtle)	curved divergent (straight)	divergent	rounded	no
1	8	f	ARR 002	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated (subtle)	curved divergent (straight)	divergent	rounded	no
1	8	f	BAJ 018	fragment	bowl	carinated (ellipsoidal)	n/a	mid-carinated (subtle)	curved divergent (straight)	divergent	rounded	no
1	8	g	BAE 005	entire	vase	carinated	flat	mid-carinated	no	straight	rounded	no
1	8	h	SMR 007	fragment	bowl	carinated	n/a	mid-carinated	no	broaden	straight	no

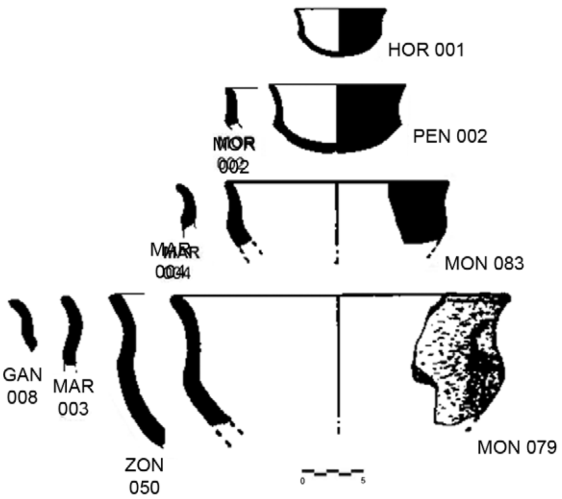
Table A8. Form 1, Type 8, mid-carinated bowls/vessels. Site codes in Table 4 (page 122–123).

Form 1, Type 8
Mid-Carinated Bowls/Vessels

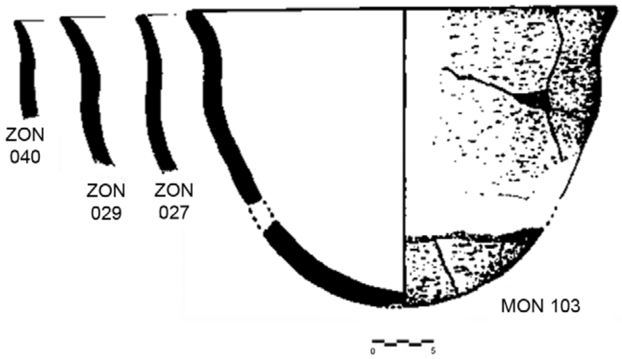


Form 1, Type 8
Mid-Carinated Bowls/Vessels

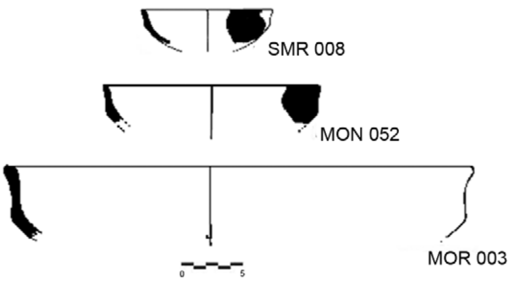
d1



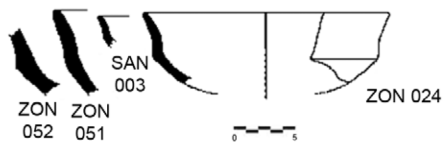
d2



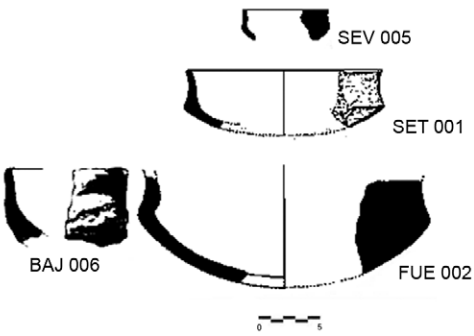
e1



e2

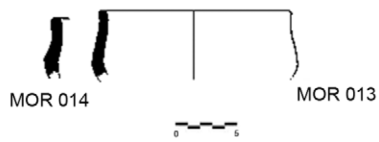


e3.1

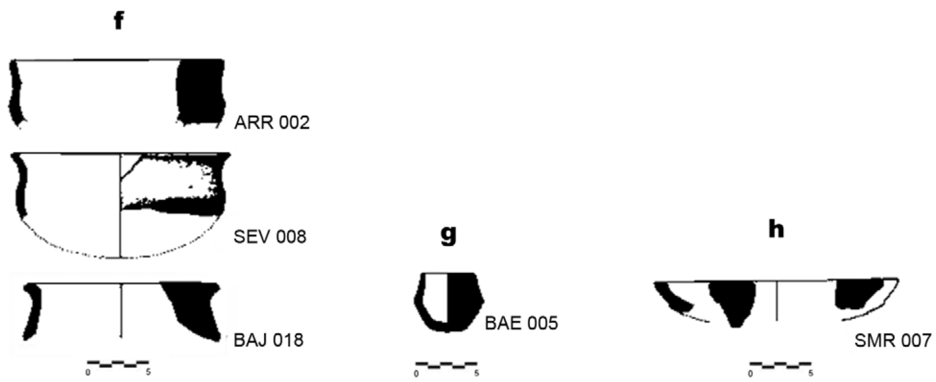


e3.2

e4



Form 1, Type 8
Mid-Carinated Bowls/Vessels



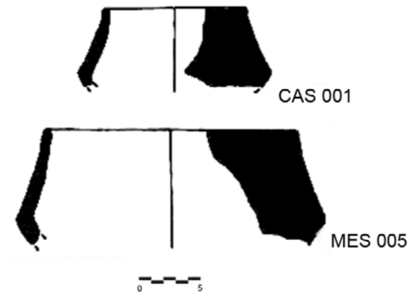
Form 1, Type 9
Low-Carinated Bowls/Vessels

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
1	9	a1	CAS 001	fragment	bowl	carinated (ellipsoidal)	convex	low-carinated	no	inwards	rounded	no
1	9	a1	MES 005	fragment	bowl	carinated (ellipsoidal)	convex	low-carinated	no	inwards	rounded	no
1	9	a2	AGU 022	fragment	bowl	carinated (ellipsoidal)	convex	low-carinated	no	divergent	rounded	no
1	9	a2	ERA 007	entire	bowl	carinated (ellipsoidal)	convex	low-carinated	no	divergent	rounded	no
1	9	a3	GUT 003	fragment	bowl	carinated	n/a	low-carinated	n/a	n/a	n/a	no
1	9	a4	VEL 001	fragment	bowl	carinated	V	low-carinated	no	inwards	rounded	no
1	9	b	GAN 014	fragment	bowl	carinated	convex	low-carinated	curved divergent (straight)	divergent	rounded	no
1	9	c	SEV 007	entire	vase	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
1	9	d	SET 027	fragment	bowl	carinated	convex	low-carinated	no	divergent	rounded	zigzag marks under inner border
1	9	e	SET 003	fragment	bowl	carinated	convex	low-carinated	no	divergent	rounded	no
1	9	e	SET 004	fragment	bowl	carinated	convex	low-carinated	no	divergent	rounded	no

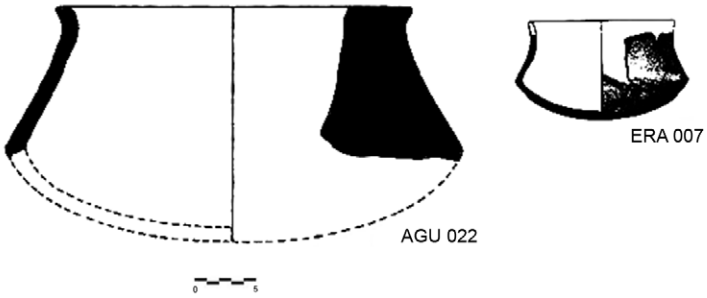
Table A9. Form 1, Type 9, low-carinated bowls/vessels. Site codes in Table 4 (page 122–123).

Form 1, Type 9
Low-Carinated Bowls/Vessels

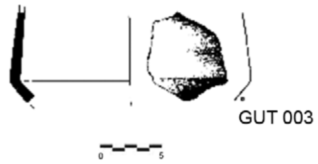
a1



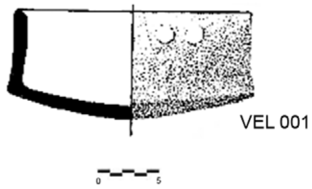
a2



a3



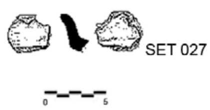
a4



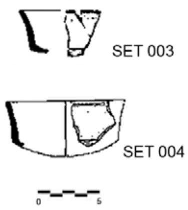
b

c

d



e

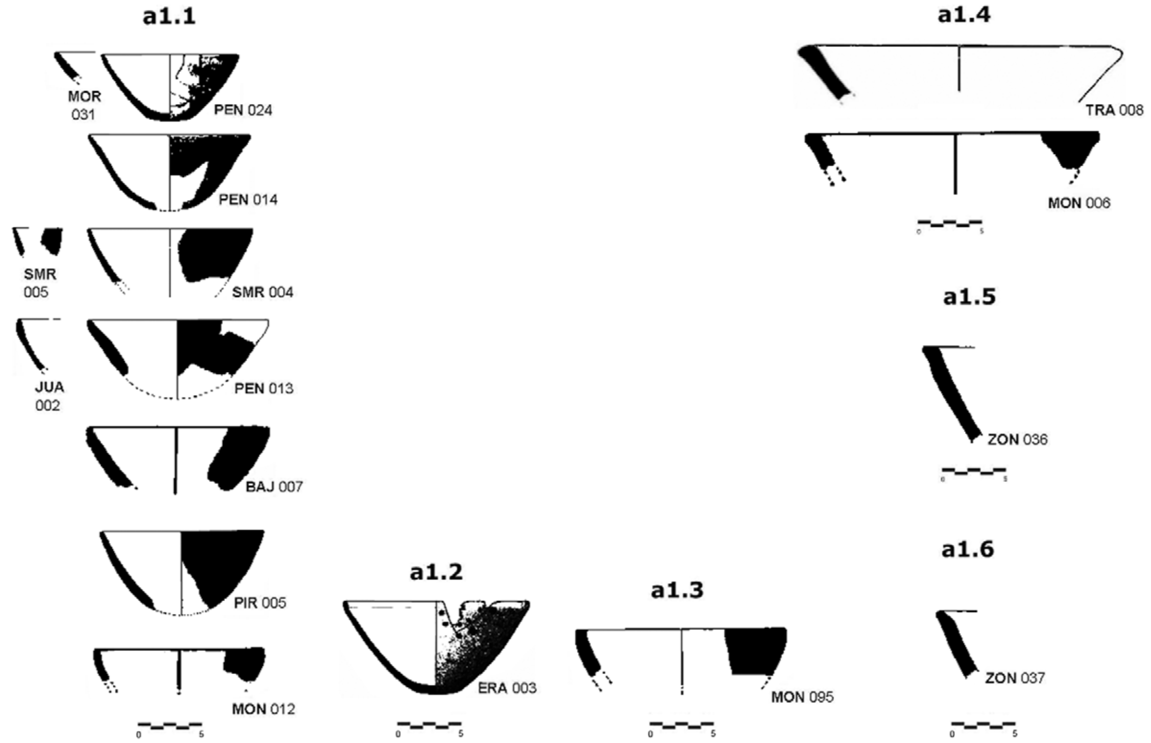


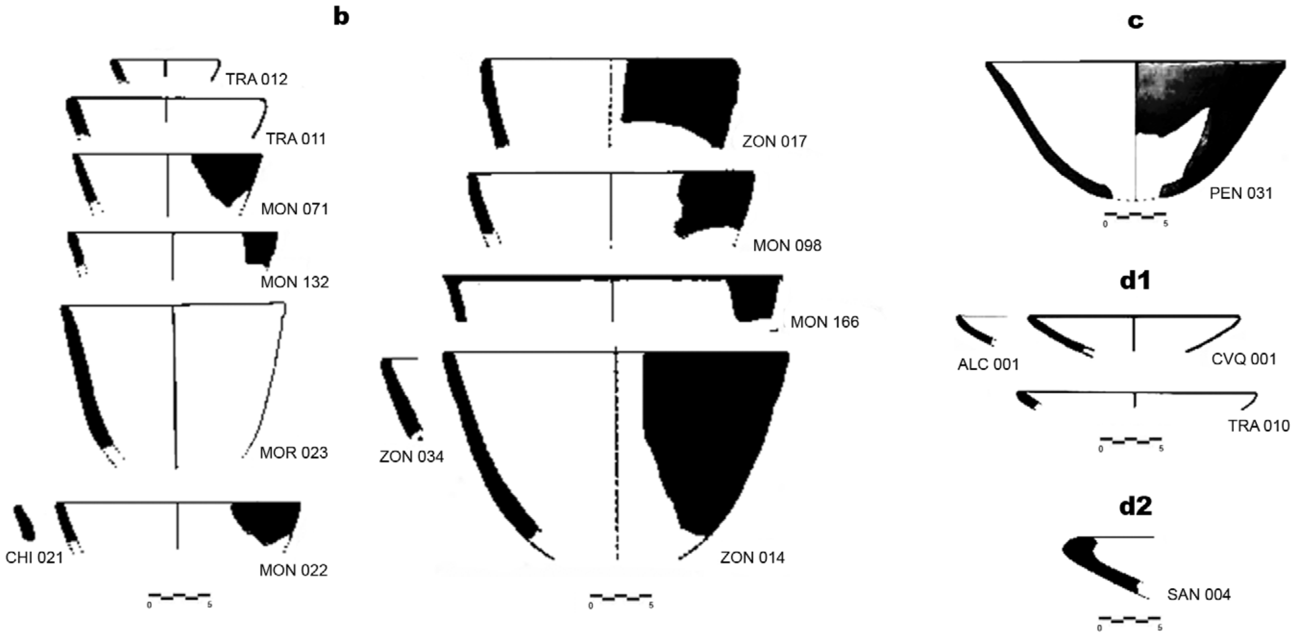
Form 1, Type 10
V-Shaped Bowls/Vessels

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
1	10	a1.1	SMR 004	fragment	bowl	V	convex	divergent	no	divergent	rounded	no
1	10	a1.1	SMR 005	fragment	bowl	V	convex	divergent	no	divergent	rounded	no
1	10	a1.1	PEN 014	fragment	bowl	V	convex	divergent	no	divergent	rounded	no
1	10	a1.1	PEN 013	fragment	bowl	V	convex	divergent	no	divergent	rounded	no
1	10	a1.1	MOR 031	fragment	bowl	V	convex	divergent	no	divergent	rounded	no
1	10	a1.1	JUA 002	fragment	bowl	V	convex	divergent	no	divergent	rounded	no
1	10	a1.1	BAJ 007	fragment	bowl	V	convex	divergent	no	divergent	rounded	no
1	10	a1.1	PEN 024	fragment	bowl	V	convex	divergent	no	divergent	rounded	no
1	10	a1.1	PIR 005	fragment	bowl	V	convex	divergent	no	divergent	rounded	no
1	10	a1.1	MON 012	fragment	bowl	V	n/a	divergent	no	divergent	rounded	no
1	10	a1.2	ERA 003	fragment	bowl	V	convex	divergent	no	straight	rounded	Reparation holes below the border
1	10	a1.3	MON 095	fragment	bowl	V	n/a	divergent	no	straight	straight	no
1	10	a1.4	TRA 008	fragment	bowl	V	n/a	divergent	no	everted	rounded	no
1	10	a1.4	MON 006	fragment	bowl	V	n/a	divergent	no	everted	rounded	no
1	10	a1.5	ZON 036	fragment	bowl	V	n/a	divergent	no	divergent	straight	no
1	10	a1.6	ZON 037	fragment	bowl	V	n/a	divergent	no	divergent	rounded	no
1	10	b1	MON 166	fragment	bowl	V (parabolic)	convex	divergent	no	divergent	rounded	no
1	10	b1	ZON 014	fragment	bowl	V (parabolic)	n/a	divergent	no	divergent	rounded	no
1	10	b1	MON 022	fragment	bowl	V (parabolic)	n/a	divergent	no	divergent	rounded	no
1	10	b1	MON 132	fragment	bowl	V (parabolic)	n/a	divergent	no	divergent	rounded	no
1	10	b1	MON 071	fragment	bowl	V (parabolic)	n/a	divergent	no	divergent	rounded	no
1	10	b1	ZON 017	fragment	bowl	V (parabolic)	n/a	divergent	no	divergent	rounded	no
1	10	b1	CHI 021	fragment	bowl	V (parabolic)	n/a	divergent	no	divergent	rounded	no
1	10	b1	TRA 011	fragment	bowl	V (parabolic)	n/a	divergent	no	divergent	rounded	no
1	10	b1	TRA 012	fragment	bowl	V (parabolic)	n/a	divergent	no	divergent	rounded	no
1	10	b1	ZON 034	fragment	bowl	V (parabolic)	n/a	divergent	no	divergent	rounded	no
1	10	b1	MON 098	fragment	bowl	V (parabolic)	n/a	divergent	no	divergent	rounded	no
1	10	b1	MOR 023	fragment	bowl	V (parabolic)	n/a	divergent	no	divergent	rounded	no
1	10	c	PEN 031	fragment	bowl	V	convex	divergent enlarged	no	divergent	rounded	no
1	10	d1	ALC 001	fragment	bowl	V	V	divergent	no	divergent	rounded	no
1	10	d1	CVQ 001	fragment	bowl	V	V	divergent	no	divergent	rounded	no
1	10	d1	TRA 010	fragment	bowl	V	V	divergent	no	divergent	rounded	no
1	10	d2	SAN 004	fragment	bowl	V	V	divergent	no	inwards	rounded	no

Table A10. Form 1, Type 10, V-shaped Bowls/Vessels. Site codes in Table 4 (page 122–123).

Form 1, Type 10
V-Shaped Bowls/Vessels



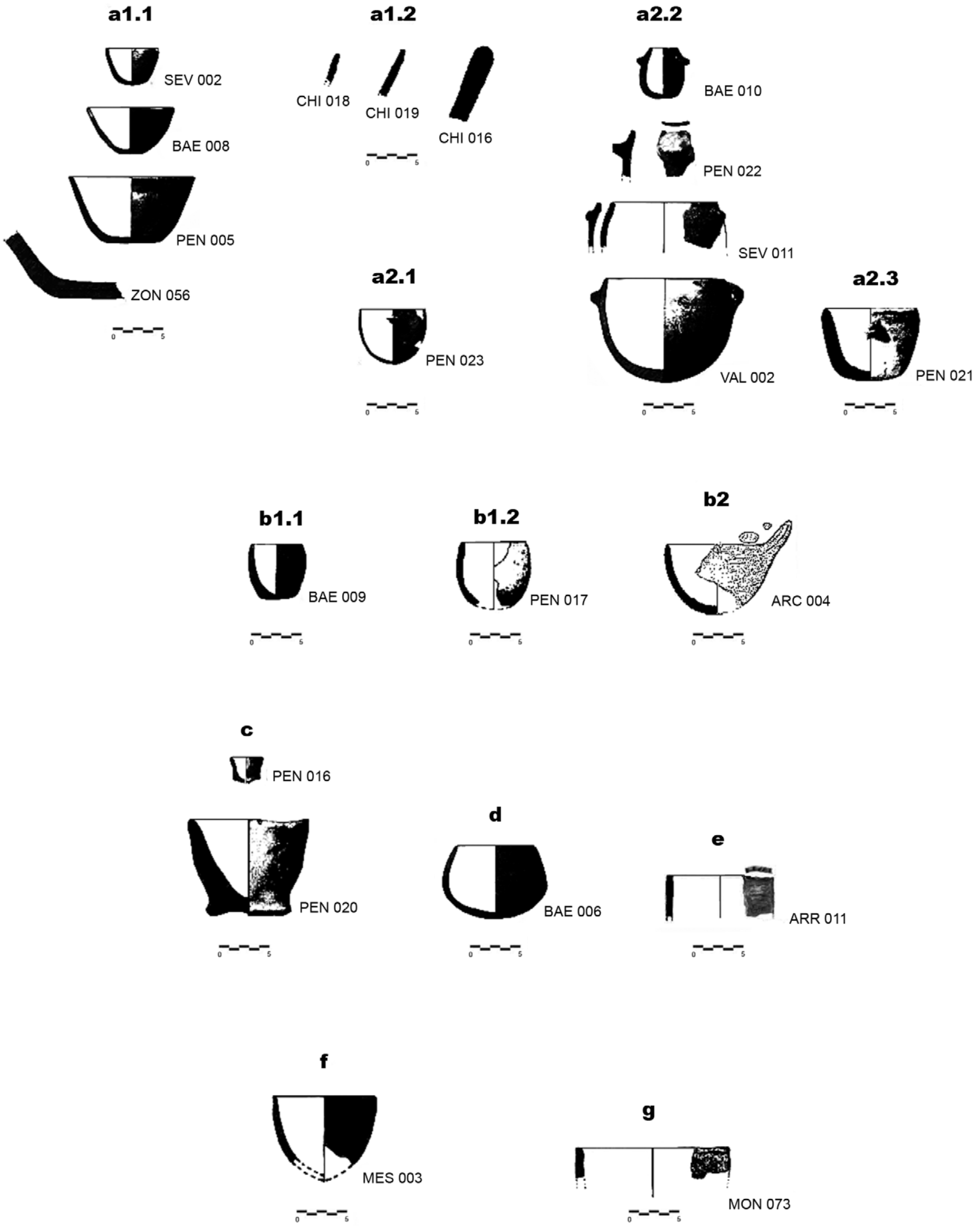


Form 1, Type 11
U-Shaped Bowls/Vessels

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
1	11	a1.1	BAE 008	fragment	bowl	U	flat	divergent	no	straight	sharp	no
1	11	a1.1	PEN 005	fragment	bowl	U	flat	divergent	no	straight	sharp	no
1	11	a1.1	SEV 002	entire	bowl	U	flat	divergent	no	straight	sharp	no
1	11	a1.1	ZON 056	fragment	bowl	U	flat	divergent	no	n/a	n/a	no
1	11	a1.2	CHI 019	fragment	bowl	U	n/a	divergent	no	divergent	rounded	no
1	11	a1.2	CHI 018	fragment	bowl	U	n/a	divergent	no	divergent	rounded	no
1	11	a1.2	CHI 016	fragment	bowl	U	n/a	divergent	no	divergent	rounded	no
1	11	a2.1	PEN 023	entire	bowl	U	convex	curved	no	straight	rounded	*mamelones* on both border sides
1	11	a2.2	BAE 010	entire	bowl	U	convex	curved convergent	no	inwards	rounded	*mamelones* on both border sides
1	11	a2.2	SEV 011	fragment	bowl	U	n/a	curved convergent	no	inwards	rounded	*mamelones* on both border sides + digital incisions along above the border
1	11	a2.2	VAL 002	entire	bowl	U	n/a	curved convergent	no	inwards	rounded	*mamelones* on both border sides
1	11	a2.2	PEN 022	fragment	bowl	U	n/a	curved convergent	no	inwards	rounded	*mamelones* on both border sides
1	11	a2.3	PEN 021	entire	bowl	U	convex	divergent	no	divergent	rounded	*mamelones* on both border sides
1	11	b1.1	BAE 009	entire	bowl	U	flat	curved convergent	no	inwards	rounded	no
1	11	b1.2	PEN 017	entire	bowl	U	convex	curved convergent	no	inwards	rounded	no
1	11	b2	ARC 004	entire	bowl	U	convex	curved convergent	no	straight	rounded	with handle on one border
1	11	c	PEN 020	entire	bowl	U	flat with fitting	divergent	no	divergent	rounded	no
1	11	c	PEN 016	entire	bowl	U	flat with fitting	divergent	no	divergent	rounded	no
1	11	d	BAE 006	entire	bowl	U	convex	curved convergent	no	inwards	rounded	no
1	11	e	ARR 011	fragment	bowl	U	n/a	straight	no	straight	straight	digital incisions along the border
1	11	f	MES 003	fragment	bowl	U	n/a	curved	no	straight	rounded	no
1	11	g	MON 073	fragment	bowl	U	n/a	curved	no	everted	rounded	no

Table A11. Form 1, Type 11, U-shaped bowls/vessels. Site codes in Table 4 (page 122–123).

Form 1, Type 11
U-Shaped Bowls/Vessels



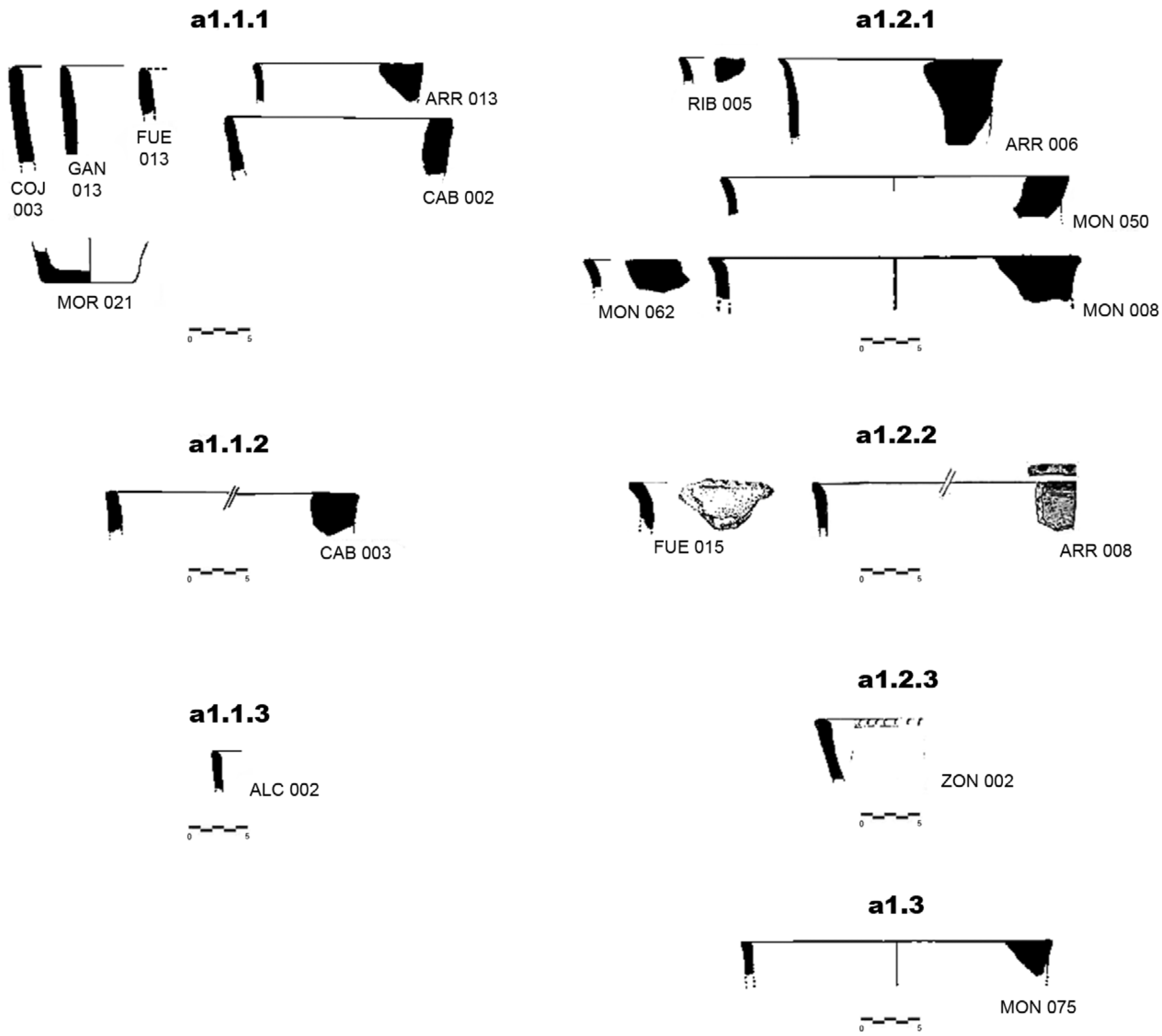
Form 2, Type 1
Flat Based *Orzas*

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
2	1	a1.1.1	COJ 003	fragment	*orza*	U	n/a	divergent	no	straight	rounded	no
2	1	a1.1.1	FUE 013	fragment	*orza*	U	n/a	divergent	no	straight	rounded	no
2	1	a1.1.1	GAN 013	fragment	*orza*	U	n/a	divergent	no	straight	rounded	no
2	1	a1.1.1	MOR 021	fragment	*orza*	U	flat	divergent	n/a	n/a	n/a	no
2	1	a1.1.1	CAB 002	fragment	*orza*	U	flat	divergent	n/a	n/a	n/a	no
2	1	a1.1.1	ARR 013	fragment	*orza*	U	n/a	divergent	no	straight	rounded	no
2	1	a1.1.2	CAB 003	fragment	*orza*	U	n/a	divergent	no	straight	straight	no
2	1	a1.1.3	ALC 002	fragment	*orza*	U	n/a	divergent	no	straight	with inner bezel	no
2	1	a1.2.1	MON 008	fragment	*orza*	U	n/a	divergent	no	divergent	rounded	no
2	1	a1.2.1	MON 050	fragment	*orza*	U	n/a	divergent	no	divergent	rounded	no
2	1	a1.2.1	MON 062	fragment	*orza*	U	n/a	divergent	no	divergent	rounded	no
2	1	a1.2.1	ARR 006	fragment	*orza*	U	n/a	divergent	no	divergent	rounded	no
2	1	a1.2.1	RIB 005	fragment	*orza*	U	n/a	divergent	no	divergent	rounded	no
2	1	a1.2.2	FUE 015	fragment	*orza*	U	n/a	divergent	no	divergent	rounded	digital incisions along the border
2	1	a1.2.2	ARR 008	fragment	*orza*	U	n/a	divergent	no	divergent	rounded	digital incisions along the border
2	1	a1.2.3	ZON 002	fragment	*orza*	U	n/a	divergent	no	broaden	rounded	digital incisions along the border
2	1	a1.3	MON 075	fragment	*orza*	U	n/a	divergent	no	broaden	straight	no
2	1	a2.1	PEN 036	entire	*orza*	U	flat	curved divergent	no	divergent	rounded	no
2	1	a2.1	MON 063	fragment	*orza*	U	n/a	curved divergent	no	divergent	rounded	no
2	1	a2.2.1	GUT 001	fragment	*orza*	U	n/a	curved divergent	no	divergent	straight	no
2	1	a2.2.1	MON 112	fragment	*orza*	U	n/a	curved divergent	no	divergent	straight	no
2	1	a2.2.1	ZON 032	fragment	*orza*	U	n/a	curved divergent	no	divergent	straight	no
2	1	a2.2.2	MON 106	fragment	*orza*	U	n/a	curved divergent	no	divergent	rounded	no
2	1	a2.3.1	MON 015	fragment	*orza*	U	n/a	curved divergent	divergent	divergent	rounded	no
2	1	a2.3.1	MON 035	fragment	*orza*	U	n/a	curved divergent	divergent	divergent	rounded	no
2	1	a2.3.1	MON 036	fragment	*orza*	U	n/a	curved divergent	divergent	divergent	rounded	no
2	1	a2.3.1	RIB 003	fragment	*orza*	U	n/a	curved divergent	divergent	divergent	rounded	no
2	1	a2.3.2	FUE 016	fragment	*orza*	U	n/a	curved divergent	divergent	divergent	rounded	incisions and dots forming a triangle
2	1	a2.4	ZON 001	fragment	*orza*	U	n/a	divergent	divergent	divergent	rounded	digital incisions along the border
2	1	a3	MOR 026	fragment	*orza*	U	n/a	curved divergent	no	inwards	rounded	no
2	1	a3	MOR 027	fragment	*orza*	U	n/a	curved divergent	no	inwards	rounded	no
2	1	b1	MAR 002	fragment	*orza*	U	n/a	curved divergent	no	divergent	rounded	no

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
2	1	b2	MON 108	fragment	*orza*	U	n/a	curved divergent	no	divergent	rounded	no
2	1	b2	MON 109	fragment	*orza*	U	n/a	curved divergent	no	divergent	rounded	no
2	1	b2	MON 110	fragment	*orza*	U	n/a	curved divergent	no	divergent	rounded	no
2	1	b2	MON 111	fragment	*orza*	U	n/a	curved divergent	no	divergent	rounded	no
2	1	b3	CHI 015	fragment	*orza*	U	n/a	curved divergent	no	divergent	rounded	no

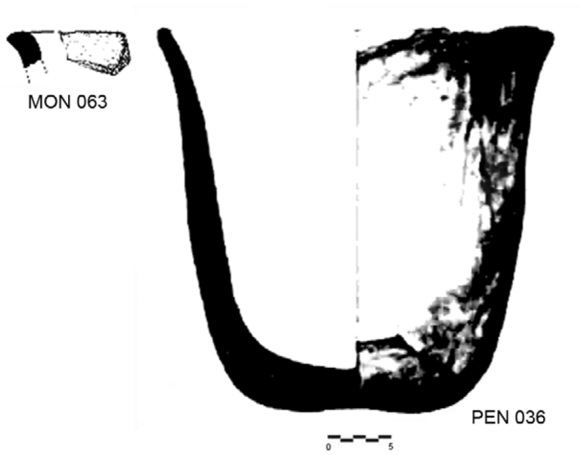
Table A12. Form 2, Type 1, flat based *orzas*. Site codes in Table 4 (page 122–123).

Form 2, Type 1
Flat Based *Orzas*

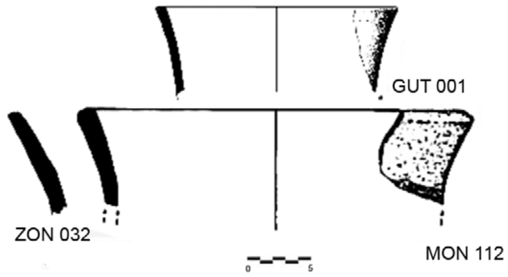


Form 2, Type 1
Flat Based *Orzas*

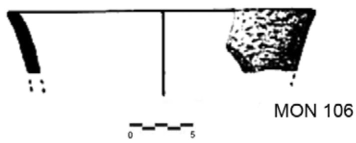
a2.1



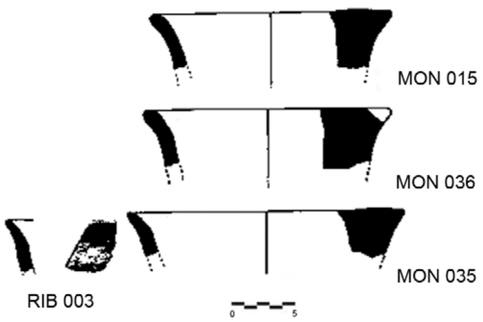
a2.2.1



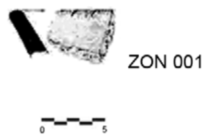
a2.2.2



a2.3.1

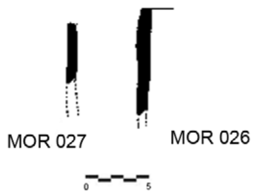


a2.4

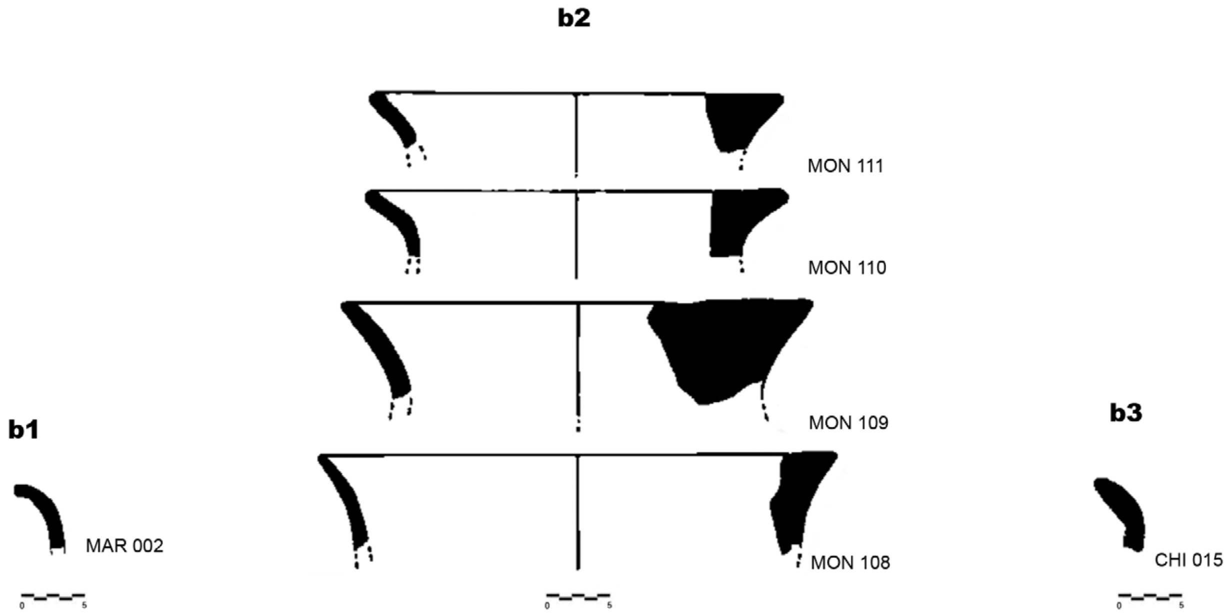


a2.3.2

a3



Form 2, Type 1
Flat Based *Orzas*



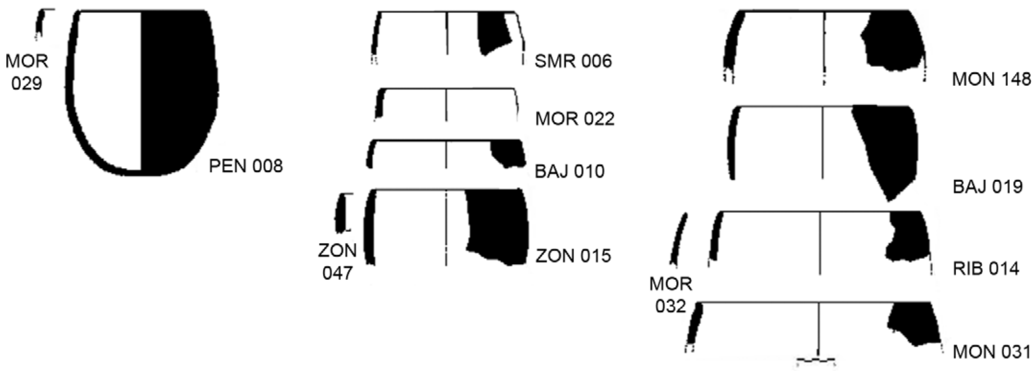
Form 2, Type 2
Parabolic *Orzas*

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
2	2	a1.1	BAJ 019	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	no
2	2	a1.1	BAJ 020	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	no
2	2	a1.1	BAJ 148	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	no
2	2	a1.1	ZON 015	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	no
2	2	a1.1	PEN 008	entire	*orza*	parabolic	con-vex	curved convergent	no	inwards	rounded	no
2	2	a1.1	MOR 022	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	no
2	2	a1.1	MOR 029	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	no
2	2	a1.1	MOR 032	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	no
2	2	a1.1	MON 031	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	no
2	2	a1.1	RIB 014	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	no
2	2	a1.1	SMR 006	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	no
2	2	a1.1	ZON 047	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	no
2	2	a1.2	ZON 018	fragment	*orza*	parabolic	n/a	divergent	no	inwards	rounded	no
2	2	a2.1	MOR 017	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	digital inci-sions along the border
2	2	a2.1	ARR 009	fragment	*orza*	parabolic	n/a	curved convergent	no	inwards	rounded	digital inci-sions along the border
2	2	a2.2	ZON 022	fragment	*orza*	parabolic	n/a	curved convergent	no	divergent	rounded	no
2	2	a2.3	MON 138	fragment	*orza*	parabolic	n/a	straight	curved	straight	straight	no
2	2	a3	FUE 010	fragment	*orza*	parabolic	n/a	divergent	no	divergent	rounded	no
2	2	a3	RIB 010	fragment	*orza*	parabolic	n/a	divergent	no	divergent	rounded	no
2	2	a3	MON 142	fragment	*orza*	parabolic	n/a	divergent	no	divergent	rounded	no
2	2	a3	RIB 011	fragment	*orza*	parabolic	n/a	divergent	no	divergent	rounded	no

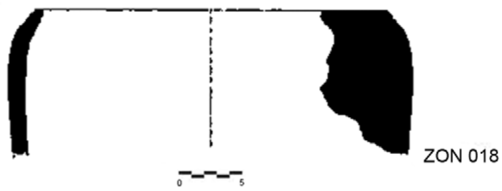
Table A13. Form 2, Type 2, parabolic *orzas*. Site codes in Table 4 (page 122–123).

Form 2, Type 2
Parabolic *Orzas*

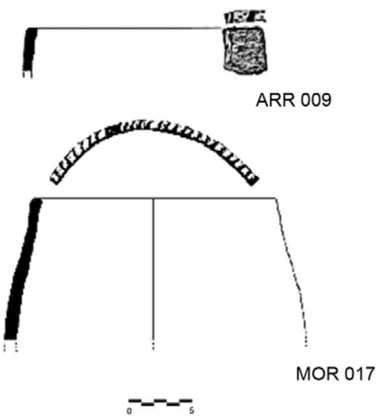
a1



a1.2

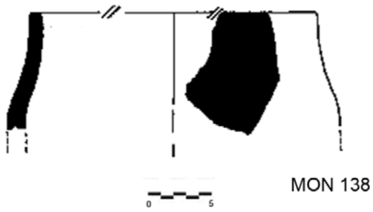


a2.1

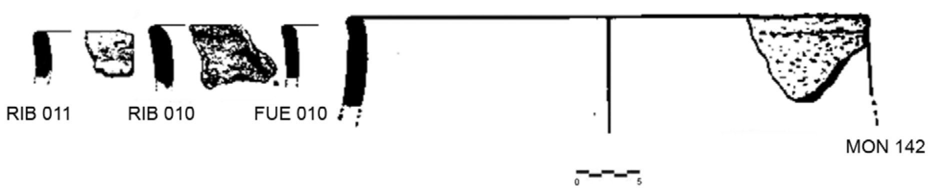


a2.2

a2.3



a3



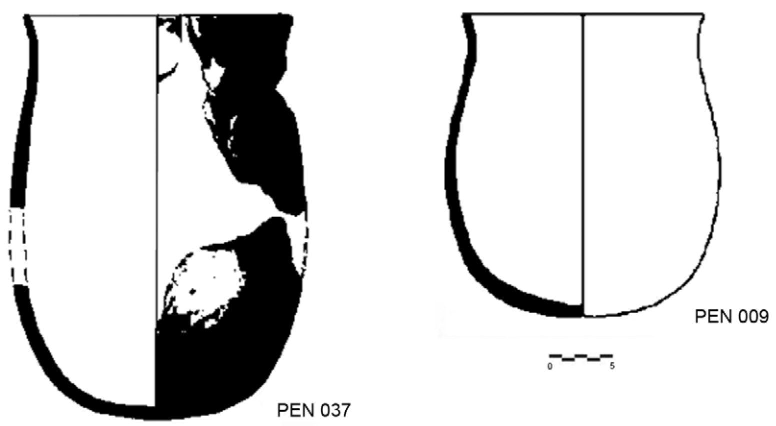
Form 2, Type 3
Everted Neck *Orzas*

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
2	3	a1.1	PEN 037	fragment	*orza*	parabolic	convex	curved convergent	curved divergent	divergent	rounded	no
2	3	a1.1	PEN 009	entire	*orza*	parabolic	convex	curved convergent	curved divergent	divergent	rounded	no
2	3	a1.2	PEN 038	fragment	*orza*	parabolic	convex	curved convergent	curved divergent	divergent	rounded	no
2	3	a1.2	ZON 028	fragment	*orza*	parabolic	n/a	curved convergent	curved divergent	divergent	rounded	no
2	3	a1.2	PEN 010	fragment	*orza*	parabolic	n/a	curved convergent	curved divergent	divergent	rounded	no
2	3	a1.2	MON 143	fragment	*orza*	parabolic	n/a	curved convergent	curved divergent	divergent	rounded	no
2	3	a1.3	MON 140	fragment	*orza*	parabolic	n/a	curved convergent	curved divergent	divergent	rounded	no
2	3	a1.4	MON 160	fragment	*orza*	parabolic	n/a	curved convergent	curved divergent	divergent	flat	no
2	3	a2.1	PEN 035	fragment	*orza*	parabolic	convex	curved convergent	curved divergent	divergent	rounded	digital incisions along the border
2	3	a2.2	ZON 039	fragment	*orza*	parabolic	n/a	curved convergent	curved divergent	divergent	rounded	no
2	3	a2.2	FUE 011	fragment	*orza*	parabolic	n/a	curved convergent	curved divergent	divergent	rounded	no
2	3	b	PEN 007	entire	*orza*	parabolic	convex	divergent	no	divergent	flat	two handles below the border

Table A14. Form 2, Type 3, everted neck *orzas*. Site codes in Table 4 (page 122–123).

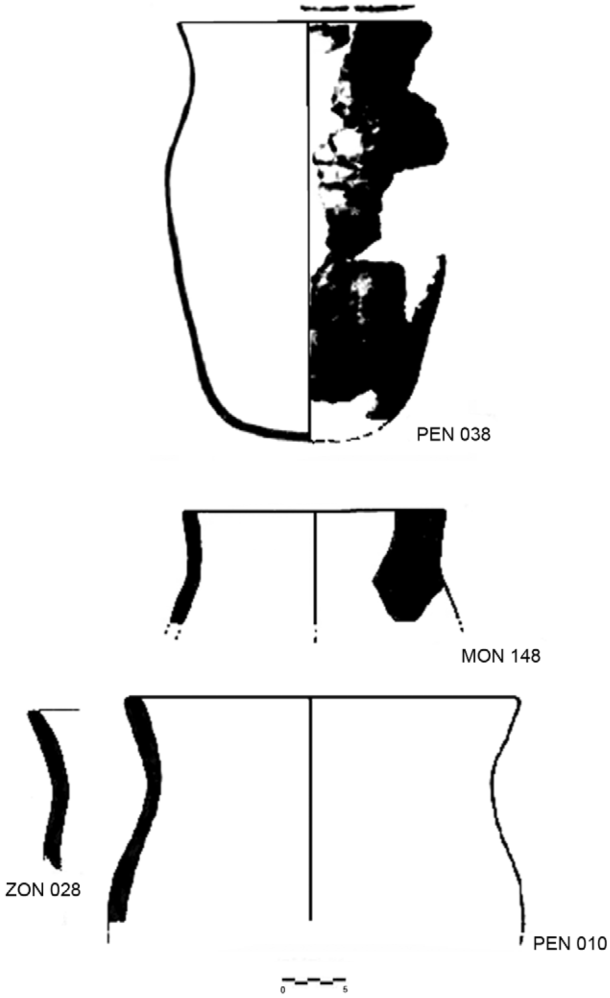
Form 2, Type 3
Everted Neck *Orzas*

a1.1

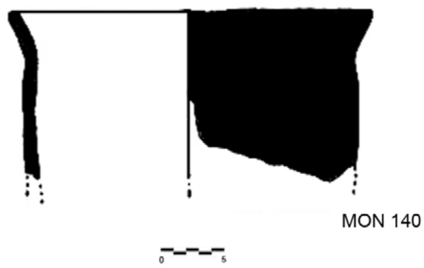


Form 2, Type 3
Everted Neck *Orzas*

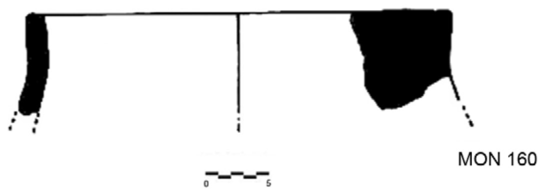
a1.2



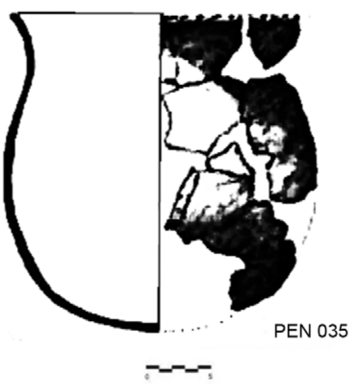
a1.3



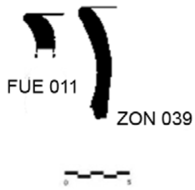
a1.4



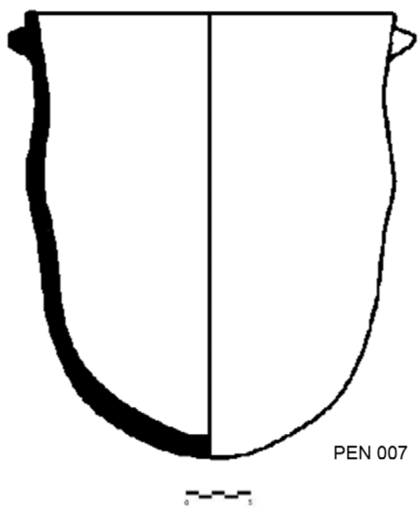
a2.1



a2.2



b



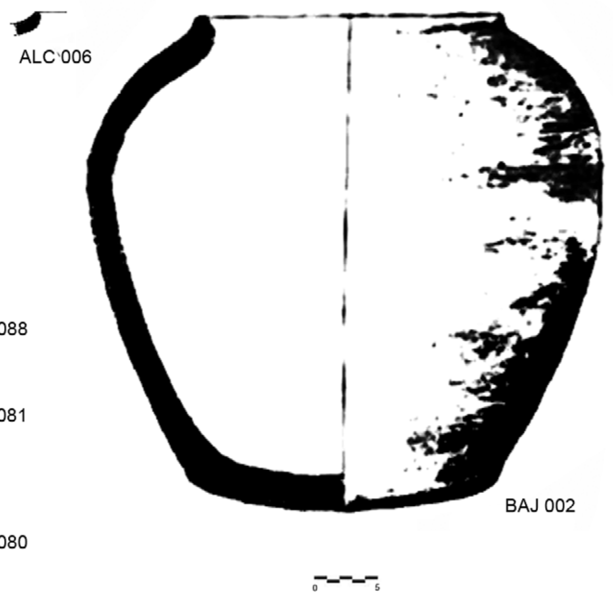
Form 2, Type 4
Globular *Orzas*

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
2	4	a1	MON 080	fragment	*orza*	globular	n/a	curved convergent	no	straight	rounded	no
2	4	a1	MON 081	fragment	*orza*	globular	n/a	curved convergent	no	straight	rounded	no
2	4	a1	MON 088	fragment	*orza*	globular	n/a	curved convergent	no	straight	rounded	no
2	4	a1	ALC 007	fragment	*orza*	globular	n/a	curved convergent	no	straight	rounded	no
2	4	a1	ALC 008	fragment	*orza*	globular	n/a	curved convergent	no	straight	rounded	no
2	4	a1	JUA 001	fragment	*orza*	globular	n/a	curved convergent	no	straight	rounded	no
2	4	a2	BAJ 002	entire	*orza*	globular	straight	curved convergent	no	straight	rounded	no
2	4	a2	ALC 006	fragment	*orza*	globular	n/a	curved convergent	no	straight	rounded	no
2	4	b	SET 015	fragment	*orza*	globular	n/a	curved convergent	curved divergent	straight	rounded	with *mamelón* above the body

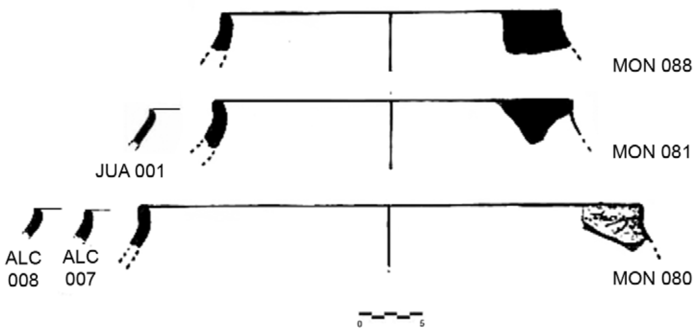
Table A15. Form 2, Type 4, globular *orzas*. Site codes in Table 4 (page 122–123).

Form 2, Type 4
Globular *Orzas*

a2



a1



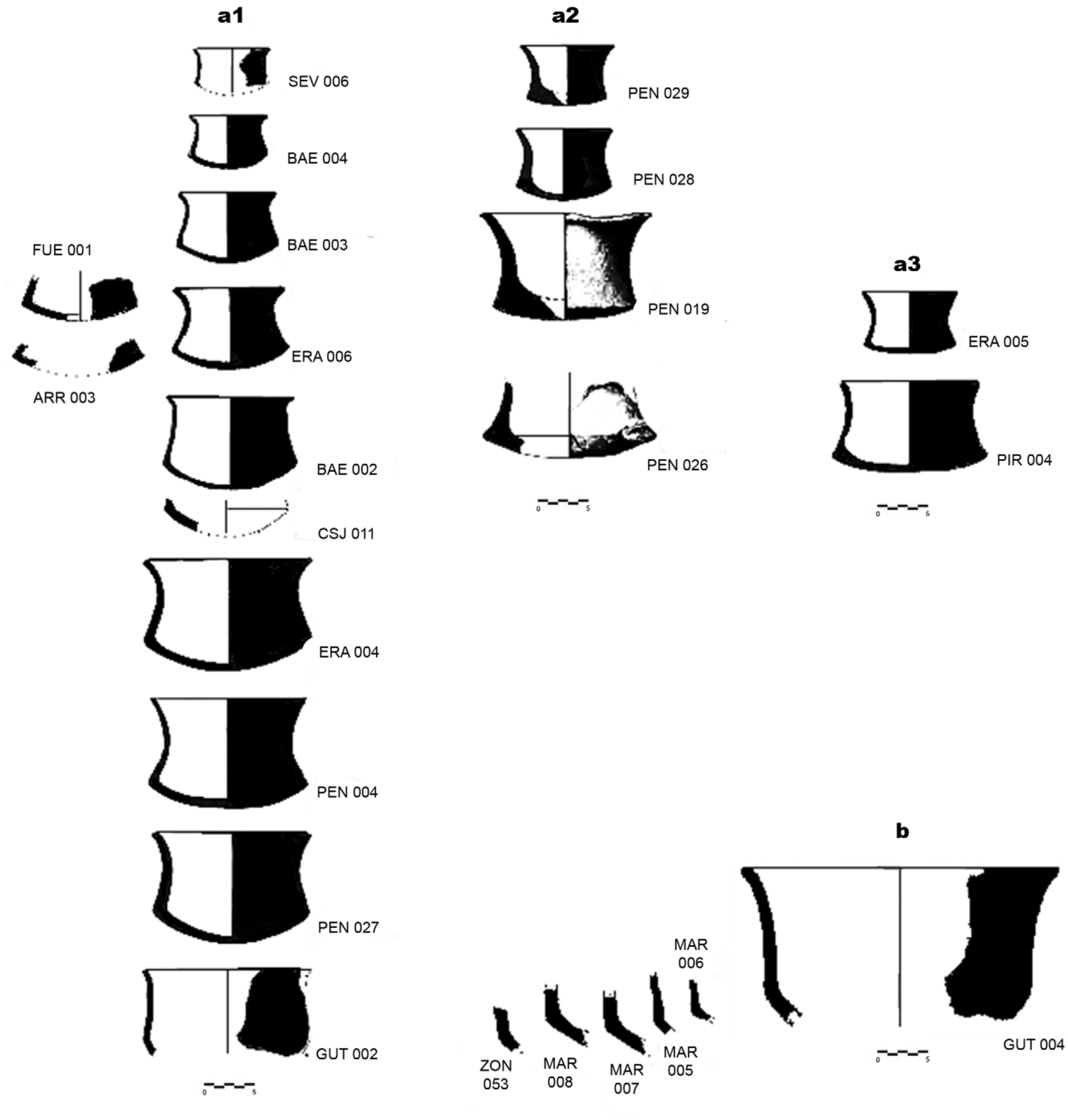
b

Form 3
Tulipas

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Deco-ration
3	1	a1	SEV 006	fragment	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a1	BAE 004	entire	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a1	ERA 006	entire	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a1	BAE 003	entire	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a1	BAE 002	entire	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a1	ERA 004	entire	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a1	PEN 004	fragment	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a1	PEN 027	entire	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a1	FUE 001	fragment	*tulipa*	carinated	convex	low-carinated	curved divergent	n/a	n/a	no
3	1	a1	ARR 003	fragment	*tulipa*	carinated	convex	low-carinated	curved divergent	n/a	n/a	no
3	1	a1	CSJ 011	fragment	*tulipa*	carinated	convex	low-carinated	curved divergent	n/a	n/a	no
3	1	a1	GUT 002	fragment	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a2	PEN 026	fragment	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a2	PEN 029	entire	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a2	PEN 028	entire	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a2	PEN 019	entire	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a3	PIR 004	entire	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	a3	ERA 005	fragment	*tulipa*	carinated	convex	low-carinated	curved divergent	divergent	rounded	no
3	1	b	GUT 004	fragment	*tulipa*	carinated	convex	low-carinated	no	divergent	rounded	no
3	1	b	MAR 005	fragment	*tulipa*	carinated	convex	low-carinated	n/a	n/a	n/a	no
3	1	b	MAR 006	fragment	*tulipa*	carinated	convex	low-carinated	n/a	n/a	n/a	no
3	1	b	MAR 007	fragment	*tulipa*	carinated	convex	low-carinated	n/a	n/a	n/a	no
3	1	b	MAR 008	fragment	*tulipa*	carinated	convex	low-carinated	n/a	n/a	n/a	no
3	1	b	ZON 053	fragment	*tulipa*	carinated	convex	low-carinated	n/a	n/a	n/a	no

Table A16. Form 3, *tulipas*. Site codes in Table 4 (page 122–123).

Form 3
Tulipas



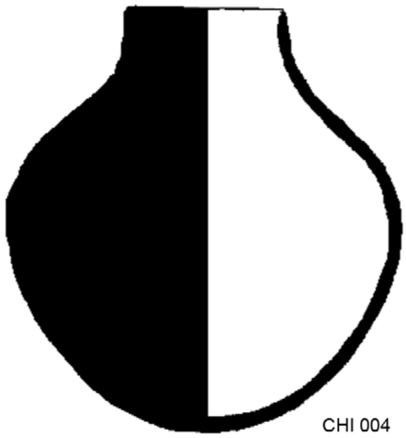
Form 4, Type 1
Bottles

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
4	1	a1.1	VAL 008	fragment	bottle	globular	n/a	curved conver-gent	curved divergent	divergent	rounded	no
4	1	a1.2	CHI 004	entire	bottle	globular	convex	curved conver-gent	straight	straight	rounded	no
4	1	a2.1	TRA 017	entire	bottle	globular	convex	curved conver-gent	straight	straight	rounded	with *mamelón* on the mid-body
4	1	a2.2	SEK 004	entire	bottle	globular	convex	curved conver-gent	curved divergent	divergent	rounded	with *mamelón* on the mid-body
4	1	b1	TRA 001	entire	bottle	carinated	flat	mid-cari-nated	curved divergent	divergent	rounded	no
4	1	b2	ERA 002	entire	bottle	globular	convex	curved conver-gent	curved divergent	divergent	rounded	no

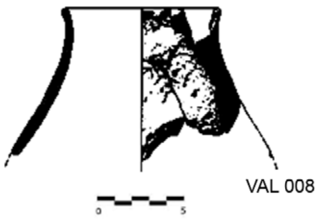
Table A17. Form 4, Type 1, bottles. Site codes in Table 4 (page 122–123).

Form 4, Type 1
Bottles

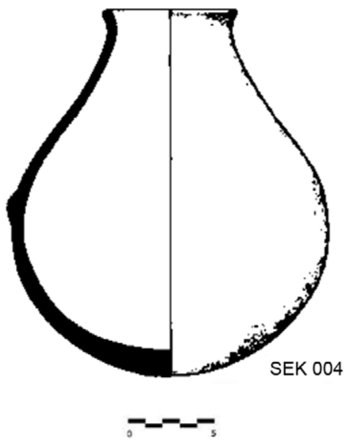
a1.2



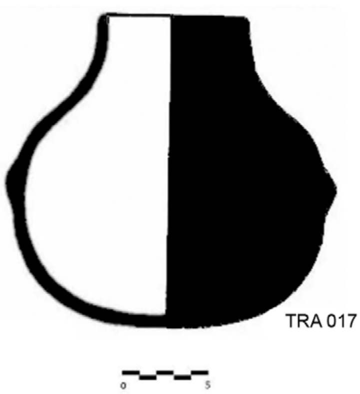
a1.1



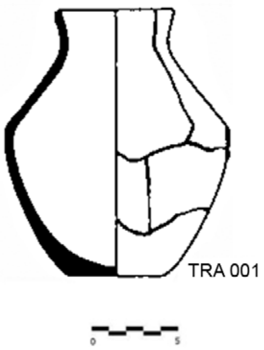
a2.2



a2.1



b1



b2

Form 4, Type 2
Globular Vessels with Spherical Body

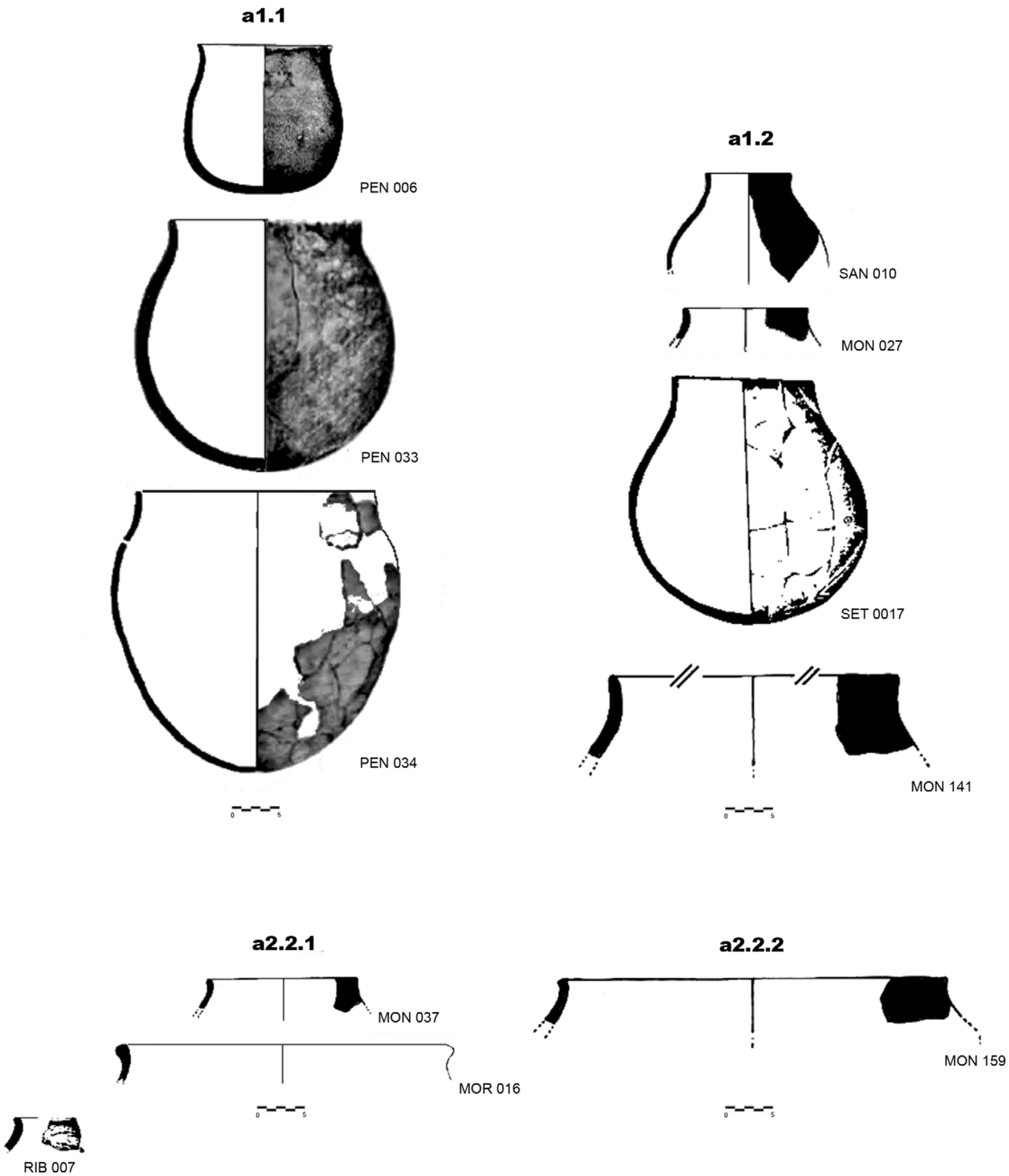
Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
4	2	a1.1	PEN 033	entire	vessel	globular	convex	curved convergent	no	straight	rounded	no
4	2	a1.1	PEN 034	entire	vessel	globular	convex	curved convergent	no	straight	rounded	no
4	2	a1.1	PEN 006	entire	vessel	globular	convex	curved convergent	no	straight	rounded	no
4	2	a1.2	MON 141	fragment	vessel	globular	n/a	curved convergent	straight	straight	rounded	no
4	2	a1.2	MON 027	fragment	vessel	globular	n/a	curved convergent	straight	straight	rounded	no
4	2	a1.2	SAN 010	fragment	vessel	globular	n/a	curved convergent	straight	straight	rounded	no
4	2	a1.2	SET 017	entire	vessel	globular	convex	curved convergent	straight	straight	rounded	no
4	2	a2.2.1	MON 037	fragment	vessel	globular	n/a	curved convergent	curved divergent	divergent	rounded	no
4	2	a2.2.1	RIB 007	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	2	a2.2.1	MOR 016	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	2	a2.2.2	MON 159	fragment	vessel	globular	n/a	curved convergent	curved divergent	divergent	straight	no
4	2	a3	MOL 001	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	2	a3	ZON 025	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	2	a3	ZON 020	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	2	a3	RIB 008	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	2	a3	MON 061	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	2	a3	MAR 001	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	2	a3	MON 064	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	2	a4.1.1	MOL 002	fragment	vessel	globular	n/a	curved convergent	no	straight	rounded	no
4	2	a4.1.2	MON 162	fragment	vessel	globular	n/a	curved convergent	no	straight	with inner bezel	no
4	2	a4.1.2	MON 034	fragment	vessel	globular	n/a	curved convergent	no	straight	with inner bezel	no
4	2	a4.1.2	MOR 024	fragment	vessel	globular	n/a	curved convergent	no	straight	with inner bezel	no
4	2	a4.2	CSJ 014	fragment	vessel	globular	n/a	curved convergent	no	inwards	with inner bezel	no
4	2	a4.2	CSJ 013	fragment	vessel	globular	n/a	curved convergent	no	inwards	with inner bezel	no
4	2	a4.3	MON 087	fragment	vessel	globular	n/a	n/a	no	inwards	rounded	no
4	2	a4.3	MON 146	fragment	vessel	globular	n/a	n/a	no	inwards	rounded	no

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
4	2	a4.3	MON 005	fragment	vessel	globular	n/a	n/a	no	inwards	rounded	no
4	2	a4.3	MON 102	fragment	vessel	globular	n/a	n/a	no	inwards	rounded	no
4	2	a4.3	MOR 004	fragment	vessel	globular	n/a	n/a	no	inwards	rounded	no
4	2	a4.3	CGF 001	entire	vessel	globular	convex	curved convergent	no	inwards	rounded	no
4	2	a4.4.1	BAJ 011	fragment	vessel	globular	n/a	curved convergent	no	straight	rounded	no
4	2	a4.4.2	CTO 001	entire	vessel	globular	convex	curved convergent	no	inwards	straight	no
4	2	a4.4.2	MON 078	fragment	vessel	globular	n/a	n/a	no	inwards	straight	no
4	2	a4.4.2	SET 019	fragment	vessel	globular	n/a	curved convergent	no	inwards	straight	no
4	2	a4.4.3	MON 114	fragment	vessel	globular	n/a	n/a	no	straight	straight	no
4	2	a4.4.3	MON 115	fragment	vessel	globular	n/a	n/a	no	straight	straight	no
4	2	a4.5	VAL 006	fragment	vessel	globular	convex	curved convergent	straight	n/a	n/a	with *mamelón* on the mid-body
4	2	a4.6	SAN 006	entire	vessel	globular	convex	curved convergent	no	inwards	rounded	with *mamelón* on mid-body and below the border
4	2	b1.1	ARR 001	fragment	vessel	globular	n/a	curved convergent	curved divergent	everted	rounded	no
4	2	b1.2	ARR 005	fragment	vessel	globular	n/a	curved convergent	curved divergent	everted	rounded	digital incisions along the border
4	2	b1.2	SEV 012	fragment	vessel	globular	n/a	curved convergent	curved divergent	everted	rounded	digital marks on the outer border
4	2	b1.3	BAE 001	entire	vessel	globular	convex	curved convergent	curved divergent	everted	rounded	*mameles* on both border sides
4	2	b1.3	COJ 006	fragment	vessel	globular	n/a	curved convergent	curved divergent	everted	rounded	*mameles* on both border sides
4	2	b2	MON 039	fragment	vessel	globular	n/a	curved convergent	curved divergent	everted	rounded	no
4	2	b2	MON 024	fragment	vessel	globular	n/a	curved convergent	curved divergent	everted	rounded	no
4	2	b2	MOR 010	fragment	vessel	globular	n/a	curved convergent	curved divergent	everted	rounded	no
4	2	b2	MON 025	fragment	vessel	globular	n/a	curved convergent	curved divergent	everted	rounded	no
4	2	c1	ZON 023	fragment	vessel	globular	convex	curved convergent	straight	straight	rounded	no
4	2	c1	PEN 012	entire	vessel	globular	convex	curved convergent	straight	straight	rounded	no

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Deco-ration
4	2	c2.1	MOR 015	fragment	vessel	globular	n/a	curved convergent	straight	divergent	rounded	no
4	2	c2.1	MOR 018	fragment	vessel	globular	n/a	curved convergent	straight	divergent	rounded	no
4	2	c2.1	MON 030	fragment	vessel	globular	n/a	curved convergent	straight	divergent	rounded	no
4	2	c2.1	BAJ 024	fragment	vessel	globular	n/a	curved convergent	straight	divergent	rounded	no
4	2	c2.2	SET 016	fragment	vessel	globular	n/a	curved convergent	straight	divergent	rounded	no
4	2	c2.2	MOR 019	fragment	vessel	globular	n/a	curved convergent	straight	divergent	rounded	no
4	2	c2.2	CHI 006	fragment	vessel	globular	n/a	curved convergent	straight	divergent	rounded	no
4	2	c2.3	FUE 009	fragment	vessel	globular	n/a	curved convergent	divergent	everted	rounded	no
4	2	c2.3	MON 042	fragment	vessel	globular	n/a	curved convergent	divergent	everted	sharp	no
4	2	c2.4	MON 032	fragment	vessel	globular	n/a	curved convergent	divergent	everted	rounded	no
4	2	c2.5	MOR 011	fragment	vessel	globular	n/a	curved convergent	straight	everted	rounded	no
4	2	c2.6	MON 033	fragment	vessel	globular	n/a	curved convergent	straight	everted	with inner bezel	no
4	2	c2.7	SET 002	fragment	vessel	globular	n/a	curved convergent	inwards	almond shape	rounded	no
4	2	c3	ZON 021	fragment	vessel	globular	n/a	curved convergent	divergent	everted	rounded	no
4	2	c3	SET 006	fragment	vessel	globular	n/a	curved convergent	divergent	everted	rounded	no
4	2	c3	MOR 007	fragment	vessel	globular	n/a	curved convergent	divergent	everted	rounded	no
4	2	c3	MOR 008	fragment	vessel	globular	n/a	curved convergent	divergent	everted	rounded	no
4	2	c3	MOR 009	fragment	vessel	globular	n/a	curved convergent	divergent	everted	rounded	no
4	2	d	COJ 007	fragment	vessel	globular	n/a	curved convergent	n/a	n/a	n/a	with *mamelón* on the mid-body

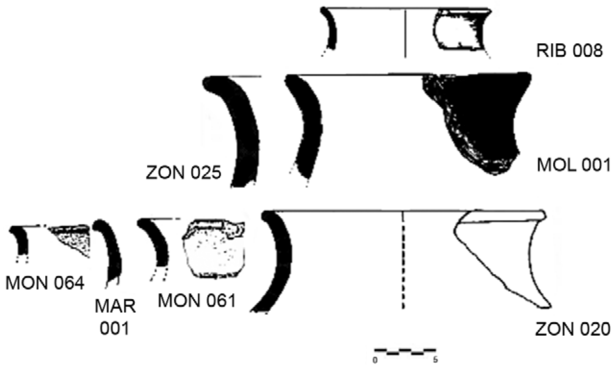
Table A18. Form 4, Type 2, globular vessels with spherical body. Site codes in Table 4 (page 122–123).

Form 4, Type 2
Globular Vessels with Spherical Body

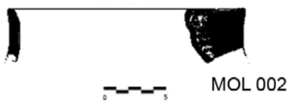


Form 4, Type 2
Globular Vessels with Spherical Body

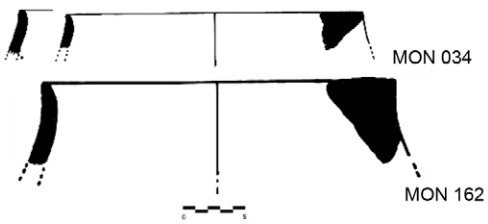
a3



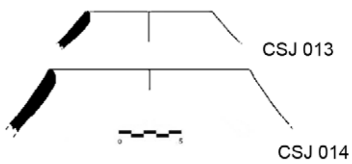
a4.1.1



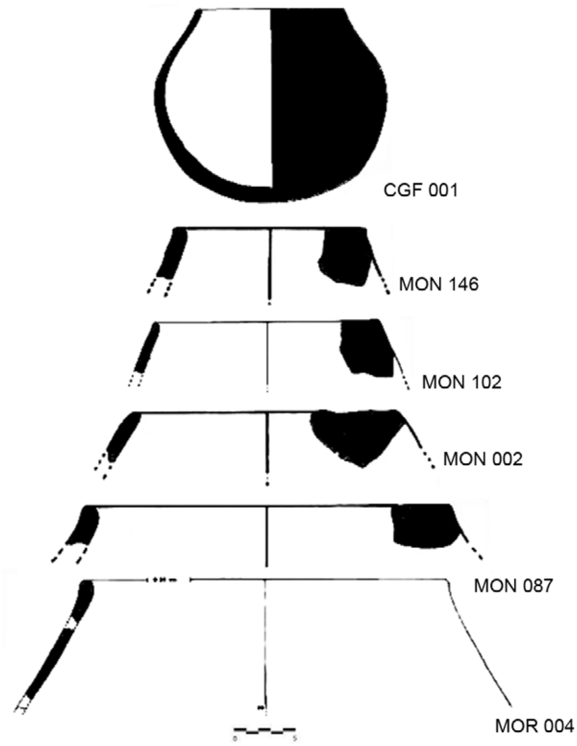
a4.1.2



a4.2

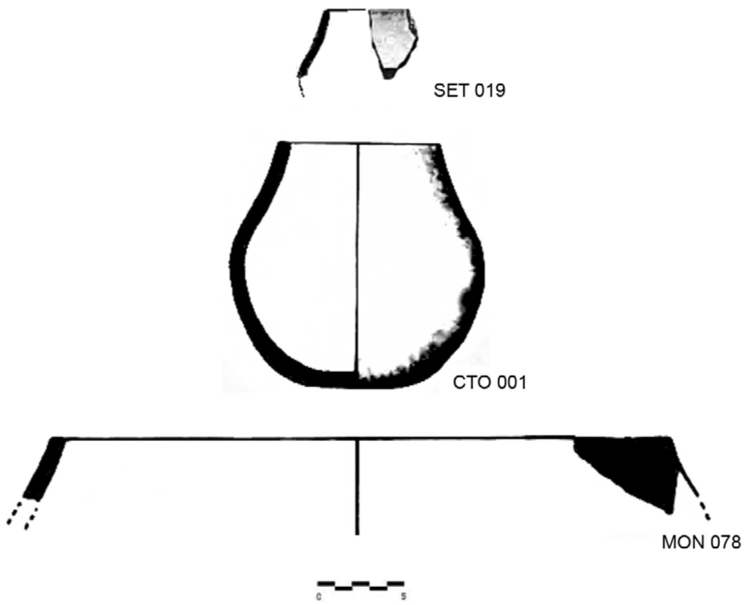


a4.3

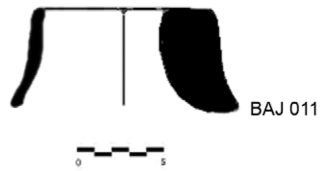


Form 4, Type 2
Globular Vessels with Spherical Body

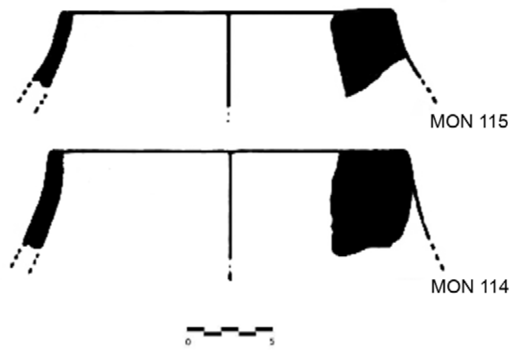
a4.4.2



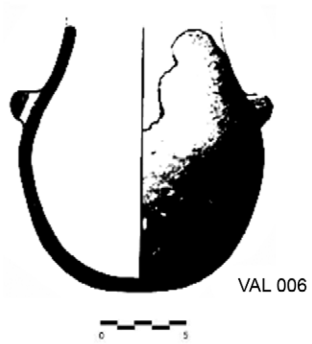
a4.4.1



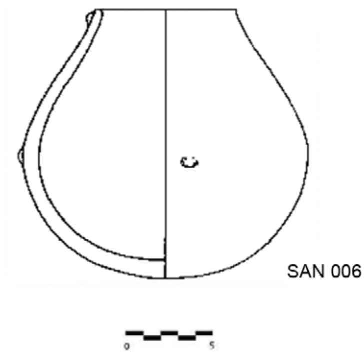
a4.4.3



a4.5

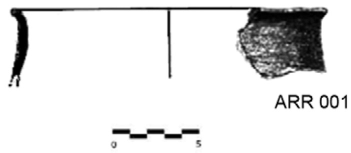


a4.6

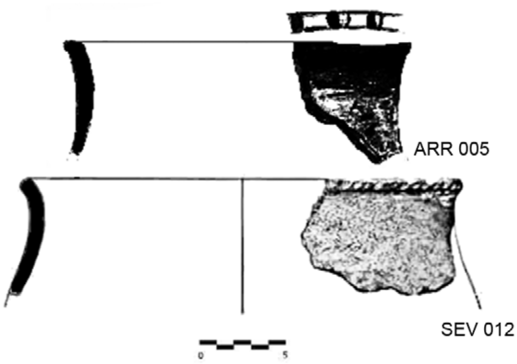


Form 4, Type 2
Globular Vessels with Spherical Body

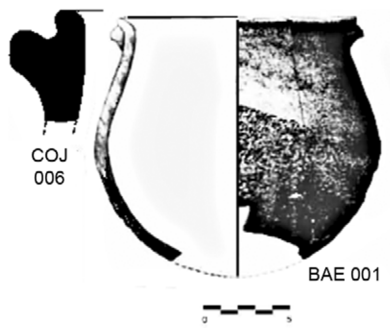
b1.1



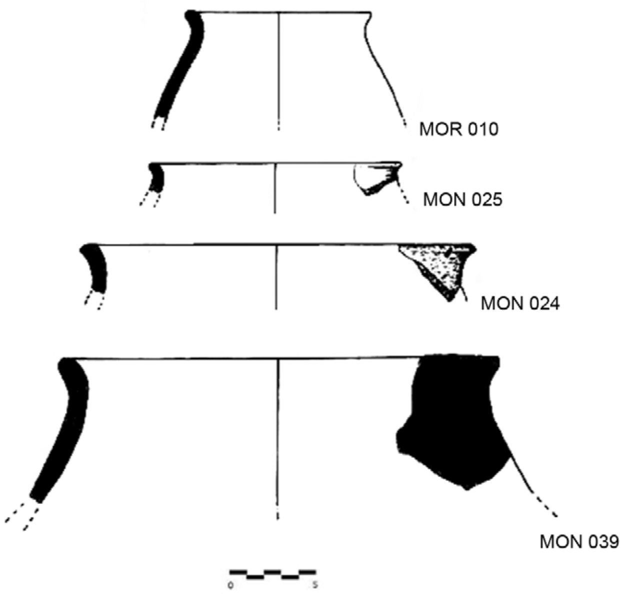
b1.2



b1.3

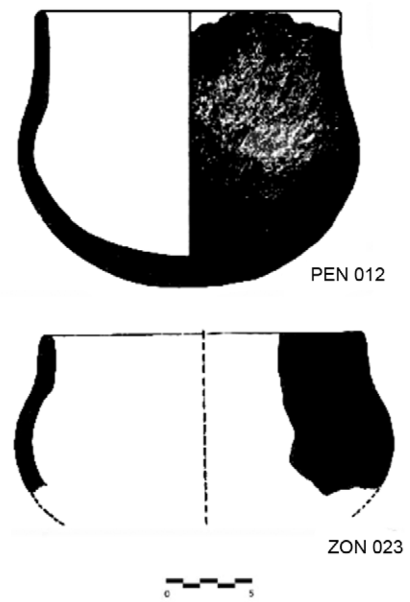


b2

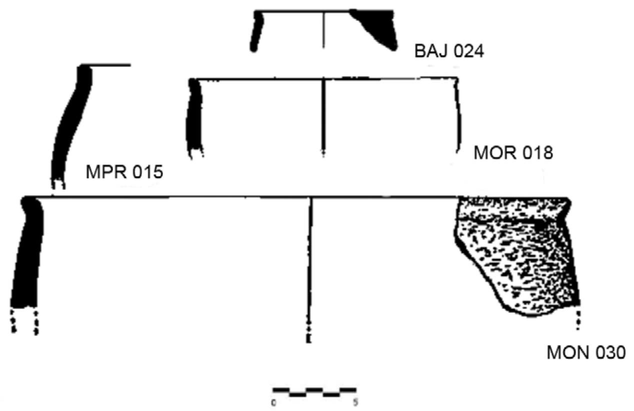


Form 4, Type 2
Globular Vessels with Spherical Body

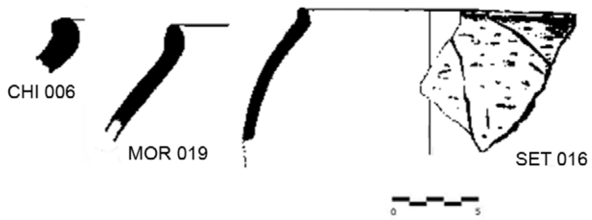
c1



c2.1

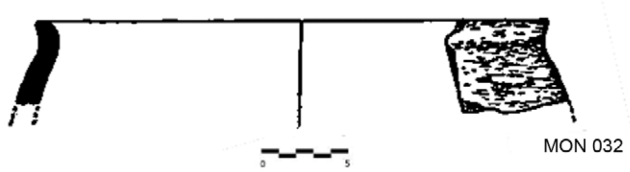


c2.2

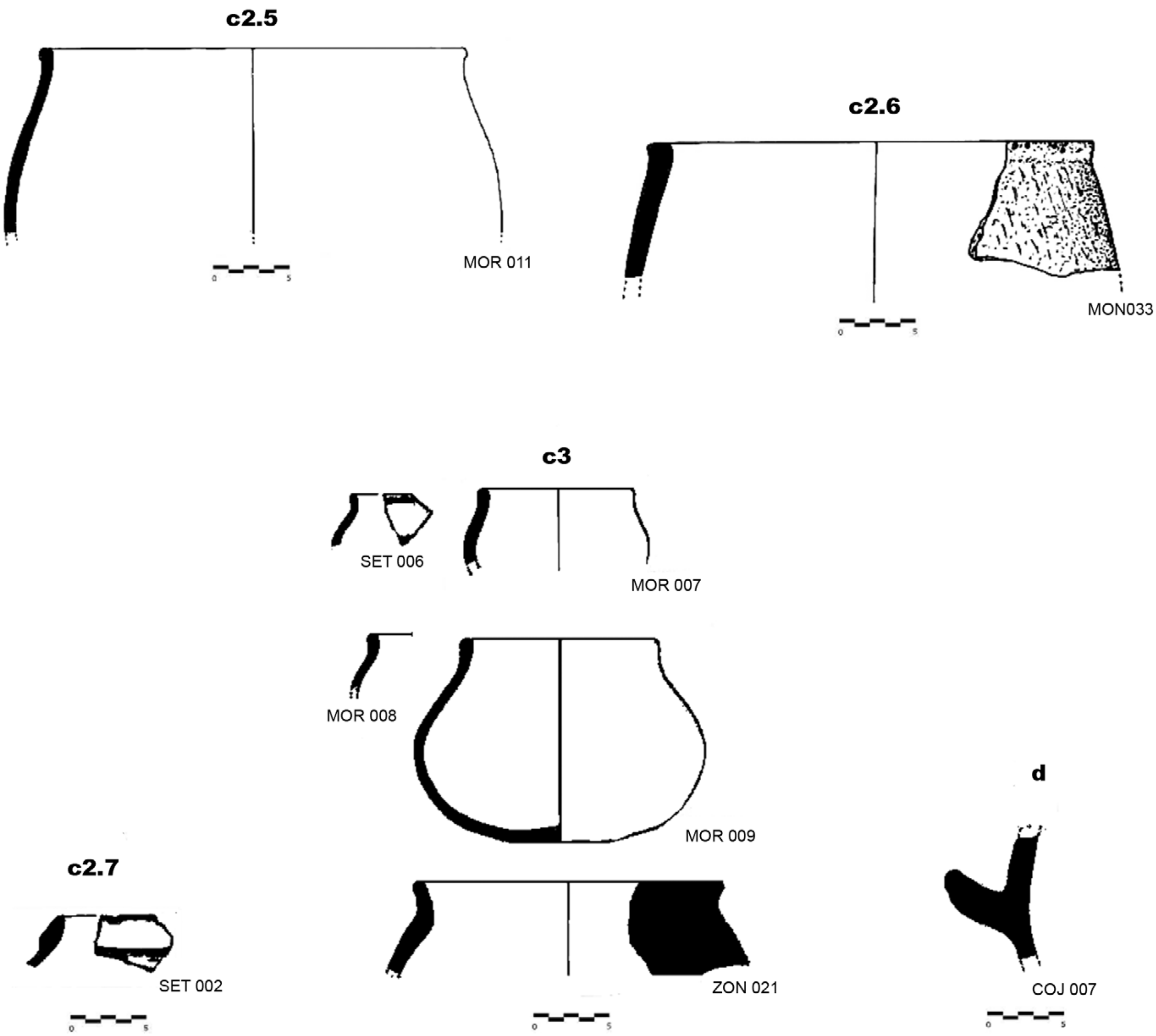


c2.3

c2.4



Form 4, Type 2
Globular Vessels with Spherical Body



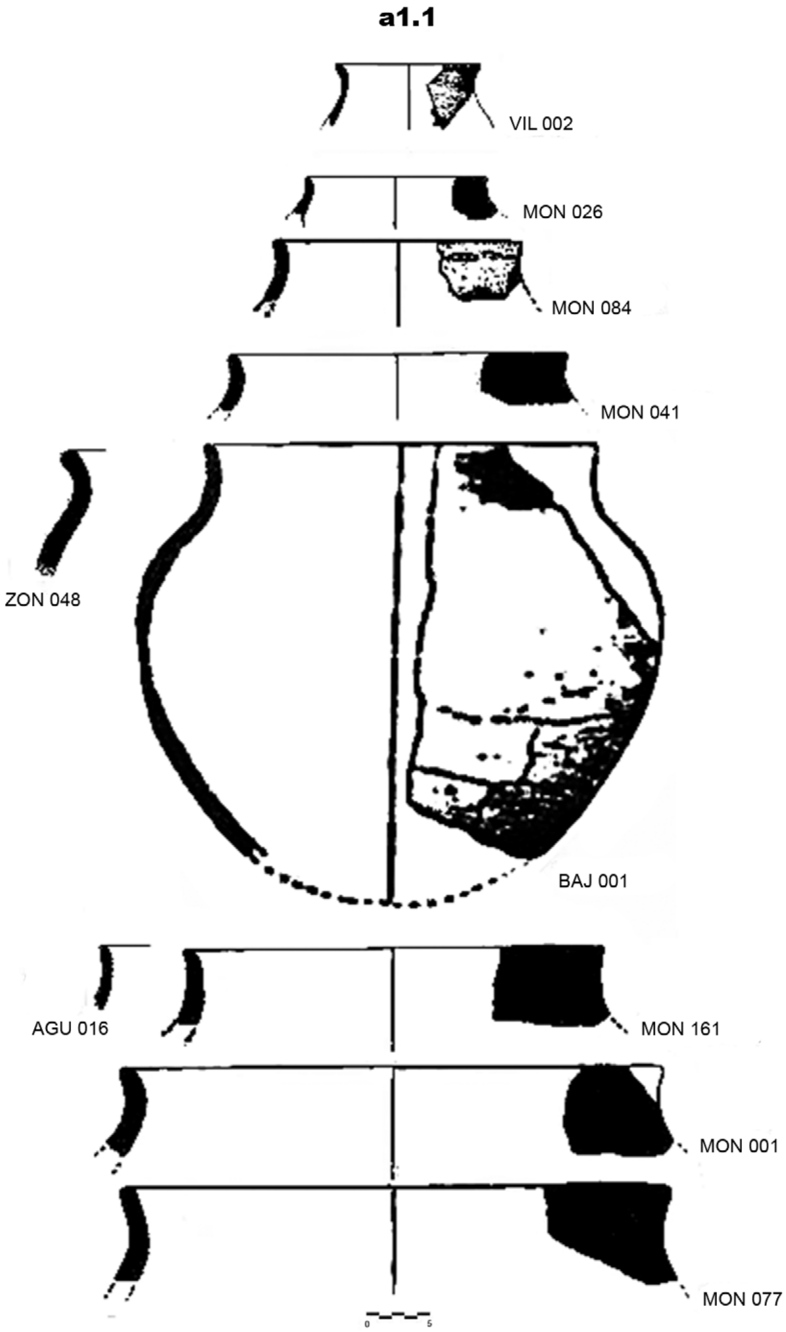
Form 4, Type 3
Globular Vessels with Ellipsoidal Body

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
4	3	a1.1	MON 026	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	3	a1.1	BAJ 001	fragment	vessel	globular	convex	curved convergent	curved divergent	divergent	rounded	no
4	3	a1.1	MON 161	fragment	vessel	globular	n/a	curved convergent	curved divergent	divergent	rounded	no
4	3	a1.1	VIL 002	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	3	a1.1	MON 001	fragment	vessel	globular	n/a	curved convergent	curved divergent	divergent	rounded	no
4	3	a1.1	MON 041	fragment	vessel	globular	n/a	curved convergent	curved divergent	divergent	rounded	no
4	3	a1.1	MON 084	fragment	vessel	globular	n/a	curved convergent	curved divergent	divergent	rounded	no
4	3	a1.1	AGU 016	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	3	a1.1	ZON 048	fragment	vessel	globular	n/a	curved convergent	curved divergent	divergent	rounded	no
4	3	a1.1	MON 077	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	rounded	no
4	3	a1.2.1	FUE 003	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	straight	no
4	3	a1.2.1	MON 009	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	straight	no
4	3	a1.2.1	MON 122	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	straight	no
4	3	a1.2.2	CHI 002	entire	vessel	globular	convex	curved convergent	curved divergent	divergent	straight	no
4	3	a2.1	CHI 014	entire	vessel	globular	convex	curved convergent	curved divergent	divergent	rounded	no
4	3	a2.2.1	TRA 002	entire	vessel	globular	convex	curved convergent	curved divergent	divergent	rounded	no
4	3	a2.2.2	MON 096	fragment	vessel	globular	n/a	n/a	curved divergent	divergent	straight	no
4	3	a3.1	MON 113	fragment	vessel	globular	n/a	curved convergent	no	divergent	rounded	no
4	3	a3.1	MON 074	fragment	vessel	globular	n/a	curved convergent	no	divergent	rounded	no
4	3	a3.1	AGU 015	fragment	vessel	globular	n/a	curved convergent	no	divergent	rounded	no
4	3	a3.1	AGU 017	fragment	vessel	globular	n/a	curved convergent	no	divergent	rounded	no
4	3	a3.1	MOR 006	fragment	vessel	globular	n/a	curved convergent	no	divergent	rounded	no
4	3	a3.2.1	FUE 014	fragment	vessel	globular	n/a	n/a	no	straight	rounded	digital marks on the outer borders
4	3	a3.2.2	SET 014	fragment	vessel	globular	n/a	curved convergent	no	divergent	rounded	digital incisions along the borders

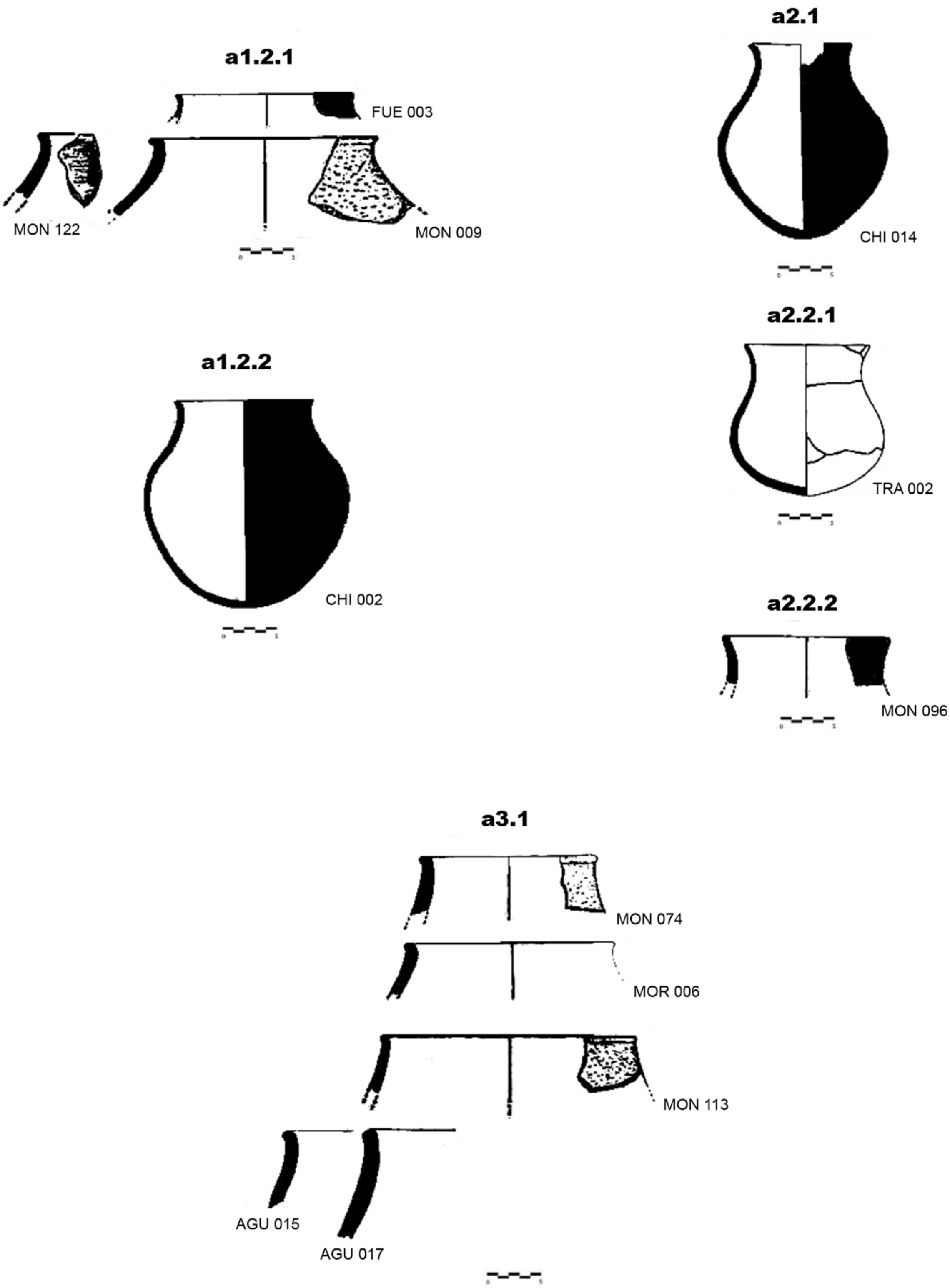
Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
4	3	a3.2.2	MOR 005	fragment	vessel	globular	n/a	n/a	no	straight	rounded	digital incisions along the borders
4	3	a3.2.3	VAL 005	entire	vessel	globular	convex	curved convergent	no	straight	rounded	digital marks on the outer borders
4	3	a3.3	SET 012	entire	vessel	globular	convex	curved convergent	straight	straight	rounded	no
4	3	b1.1	MON 054	fragment	vessel	globular	n/a	curved convergent	curved divergent	divergent	rounded	no
4	3	b1.1	MON 040	fragment	vessel	globular	n/a	curved convergent	curved divergent	divergent	rounded	no
4	3	b1.1	COJ 005	fragment	vessel	globular	n/a	curved convergent	curved divergent	divergent	rounded	no
4	3	b1.2	ZON 049	fragment	vessel	globular	n/a	curved convergent	curved divergent	divergent	rounded	no
4	3	b2	GAN 001	entire	vessel	carinated	convex	mid-carinated	curved divergent	divergent	rounded	no
4	3	b2	VAL 009	fragment	vessel	carinated	convex	mid-carinated	n/a	n/a	n/a	no
4	3	b2	CML 003	entire	vessel	carinated	convex	mid-carinated	curved divergent	divergent	rounded	no

Table A19. Form 4, Type 3, globular vessels with ellipsoidal body. Site codes in Table 4 (page 122–123).

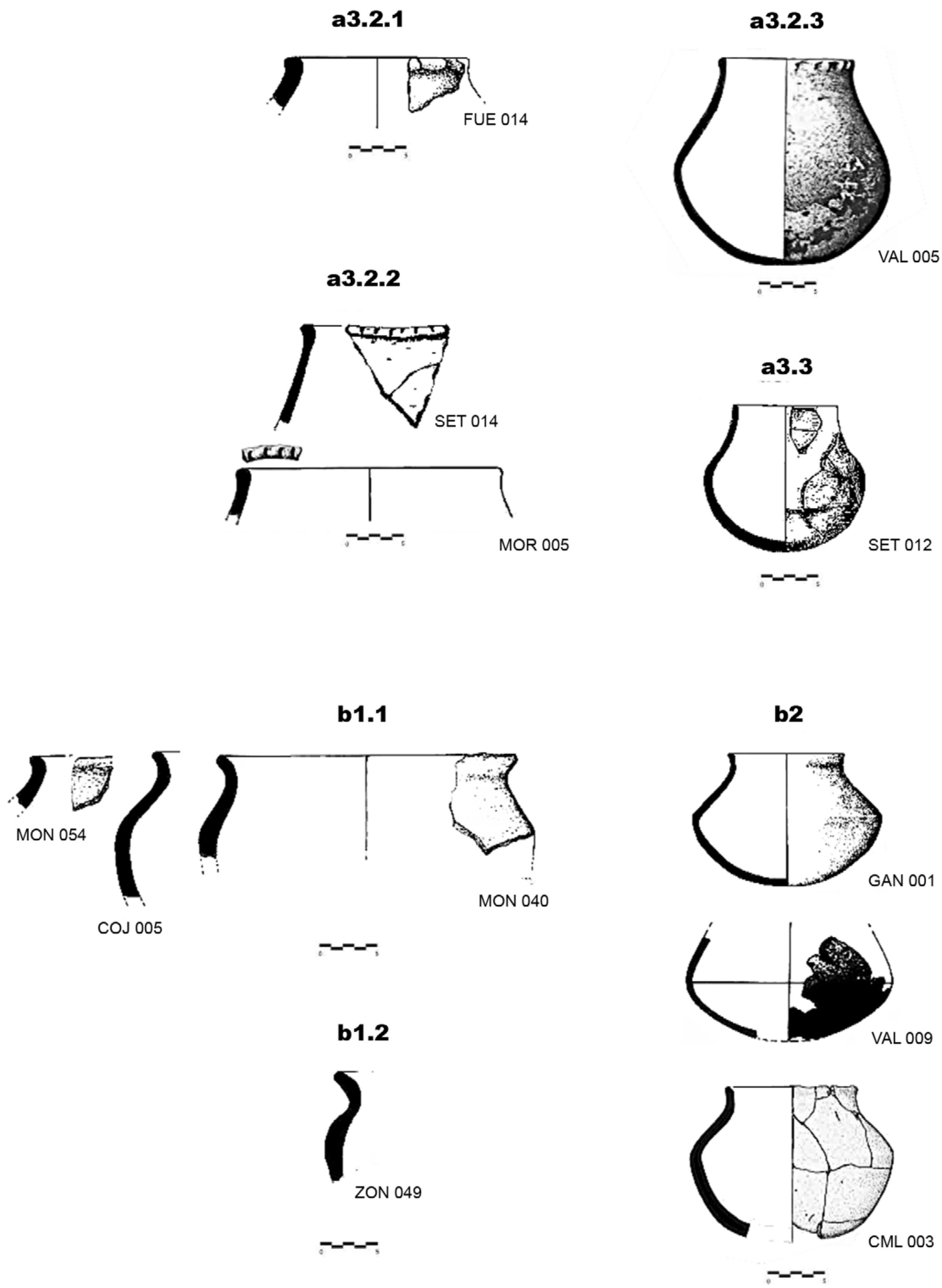
Form 4, Type 3
Globular Vessels with Ellipsoidal Body



Form 4, Type 3
Globular Vessels with Ellipsoidal Body



Form 4, Type 3
Globular Vessels with Ellipsoidal Body

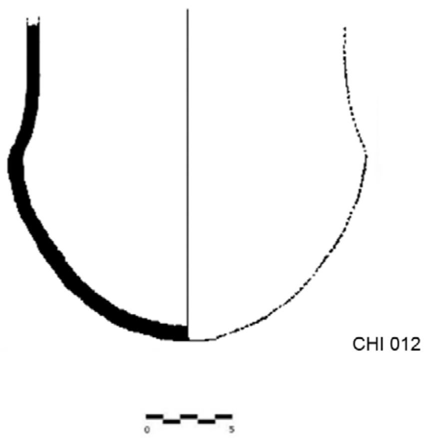


Form 4, Type 4
Carinated Vessels

Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Deco-ration
4	4	a	CHI 012	fragment	vessel	carinated	convex	mid-carinated	n/a	n/a	n/a	no

Table A20. Form 4, Type 4, carinated vessels. Site codes in Table 4 (page 122–123).

a

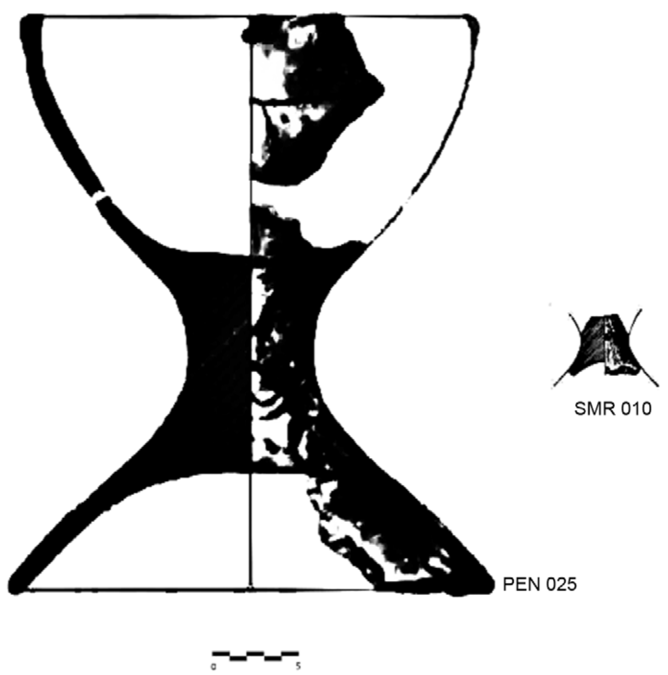


Form 5
Cups

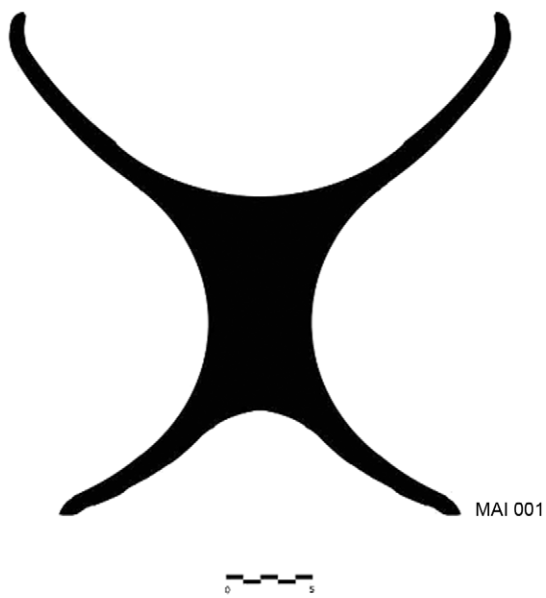
Form	Type	Group	Code	Condition	Type	Body	Base	Wall	Neck	Border	Rim	Decoration
5	1	a1	PEN 025	fragment	cup	biconic	flat	curved	curved divergent	convergent	rounded	*mamelón* below the border
5	1	a1	SMR 010	fragment	cup	biconic	n/a	n/a	curved divergent	n/a	n/a	no
5	1	a3	UBE 001	entire	cup	biconic	flat	curved	curved divergent	inwards	sharp	*mamelones* along the border
5	1	a2	MAI 001	entire	cup	biconic	flat	curved	curved divergent	convergent	rounded	no
5	2	b	SEV 010	fragment	cup	biconic	flat	n/a	n/a	n/a	n/a	no
5	2	b	SET 013	fragment	cup	biconic	flat	n/a	n/a	n/a	n/a	no

Table A21. Form 5, cups. Site codes in Table 4 (page 122–123).

a1

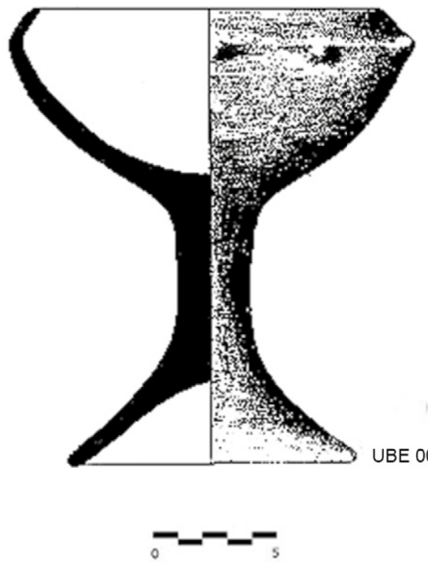


a2



Form 5
Cups

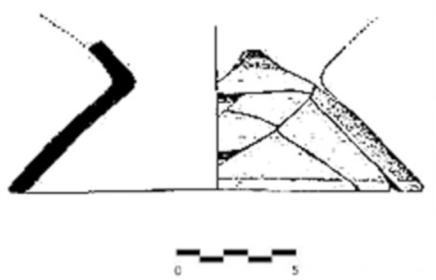
a3



UBE 001

b

SEV 010



SET 027

SITE	AGU	ALC	ARC	ARR	BAE	BAJ	CAB	CAN	CAR	CAS	CGF	CHI	CML	COJ	COR	CSJ	CTO	CVQ	ENC	ERA	ESP	FUE	GAN	GUT	HOR	JUA
AGU	-	1	1	1	.	3	1	.	.	.	.	4	.	2	2	1	.	.	2	1	1	1	1	.	.	.
ALC	1	-	.	1	.	1	1	.	.	.	.	1	.	2	1	.	.	1	1	.	.	1	1	.	.	1
ARC	1	.	-	1	.	2	.	.	.	.	.	1	.	1	.	.	.	.	1	.	.	1	.	.	.	.
ARR	1	1	1	-	1	3	1	.	.	.	.	.	.	1	.	1	.	.	.	1	.	3	1	1	.	.
BAE	.	.	.	1	-	.	.	.	.	.	.	.	.	1	.	1	.	.	.	2	.	1	.	1	.	.
BAJ	3	1	2	3	.	-	.	.	.	.	.	1	.	1	.	.	1	.	1	.	.	2	.	.	.	1
CAB	1	1	.	1	.	.	-	.	.	.	.	.	.	1	.	.	.	.	.	.	.	2	1	.	.	.
CAN	.	.	.	.	.	.	.	-	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
CAR	.	.	.	.	.	.	.	.	-	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
CAS	.	.	.	.	.	.	.	.	.	-	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
CGF	.	.	.	.	.	.	.	.	.	.	-	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
CHI	4	1	1	.	.	1	.	.	.	.	.	-	.	2	1	.	.	.	2	.	.	3	1	.	.	.
CML	.	.	.	.	.	.	.	1	.	.	.	.	-	.	.	.	.	.	.	.	.	.	1	.	.	.
COJ	2	2	1	1	1	1	1	.	.	.	.	2	.	-	1	.	.	.	1	.	.	2	1	.	.	.
COR	2	1	.	.	.	.	.	.	.	.	.	1	.	1	-	.	.	.	1	.	.	.	.	.	.	.
CSJ	1	.	.	1	1	.	.	.	.	.	.	.	.	.	.	-	.	.	.	1	.	1	.	1	.	.
CTO	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	-	.	.	.	.	.	.	.	.	.
CVQ	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	.	.	.	.	.	.	.	.
ENC	2	1	1	.	.	1	.	.	.	.	.	2	.	1	1	.	.	.	-	.	.	1	.	.	.	.
ERA	1	.	.	1	2	.	.	.	.	.	.	.	.	.	.	1	.	.	.	-	.	1	.	1	.	.
ESP	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	.	.	.	.	.
FUE	1	1	1	3	1	2	2	.	.	.	.	3	.	2	.	1	.	.	1	1	.	-	1	1	.	.
GAN	1	1	.	1	.	.	1	.	.	.	.	1	1	1	.	.	.	.	.	.	.	1	-	.	1	.
GUT	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	1	.	-	.	.
HOR	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	-	.
JUA	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-
MAI	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MAR	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.
MES	2	.	.	.	.	.	.	.	.	1	.	.	.	.	1	.	.	.	.	.	1	.	.	.	.	.
MOL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MON	9	2	2	3	.	12	2	.	1	.	1	5	.	3	1	.	1	.	2	.	.	8	1	1	1	2
MOR	4	2	1	2	1	5	1	.	.	.	1	4	.	3	1	.	.	.	2	1	.	3	2	.	1	1
PEN	2	.	1	1	5	3	.	.	1	.	.	1	.	1	.	1	1	.	1	2	.	2	1	1	1	1
PIR	.	.	.	1	1	2	.	.	1	.	.	.	.	.	.	1	.	.	.	1	.	1	.	1	.	1
RIB	1	.	1	2	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
SAN	1	.	1	.	.	1	.	.	1	.	.	2	.	1	.	.	.	.	1	.	.	1	.	.	.	.
SEB	.	.	.	.	.	.	.	1	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
SEK	2	.	1	.	.	1	.	.	.	.	.	1	.	1	.	1	.	.	1	.	.	1	.	.	.	.
SET	4	.	.	.	.	2	.	1	.	.	.	3	.	.	.	1	1	.	.	.	.	2	1	.	.	.
SEV	1	.	.	3	4	3	.	.	.	.	.	.	.	.	.	1	.	.	.	2	.	2	.	1	.	.
SMR	1	.	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1
TRA	3	1	1	.	.	1	.	.	1	.	.	4	.	1	.	1	.	1	1	.	.	1	1	.	.	.
UBE	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
VAL	.	.	.	.	1	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	1	1	.	.	.
VEL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
VIL	2	.	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
ZON	4	2	2	2	1	7	.	.	.	.	.	4	.	3	1	.	.	.	2	.	.	3	1	2	1	.
CEN	1	1	.	1	2	2	.	.	.	.	.	1	.	.	.	1	.	.	.	1	.	1	1	3	1	1
BER	10	0	2	2	2	8	0	0	1	0	1	4	0	1	1	1	0	0	1	1	1	1	1	0	0	1
TRS	5	.	1	.	.	3	.	.	.	.	.	4	.	1	.	2	1	.	1	.	1	2	1	.	.	.
NEG	3	1	1	3	2	2	.	.	.	.	.	4	.	2	2	1	.	.	2	2	.	3	1	1	1	1
ORC	4	.	2	2	.	5	.	.	.	.	.	2	.	2	.	.	1	.	1	.	.	1	.	.	.	.

Table A22. Matrix of type matches. Site codes in Table 4 (page 122–123) (Continued on next page).

SITE	MAI	MAR	MES	MOL	MON	MOR	PEN	PIR	RIB	SAN	SEB	SEK	SET	SEV	SMR	TRA	UBE	VAL	VEL	VIL	ZON	CEN	BER	TRS	NEG	ORC
AGU	.	.	2	.	9	4	2	.	1	1	.	2	4	1	1	3	1	.	.	2	4	1	10	5	3	4
ALC	.	.	.	.	2	2	.	.	.	.	.	.	.	.	.	1	.	.	.	.	2	1	0	.	1	.
ARC	.	.	.	.	2	1	1	.	1	1	.	1	.	.	.	1	.	.	.	.	2	.	2	1	1	2
ARR	.	.	.	.	3	2	1	1	2	.	.	.	.	3	.	.	.	.	.	.	2	1	2	.	3	2
BAE	.	.	.	.	.	1	5	1	.	.	.	.	.	4	1	.	.	1	.	.	1	2	2	.	2	.
BAJ	.	.	.	.	12	5	3	2	2	1	.	1	2	3	2	1	.	.	.	1	7	2	8	3	2	5
CAB	.	.	.	.	2	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.
CAN	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	0	.	.	.
CAR	.	.	.	.	1	.	1	1	.	1	1	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.
CAS	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	.	.	.
CGF	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
CHI	.	.	.	.	5	4	1	.	.	2	.	1	3	.	.	4	.	1	.	.	4	1	4	4	4	2
CML	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	.	0	.	.	.
COJ	.	.	.	.	3	3	1	.	.	1	.	1	.	.	.	1	.	.	.	.	3	.	1	1	2	2
COR	.	.	1	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	1	.	2	.
CSJ	.	.	.	.	.	.	1	1	.	.	.	1	1	1	.	1	.	.	.	.	.	1	1	2	1	.
CTO	.	.	.	.	1	.	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	0	1	.	1
CVQ	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	0	.	.	.
ENC	.	.	.	.	2	2	1	.	.	1	.	1	.	.	.	1	.	.	.	.	2	.	1	1	2	1
ERA	.	.	.	.	.	1	2	1	.	.	.	.	.	2	1	.	.	.	.	.	.	1	1	.	2	.
ESP	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.
FUE	.	.	.	.	8	3	2	1	1	1	.	1	2	2	.	1	.	1	.	.	3	1	1	2	3	1
GAN	.	1	.	.	1	2	1	.	.	.	.	.	1	.	.	1	.	1	.	.	1	1	1	1	1	.
GUT	.	1	.	.	1	.	1	1	.	.	.	.	.	1	.	.	.	.	.	.	2	3	0	.	1	.
HOR	.	1	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	0	.	1	.
JUA	.	.	.	.	2	1	1	1	.	.	.	.	.	.	1	.	.	.	.	.	.	1	1	.	1	.
MAI	-	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	.	1	.
MAR	.	-	.	1	2	1	1	.	1	.	.	.	.	.	.	.	.	.	.	.	3	2	0	.	2	.
MES	.	.	-	.	1	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	1	2	1	1	.
MOL	.	1	.	-	2	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1	1	0	.	1	1
MON	.	2	1	2	-	15	9	3	9	4	1	1	7	4	5	9	1	1	.	1	18	13	11	5	7	1.
MOR	.	1	.	1	15	-	5	1	2	1	.	1	5	2	5	2	1	1	.	.	6	2	6	1	7	4
PEN	.	1	.	.	9	5	-	3	1	3	1	1	1	4	4	2	.	1	.	.	6	5	6	2	6	2
PIR	.	.	.	.	3	1	3	-	1	1	1	.	.	1	1	.	.	.	.	.	.	2	3	.	2	1
RIB	.	1	.	1	9	2	1	1	-	.	.	.	.	.	1	.	.	.	.	.	3	4	1	.	1	3
SAN	.	.	.	.	4	1	3	1	.	-	1	1	2	.	.	4	.	.	.	.	2	1	3	2	1	1
SEB	.	.	.	.	1	.	1	1	.	1	-	.	1	.	.	1	.	.	.	.	.	.	1	.	.	.
SEK	.	.	.	.	1	1	1	.	.	1	.	-	.	.	.	2	.	.	.	.	1	.	2	2	1	1
SET	.	.	.	.	7	5	1	.	.	2	1	.	-	3	1	4	1	1	.	.	1	2	5	5	1	3
SEV	.	.	.	.	4	2	4	1	.	.	.	.	3	-	2	.	1	1	.	.	1	2	3	1	3	1
SMR	.	.	.	.	5	5	4	1	1	.	.	.	1	2	-	.	1	.	.	.	1	1	2	.	2	.
TRA	.	.	1	.	9	2	2	.	.	4	1	2	4	.	.	-	.	1	.	.	3	4	4	3	2	1
UBE	.	.	.	.	1	1	.	.	.	.	.	.	1	1	1	.	-	.	.	.	.	.	1	.	.	.
VAL	.	.	.	.	1	1	1	.	.	.	.	.	1	1	.	1	.	-	.	.	1	1	0	.	.	.
VEL	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	.	.	.	0	.	.	.
VIL	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	1	.	1	.	1	1
ZON	.	3	.	1	18	6	6	.	3	2	.	1	1	1	1	3	.	1	.	1	-	6	5	2	6	5
CEN	1	2	1	1	13	2	5	2	4	1	.	.	2	2	1	4	.	1	.	.	6	-	2	.	4	1
BER	0	0	2	0	11	6	6	3	1	3	1	2	5	3	2	4	1	0	0	1	5	2	-	6	3	4
TRS	.	.	1	.	5	1	2	.	.	2	.	2	5	1	.	3	.	.	.	.	2	.	6	-	2	3
NEG	1	2	1	1	7	7	6	2	1	1	.	1	1	3	2	2	.	.	.	1	6	4	3	2	-	2
ORC	.	.	.	1	1	4	2	1	3	1	.	1	3	1	.	1	.	.	.	1	5	1	4	3	2	-

Table A22. (Continuation) Matrix of type matches. Site codes in Table 4 (page 122–123).

Appendix IV: Betweenness Scores for the Sites in the Study Area

The betweenness score $g(v)$ is obtained by using the geodesic distance of the nodes or the shortest paths between all pairs of nodes in the network. After having the sum of all of the shortest paths, the betweenness score is calculated by dividing the number of all of the shortest paths from one node (s) to another (t) passing through a specific node, that is not an end point (v), by the total number of short paths σ_{st}.

$$g(v) = \sum_{s \neq v \neq t} \frac{\sigma_{st}(v)}{\sigma_{st}}$$

Rank	ID	Betweenness Score
1	MON	116.496
2	BER	84.719
3	NEG	81.567
4	MOR	61.173
5	CEN	58.605
6	MES	52.604
7	PEN	52.42
8	TRA	52.122
9	SET	49.624
10	AGU	48.887
11	ZON	33.958
12	GAN	32.902
13	TRS	21.212
14	ALC	20.944
15	FUE	20.801
16	SEB	19.597
17	BAJ	16.813
18	ORC	14.221
19	VAL	12.818
20	PIR	12.149
21	ARR	9.232
22	SEV	8.633
23	SAN	7.492
24	COJ	6.936
25	CHI	5.515
26	RIB	5.47

Rank	ID	Betweenness Score
27	SMR	4.333
28	CSJ	3.508
29	BAE	2.875
30	COR	2.428
31	CML	1.948
32	GUT	1.568
33	MAR	1.563
34	ENC	1.473
35	ARC	1.06
36	VIL	0.913
37	SEK	0.89
38	ERA	0.884
39	CAN	0.565
40	JUA	0.482
41	CAB	0.351
42	CAR	0.125
43	MOL	0.125
44	CAS	0
45	CGF	0
46	CTO	0
47	CVQ	0
48	ESP	0
49	HOR	0
50	MAI	0
51	UBE	0
52	VEL	0

Table A23. Betweenness scores for the sites in the study area. Site codes in Table 4 (page 122–123).

Appendix V: Maps Showing the Site Location for Every Pottery Subtype

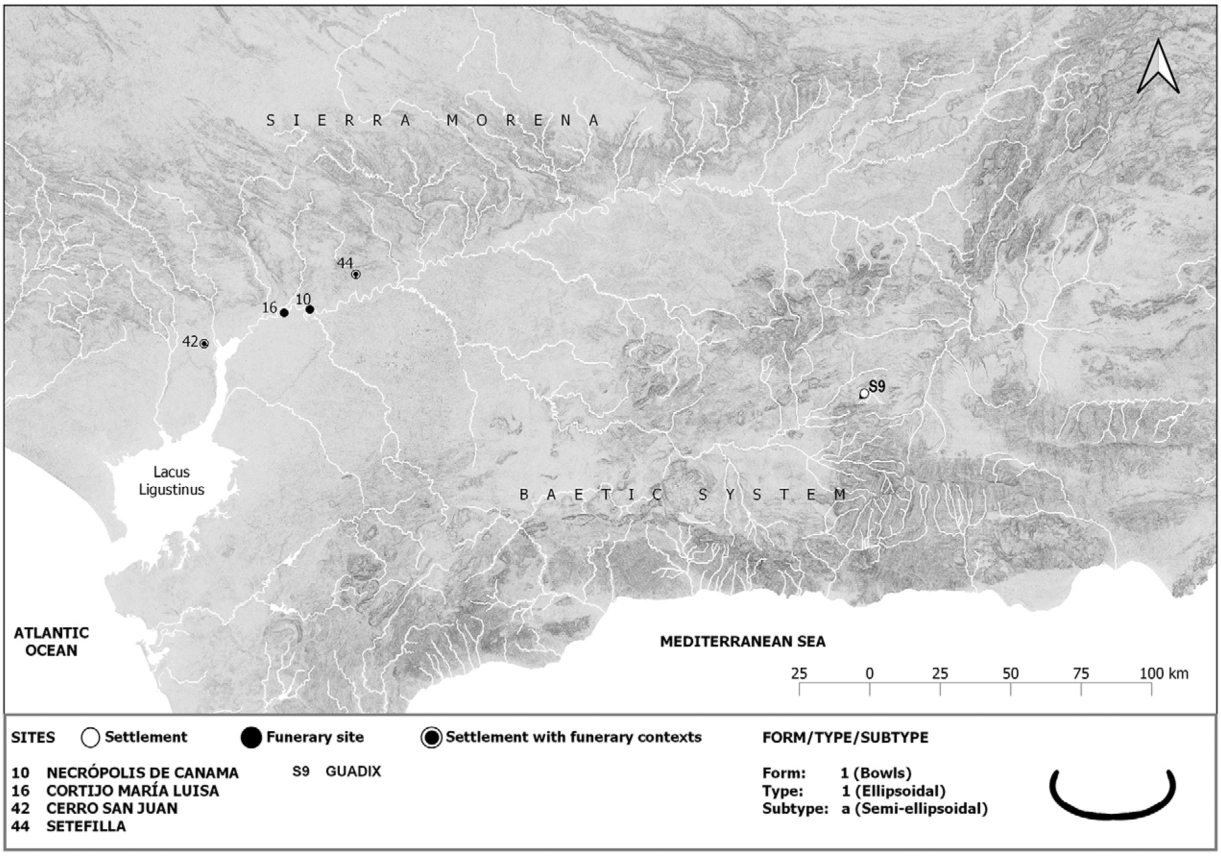
The following maps are indicating the geographic location of the sites where the pottery subtypes mentioned in this text were found. The size and scale are the same for all maps, making it easier to compare the distribution of the sites across the area studied in this research. Below the map, in the info section, the lower-right corner shows the silhouette of the subtypes, whereas the sites are listed on the left.

These maps also show the location of additional sites mainly in the Baza and Guadix Valleys, where Aranda et al. in 2012 and Schubart et al. in 2018 produced pottery catalogues. These sites were not included in the analysis described in chapter 5 and are only supplementary information. These sites were added to show how some pottery from the Baza and Guadix Valleys (regions considered closer to the core of the 'Argaric territory') share morphological similarities with the ones present in the Middle and Low Guadalquivir Valley. The comparison with these sites suggests how knowledge of pottery production and use could have flowed across the whole of the southern Iberian Peninsula, regardless the ideas or perceptions archaeologists have today of such space during the Full Bronze Age.

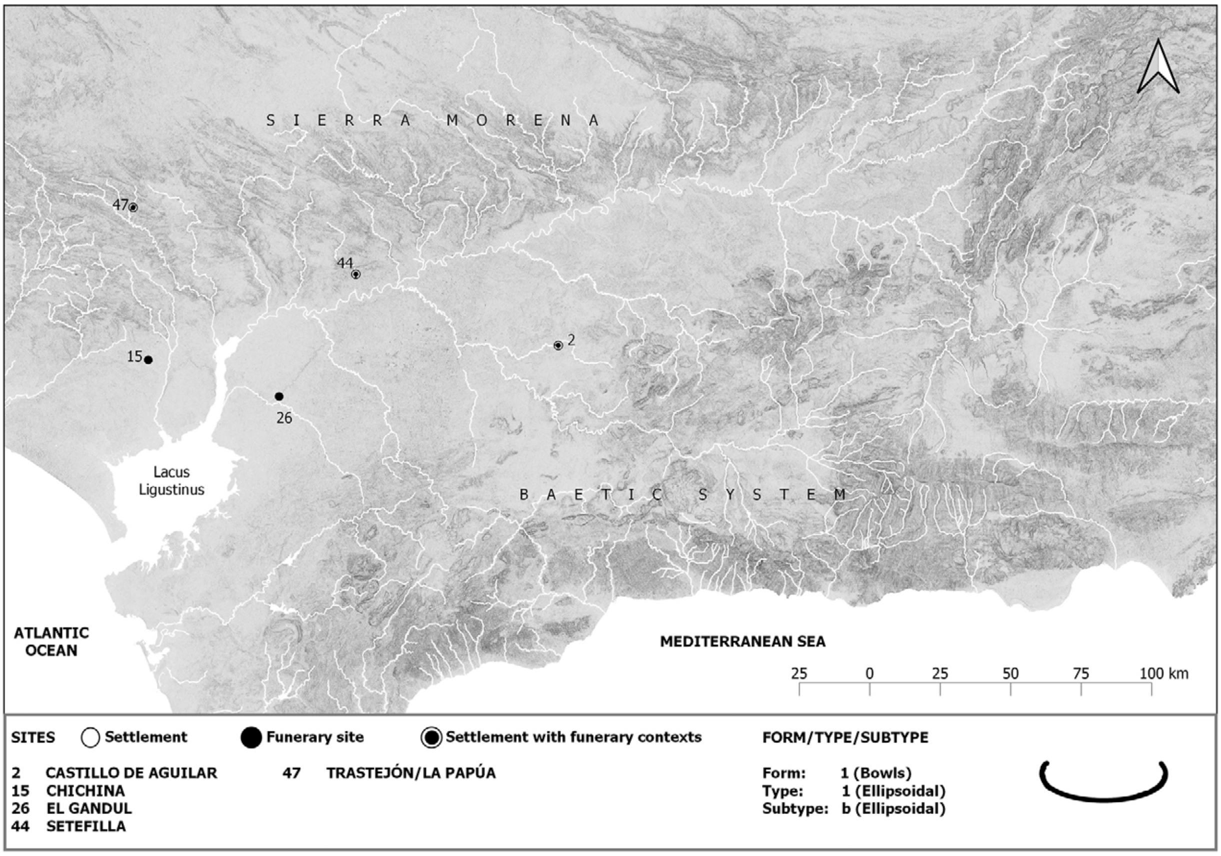
This exercise of comparison is just an invitation to further develop the method presented here and to continue the exploration of new interactions and interconnections that have not been studied thoroughly yet. The supplementary sites presented in the maps are listed in Table A24.

N°	Name of the Site	Type of Site	Location	Province	Reference
S1	Alcudia de Guadix	Settlement	Valle del Zalabí	Granada	Schubart et al. 2018
S2	Alquife	Funerary	Guadix	Granada	Schubart et al. 2018
S3	Baza	Settlement	Baza	Granada	Schubart et al. 2018
S4	Caniles	Settlement	Baza	Granada	Schubart et al. 2018
S5	Cajar	Settlement	Vega de Granada	Granada	Schubart et al. 2018
S6	Cerro del Culantrillo	Settlement	Gorafe	Granada	Schubart et al. 2018
S7	Cerro de San Cristóbal	Settlement + Funerary	Ogíjares	Granada	Aranda et al. 2012
S8	El Zalabí	Funerary	Valle del Zalabí	Granada	Schubart et al. 2018
S9	Guadix	Settlement	Guadix	Granada	Schubart et al. 2018
S10	Pantano de los Bermejales	Funerary	Alhama	Granada	Schubart et al. 2018
S11	Salobreña	Settlement	Costa Granadina	Granada	Schubart et al. 2018
S12	Pago del Sapo	Settlement	Almuñécar	Granada	Schubart et al. 2018
S13	Fiñana	Settlement	Filabres-Tabernas	Almería	Schubart et al. 2018
S14	Alhama de Granada	Settlement	Alhama	Granada	Schubart et al. 2018
S15	Lentejí	Settlement	Costa Granadina	Granada	Schubart et al. 2018
S16	Granada	Settlement	Granada	Granada	Schubart et al. 2018
S17	Cerro Velilla Almuñécar	Settlement	Almuñécar	Granada	Schubart et al. 2018
S18	Huéneja	Funerary	Guadix	Granada	Schubart et al. 2018
S19	Puebla de Don Fadrique	Settlement	Huéscar	Granada	Schubart et al. 2018
S20	Gorafe	Settlement	Gorafe	Granada	Schubart et al. 2018
S21	Tocón	Settlement	Ílora	Granada	Schubart et al. 2018

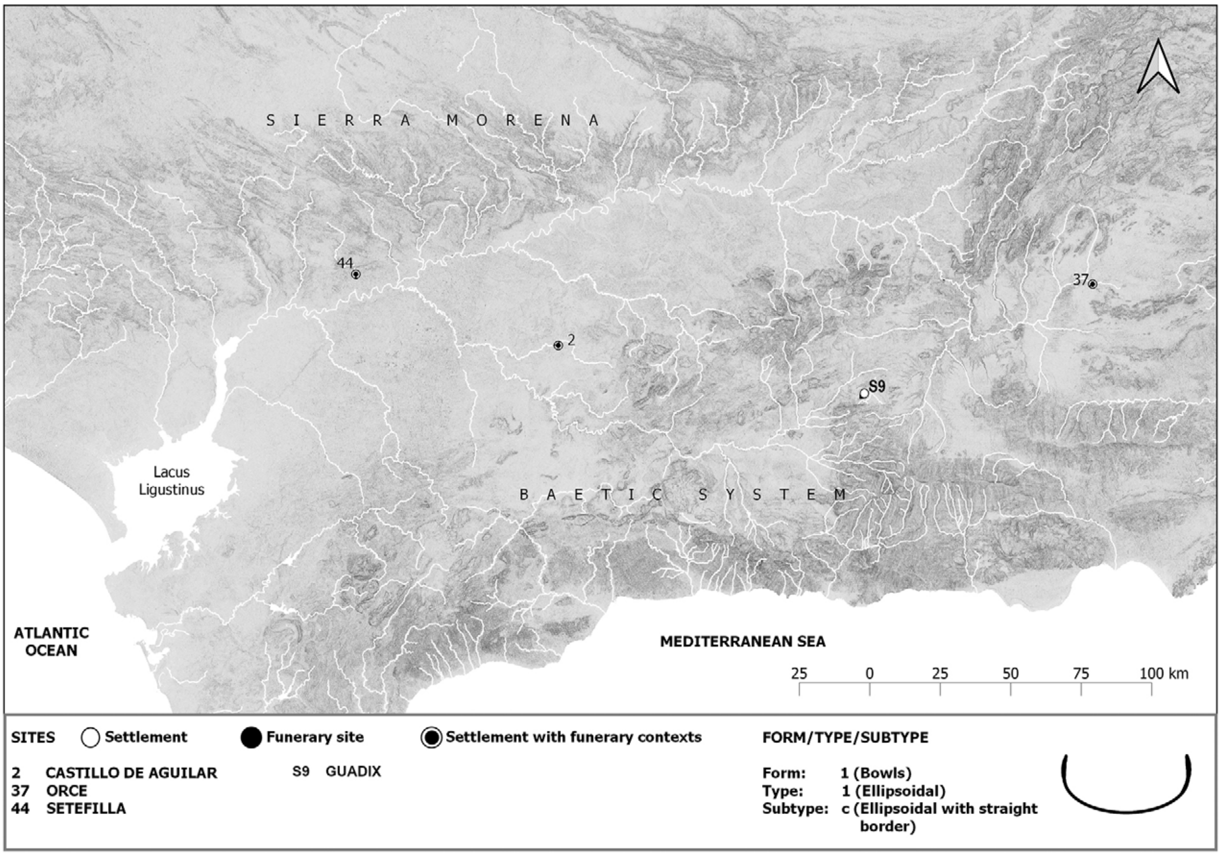
Table A24. Location of the supplementary sites included in the maps of Appendix V.



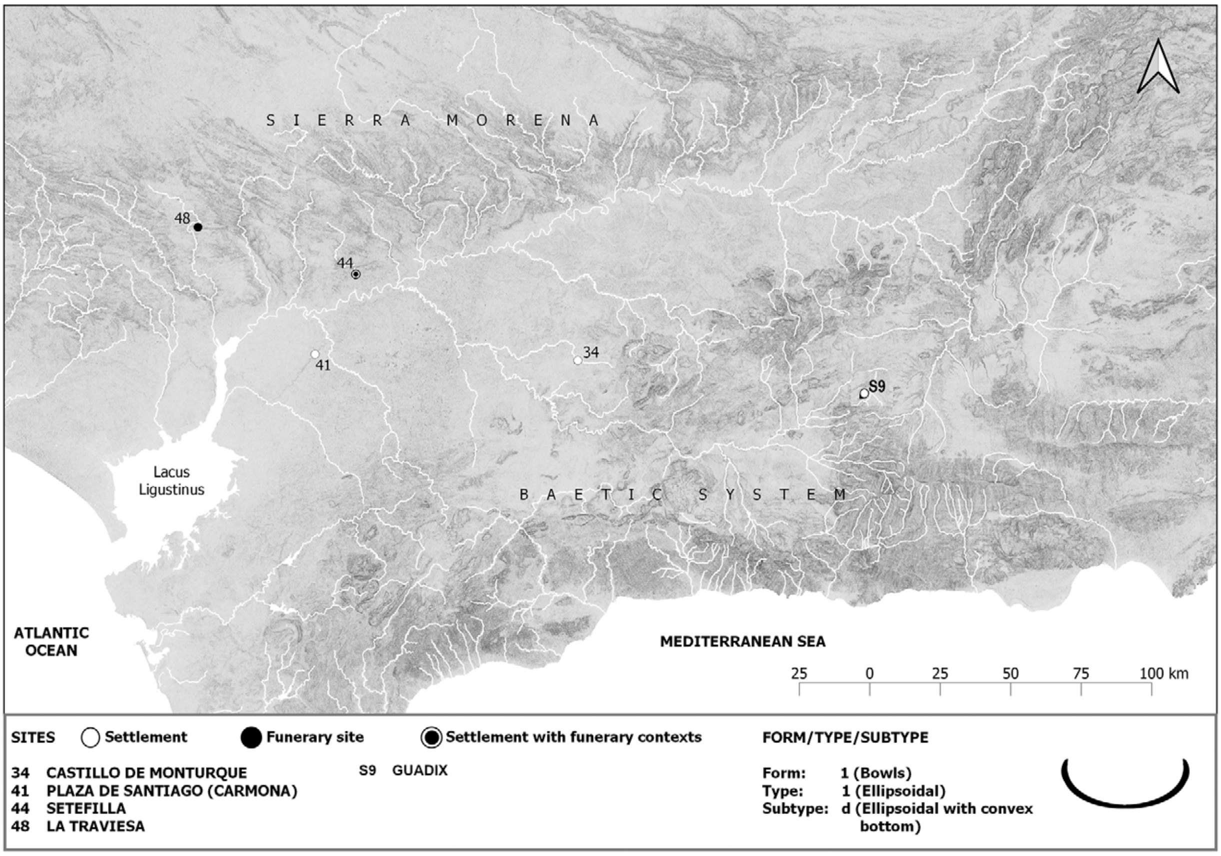
Map A1. Sites with pottery Form 1, Type 1, Subtype a.



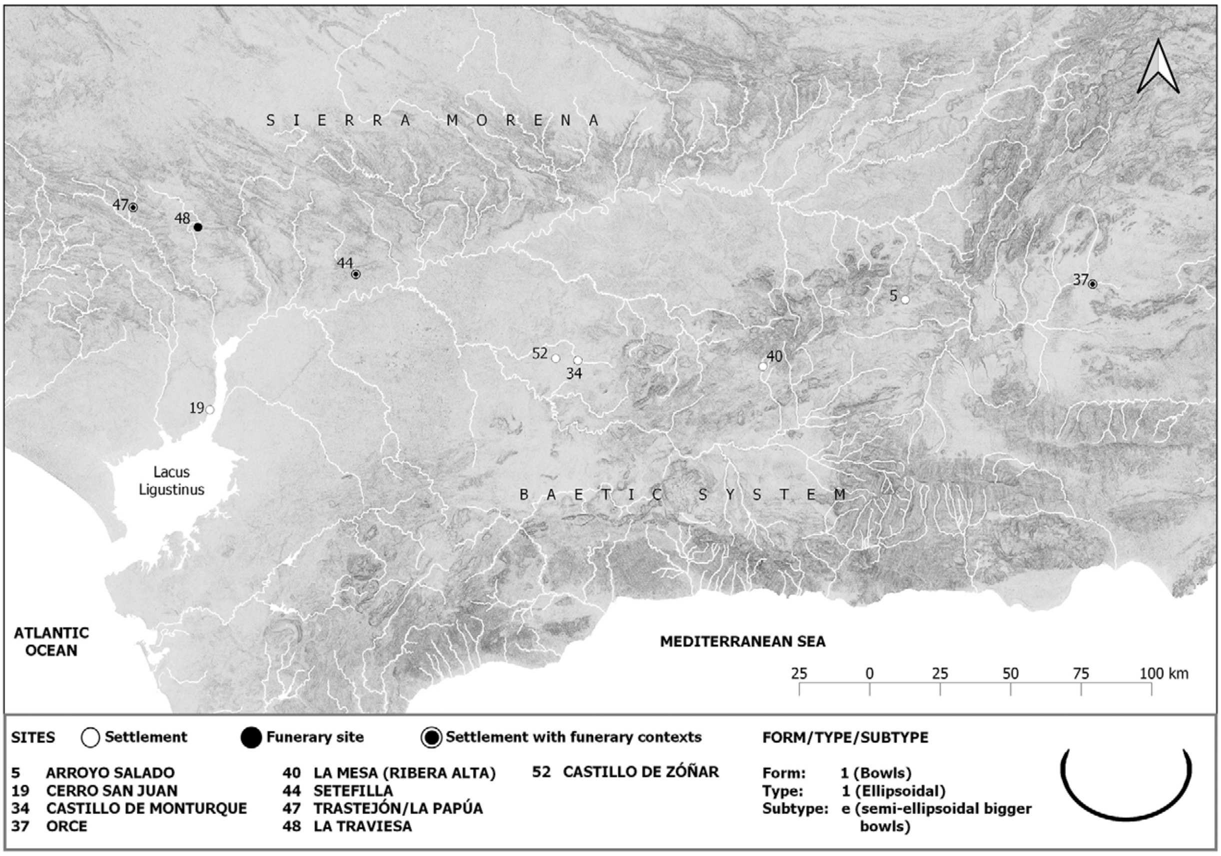
Map A2. Sites with pottery Form 1, Type 1, Subtype b.



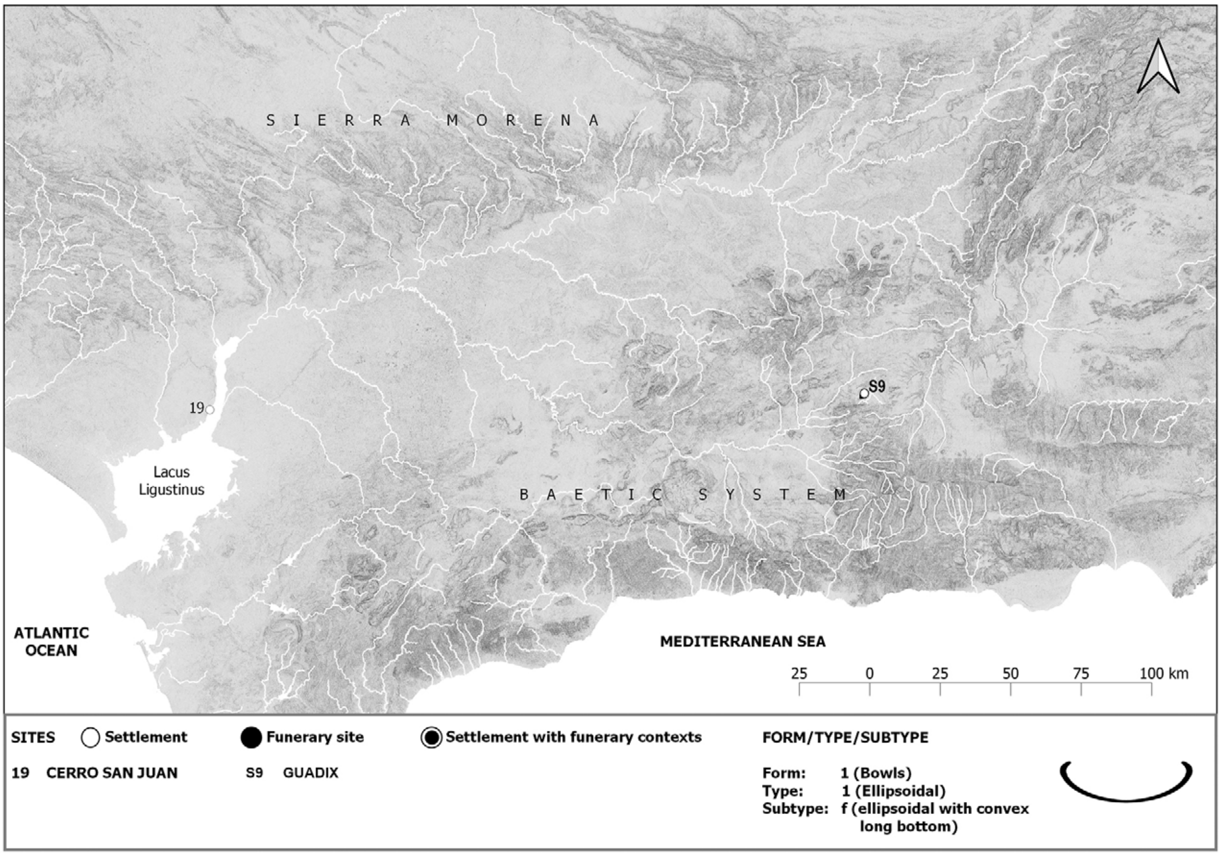
Map A3. Sites with pottery Form 1, Type 1, Subtype c.



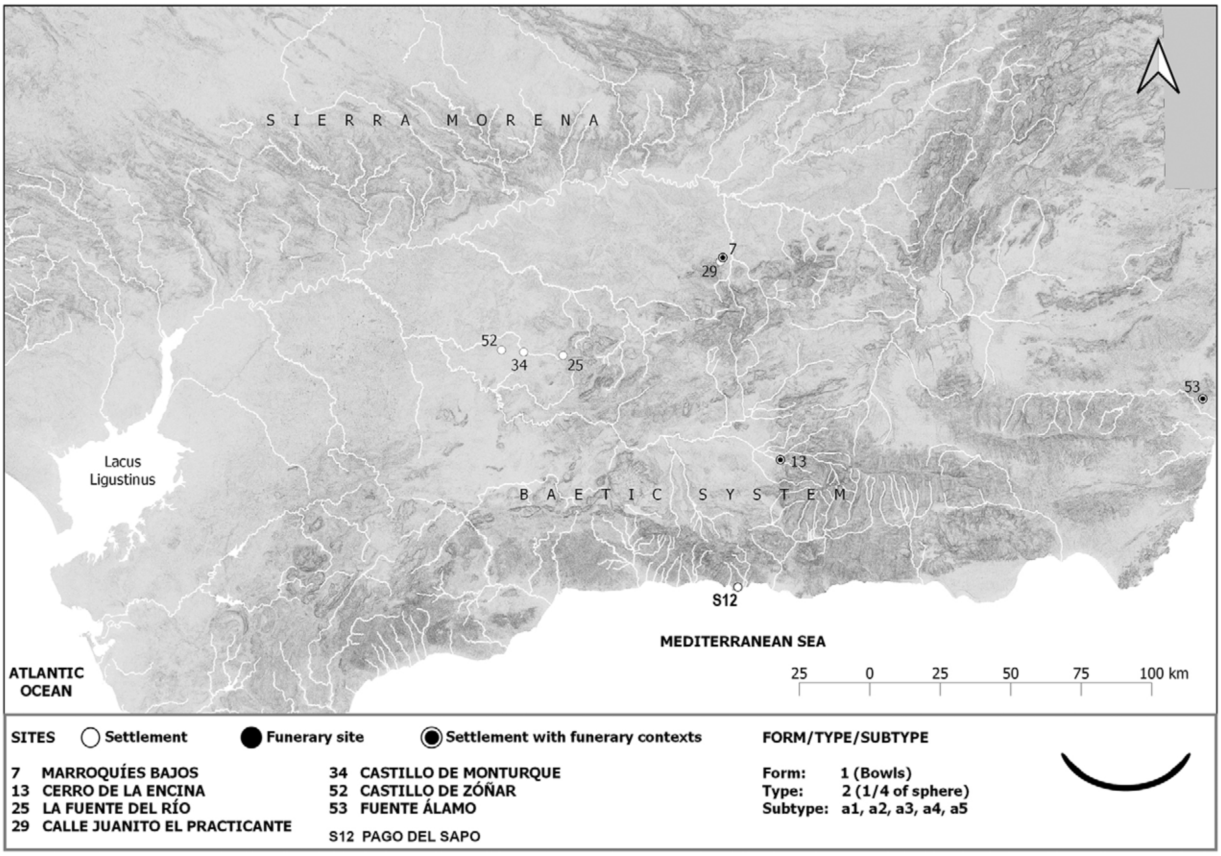
Map A4. Sites with pottery Form 1, Type 1, Subtype d.



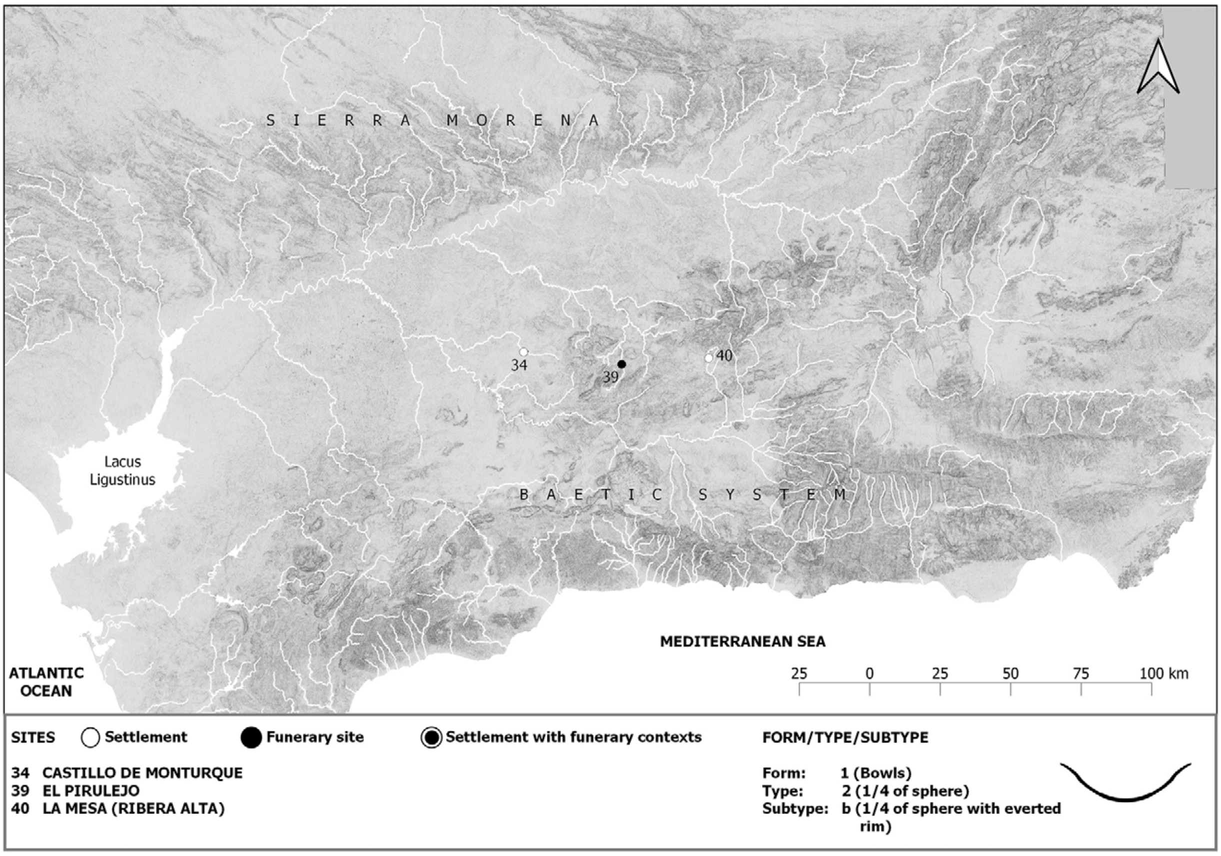
Map A5. Sites with pottery Form 1, Type 1, Subtype e.



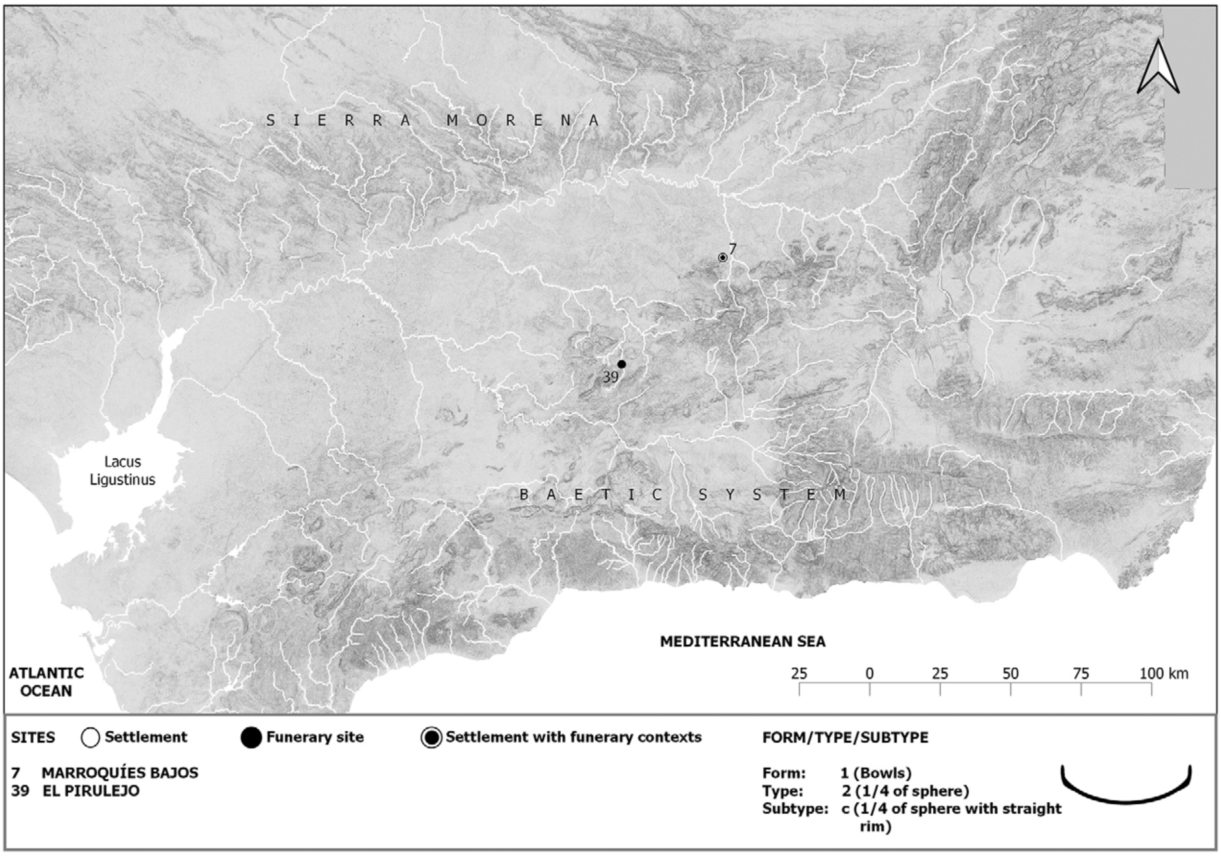
Map A6. Sites with pottery Form 1, Type 1, Subtype f.



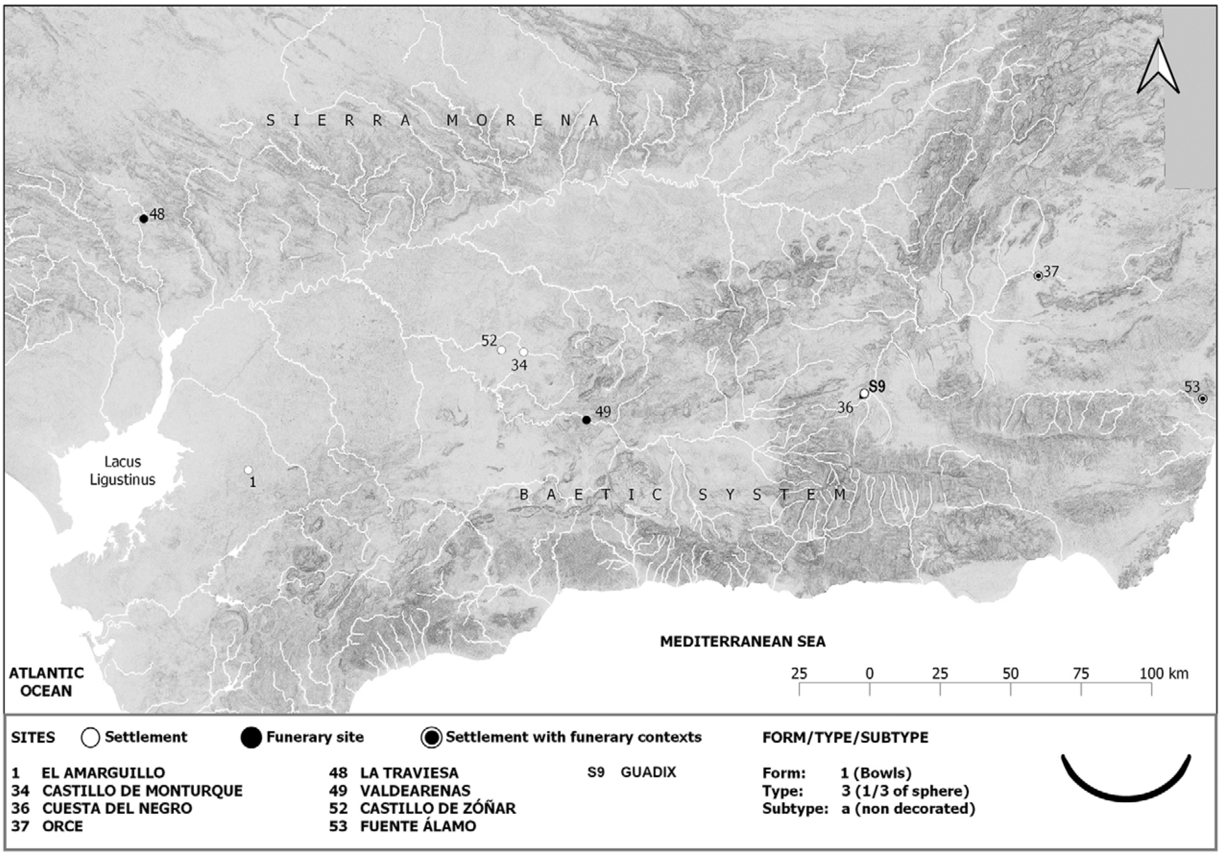
Map A7. Sites with pottery Form 1, Type 2, Subtype a.



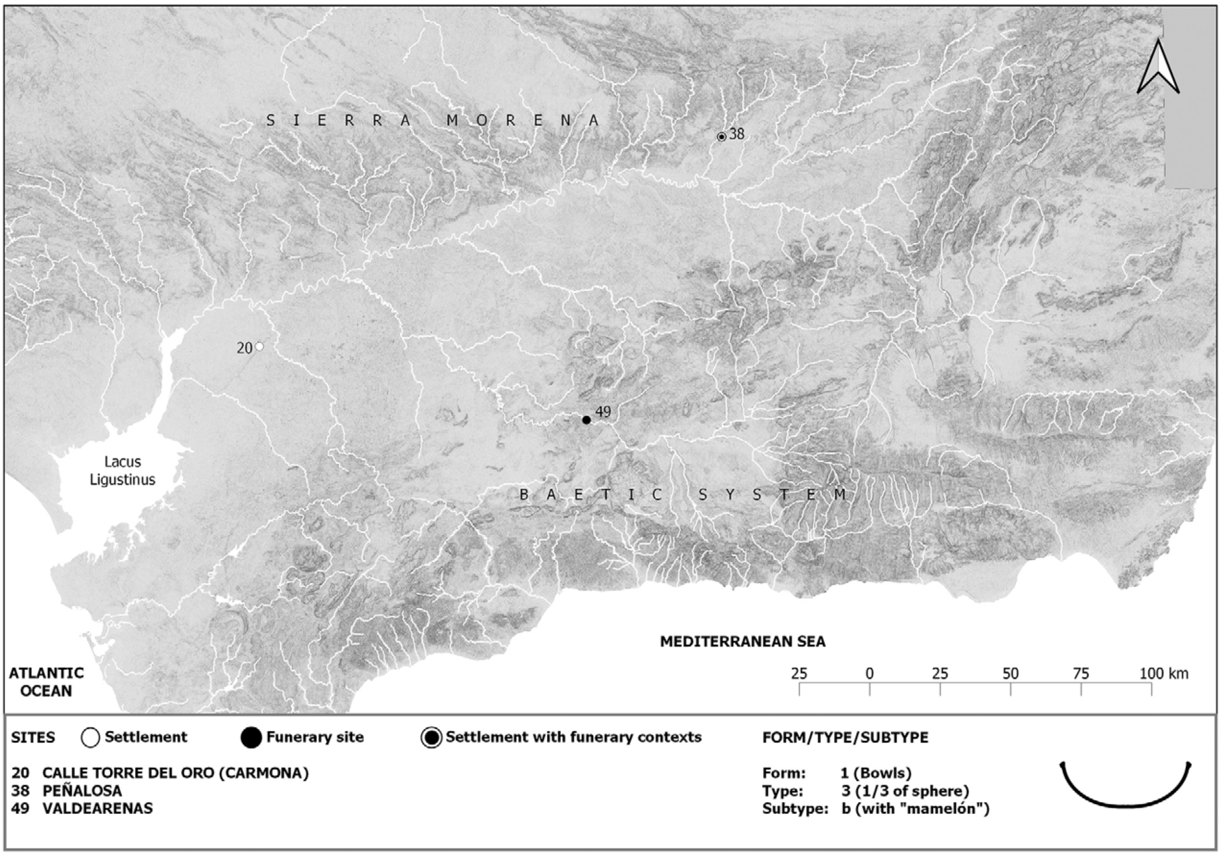
Map A8. Sites with pottery Form 1, Type 2, Subtype b.



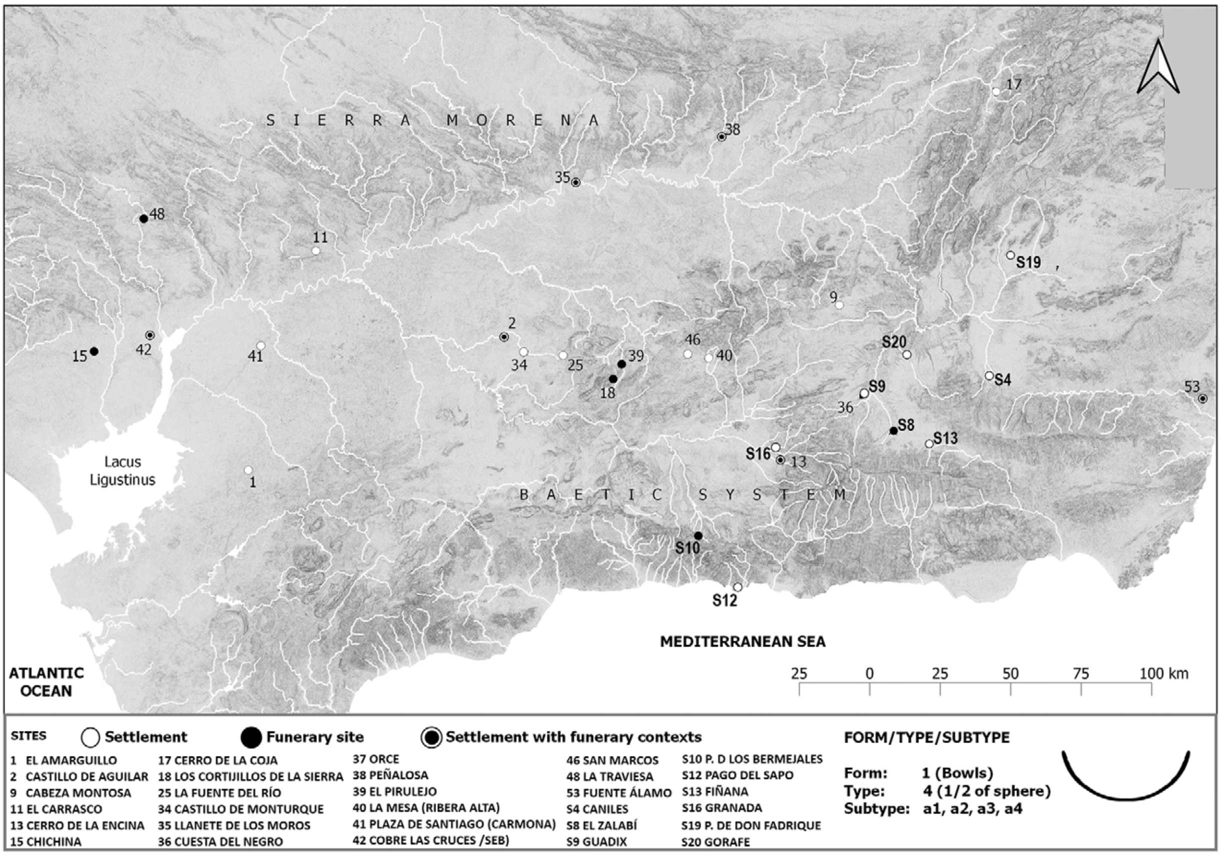
Map A9. Sites with pottery Form 1, Type 2, Subtype c.



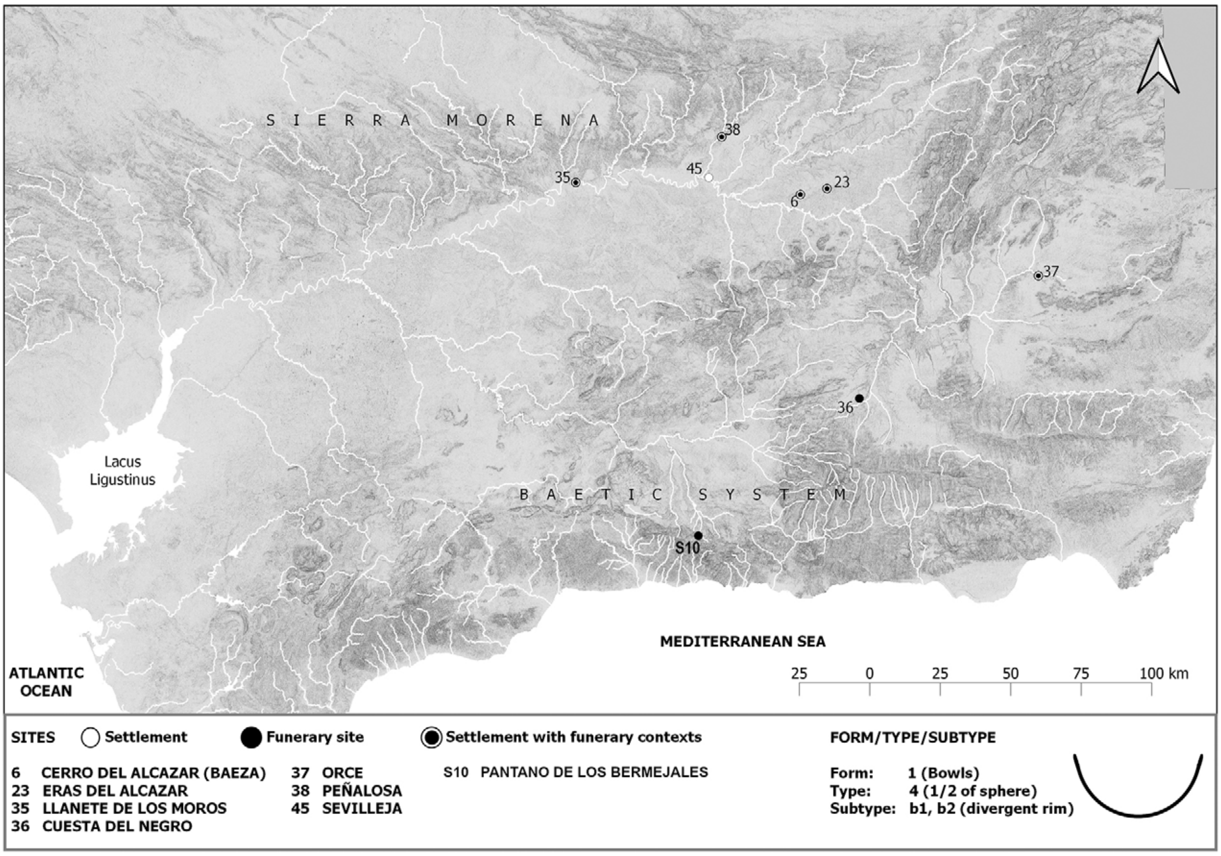
Map A10. Sites with pottery Form 1, Type 3, Subtype a.



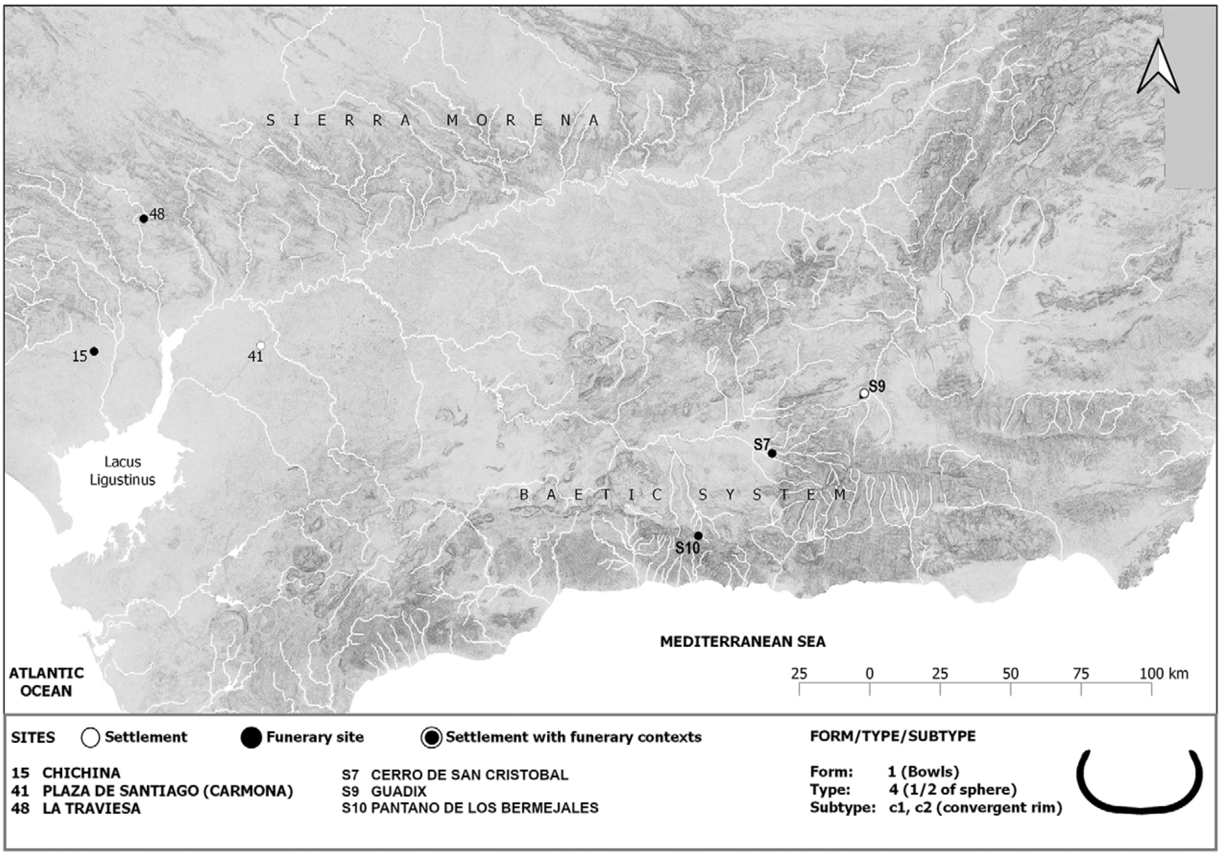
Map A11. Sites with pottery Form 1, Type 3, Subtype b.



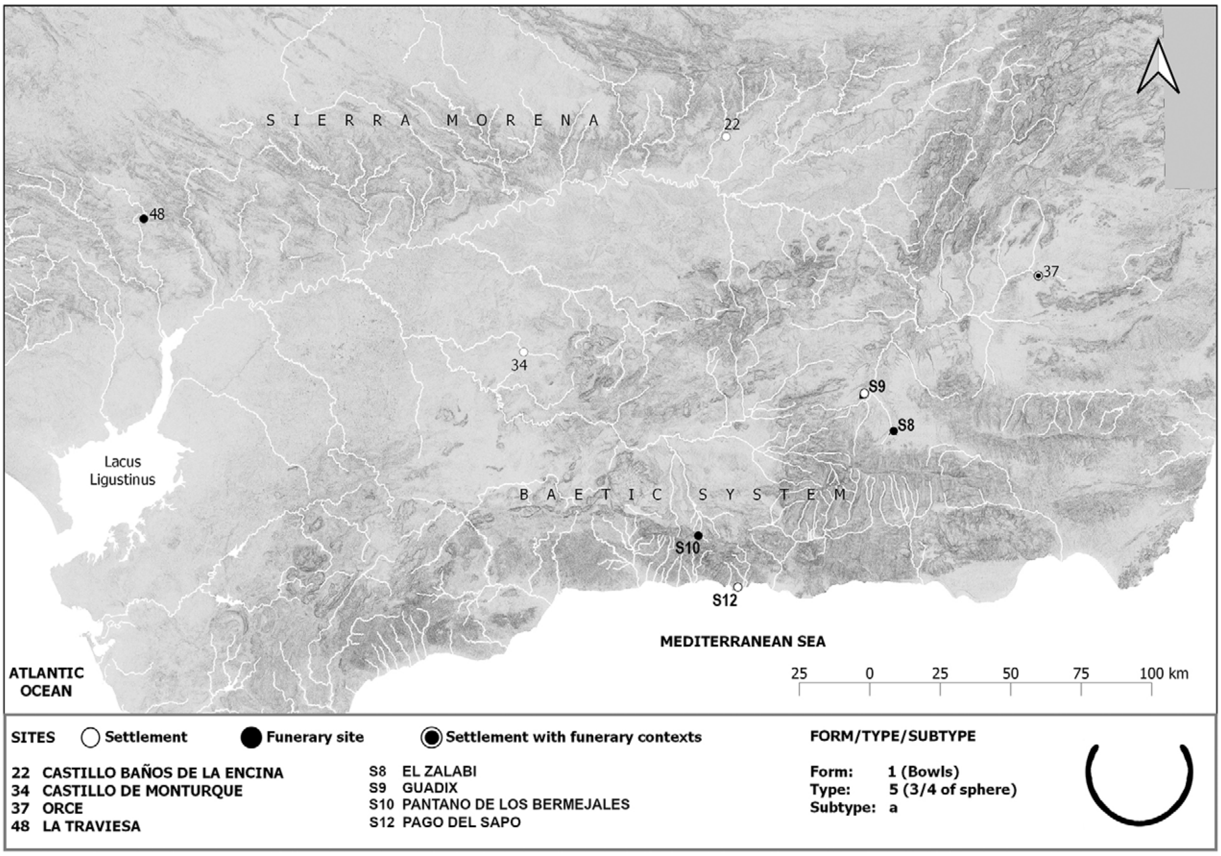
Map A12. Sites with pottery Form 1, Type 4, Subtype a.



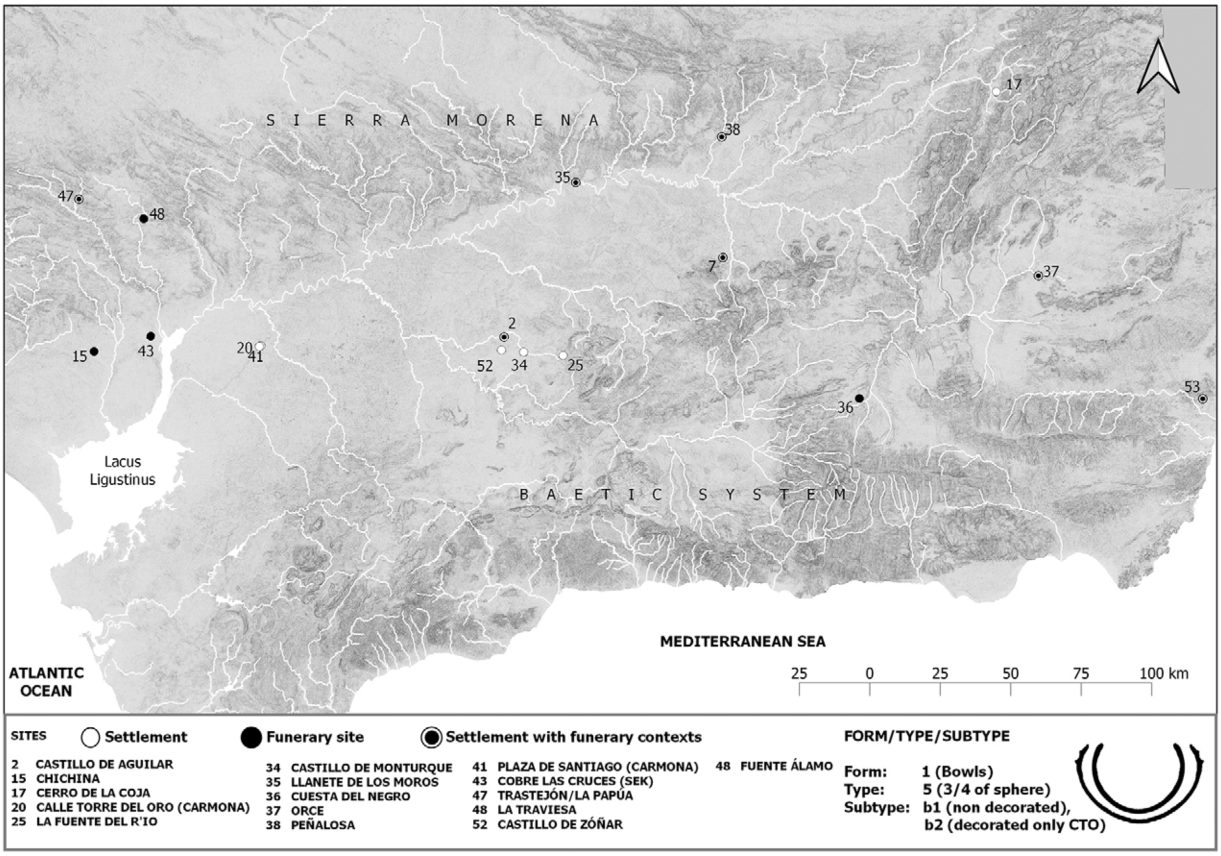
Map A13. Sites with pottery Form 1, Type 4, Subtype b.



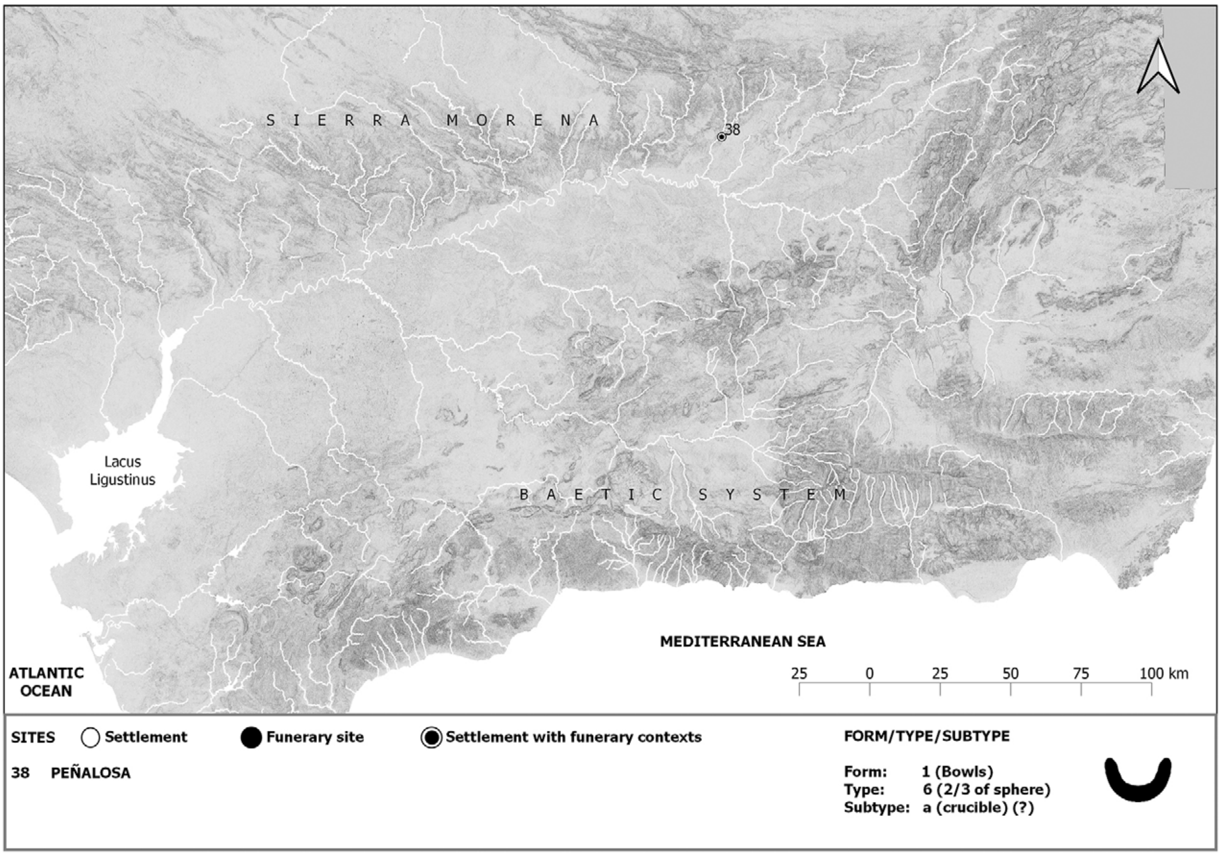
Map A14. Sites with pottery Form 1, Type 4, Subtype c.



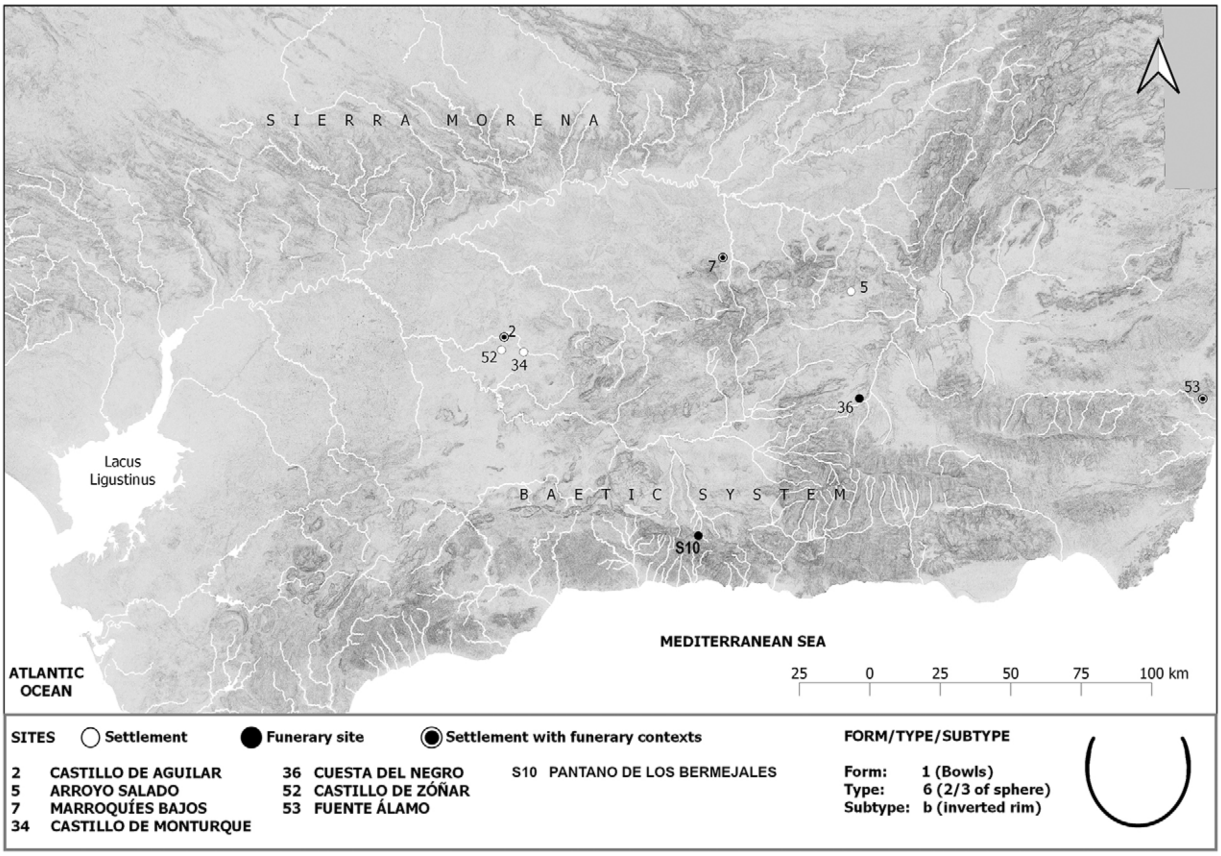
Map A15. Sites with pottery Form 1, Type 5, Subtype a.



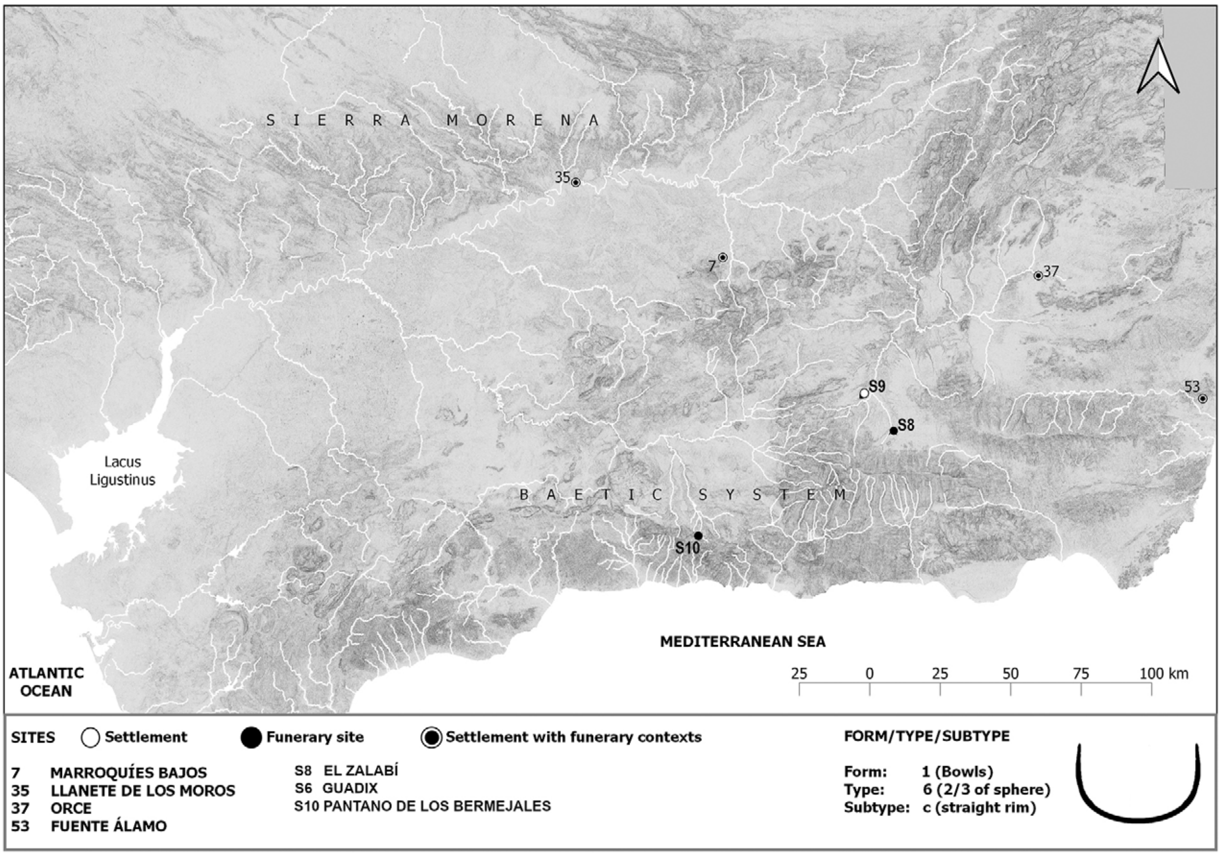
Map A16. Sites with pottery Form 1, Type 5, Subtype b.



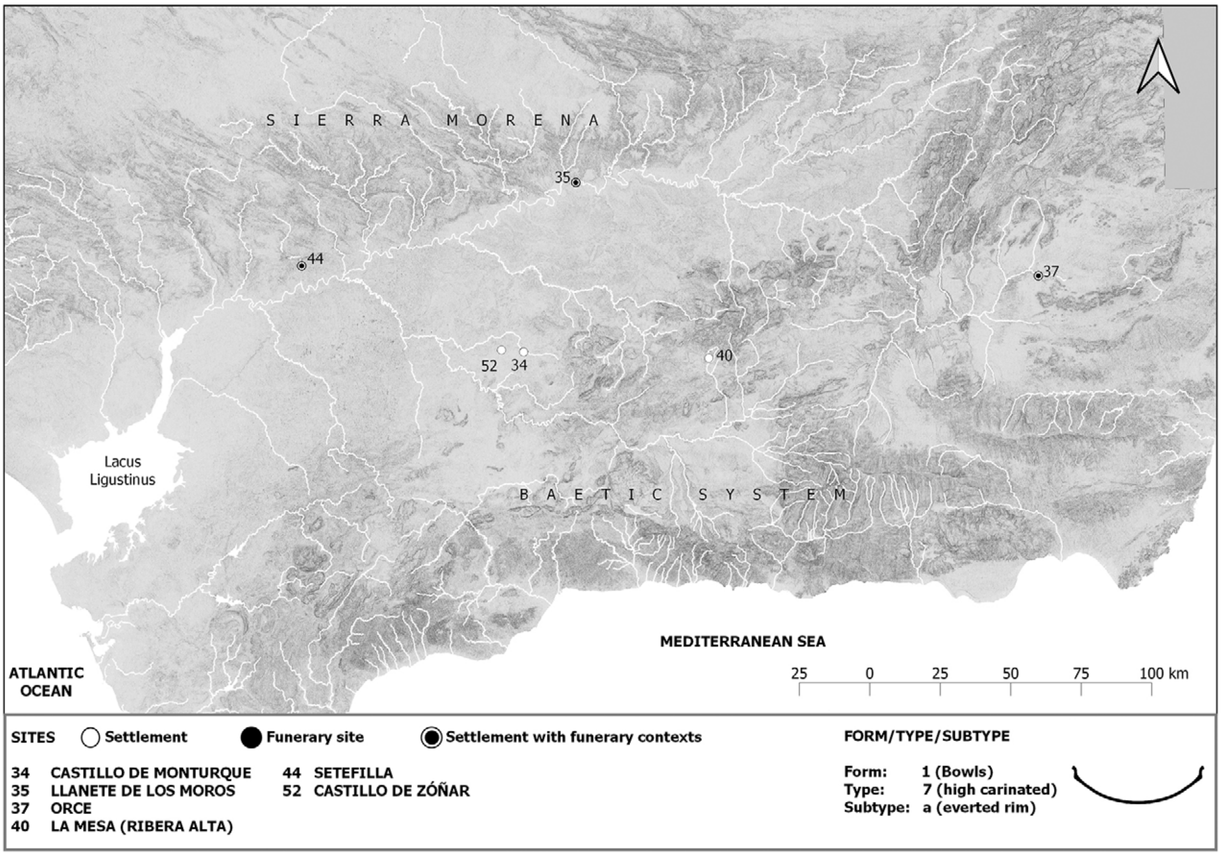
Map A17. Sites with pottery Form 1, Type 6, Subtype a.



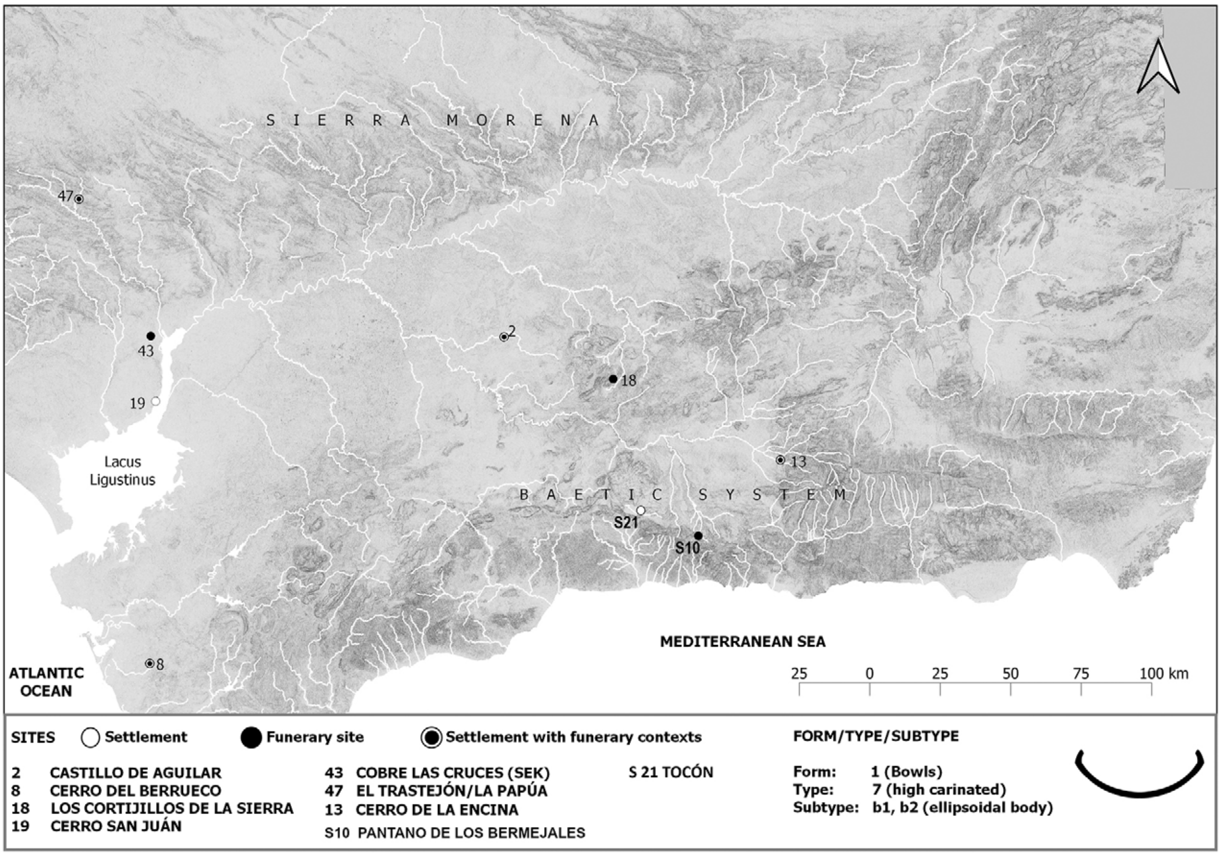
Map A18. Sites with pottery Form 1, Type 6, Subtype b.



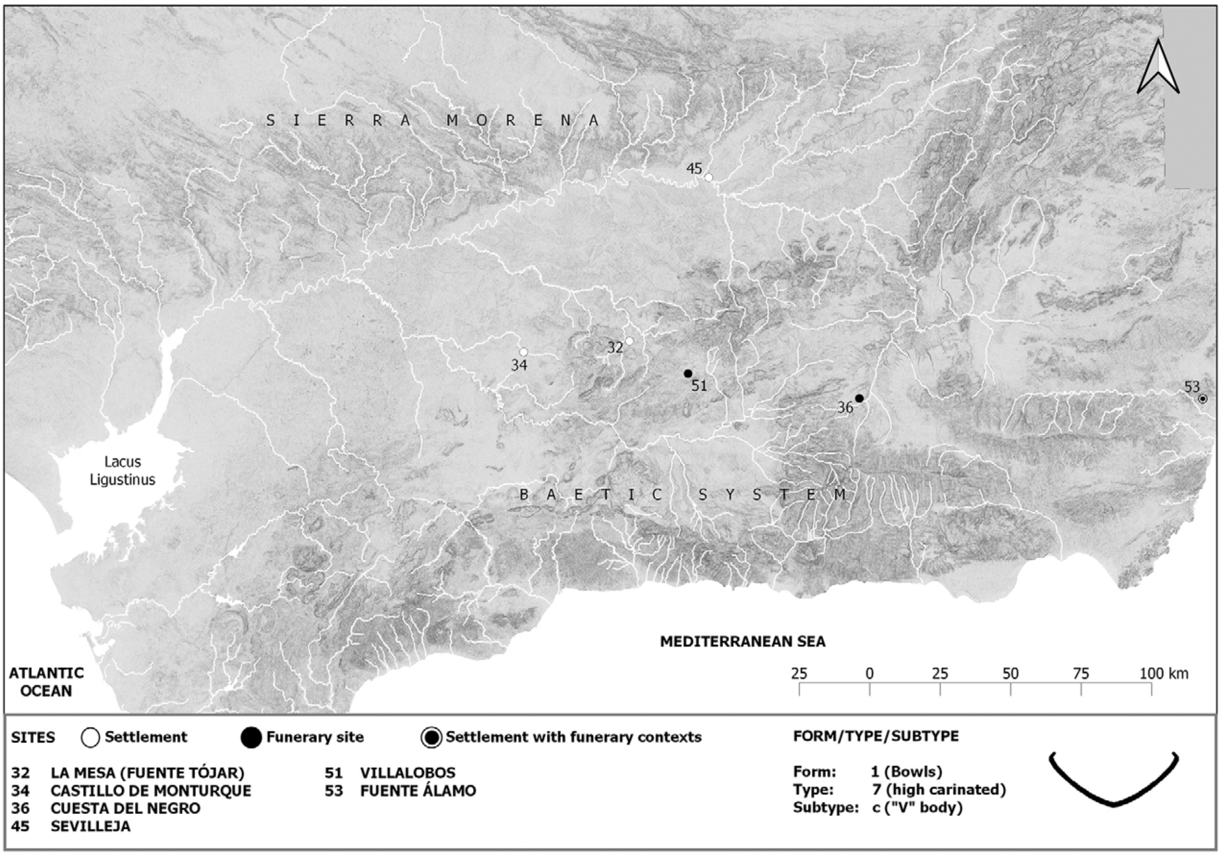
Map A19. Sites with pottery Form 1, Type 6, Subtype c.



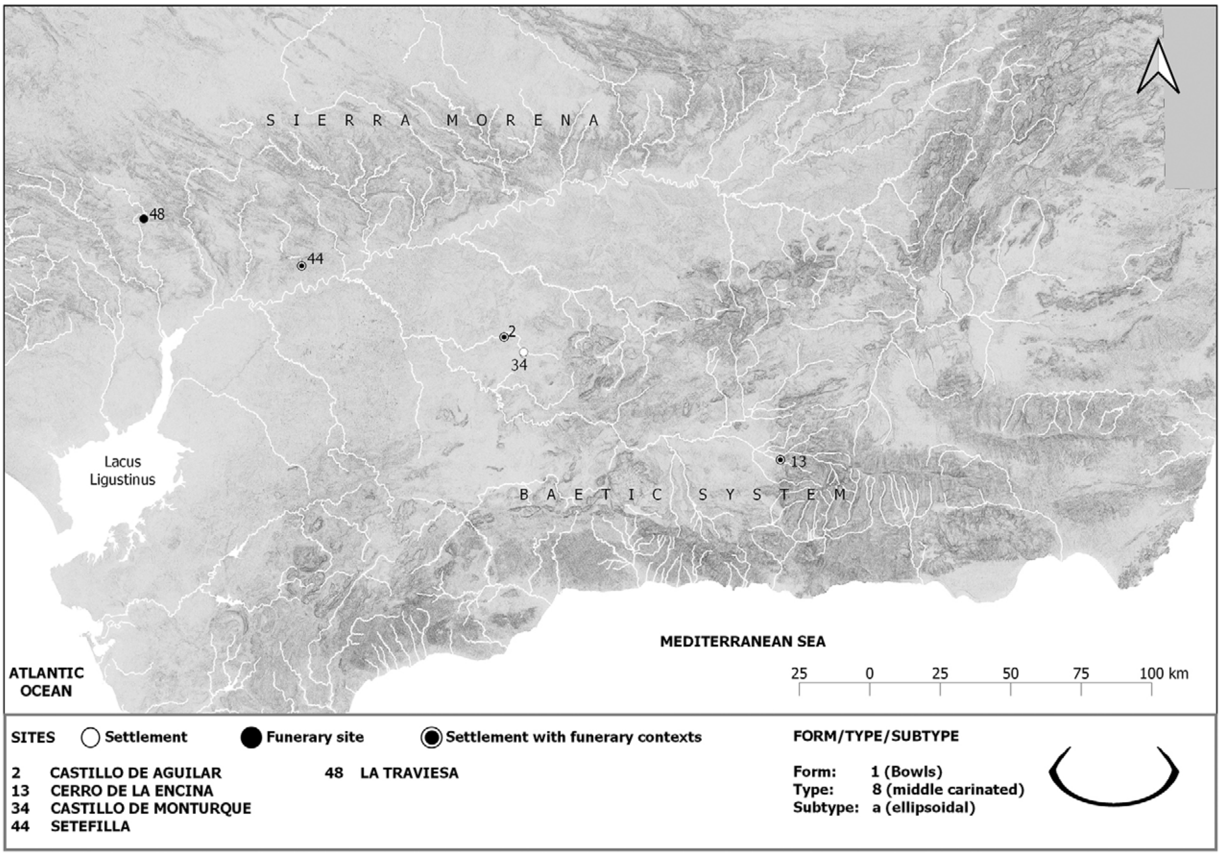
Map A20. Sites with pottery Form 1, Type 7, Subtype a.



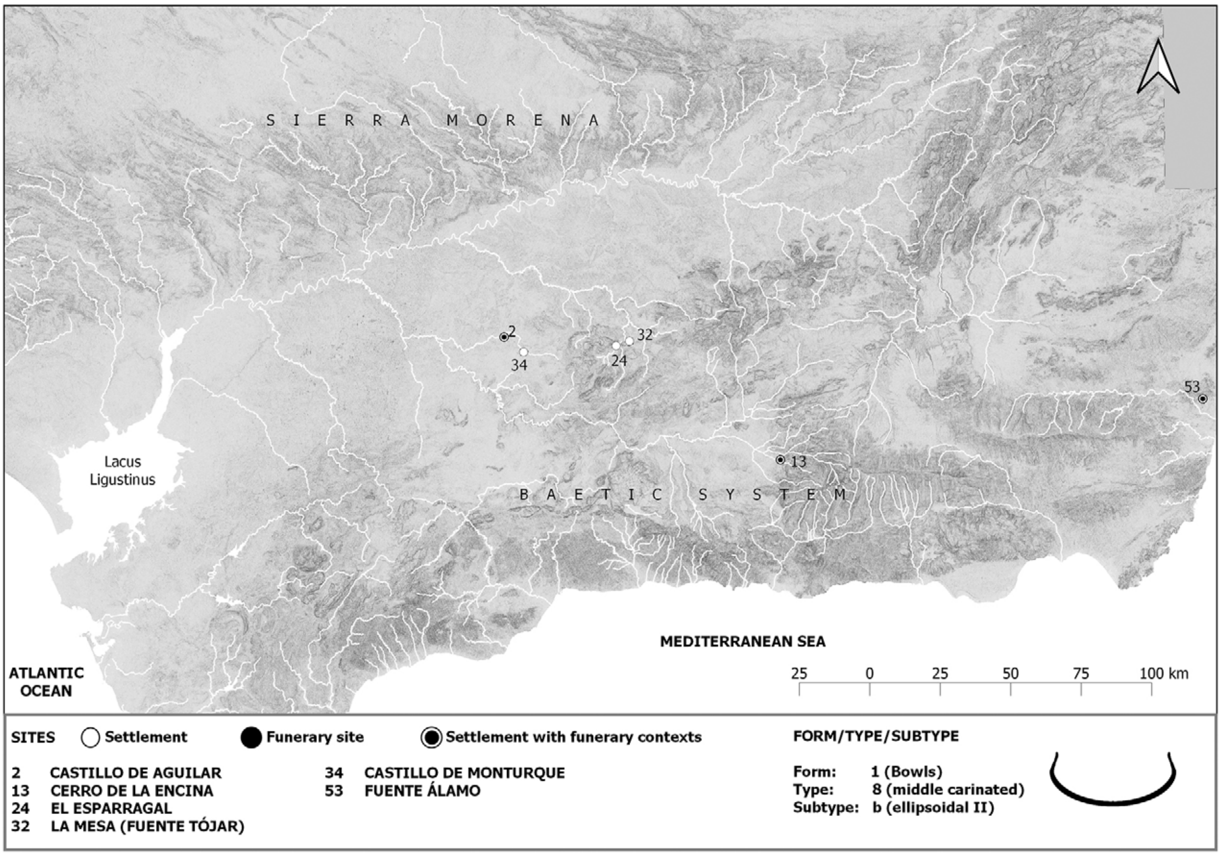
Map A21. Sites with pottery Form 1, Type 7, Subtype b.



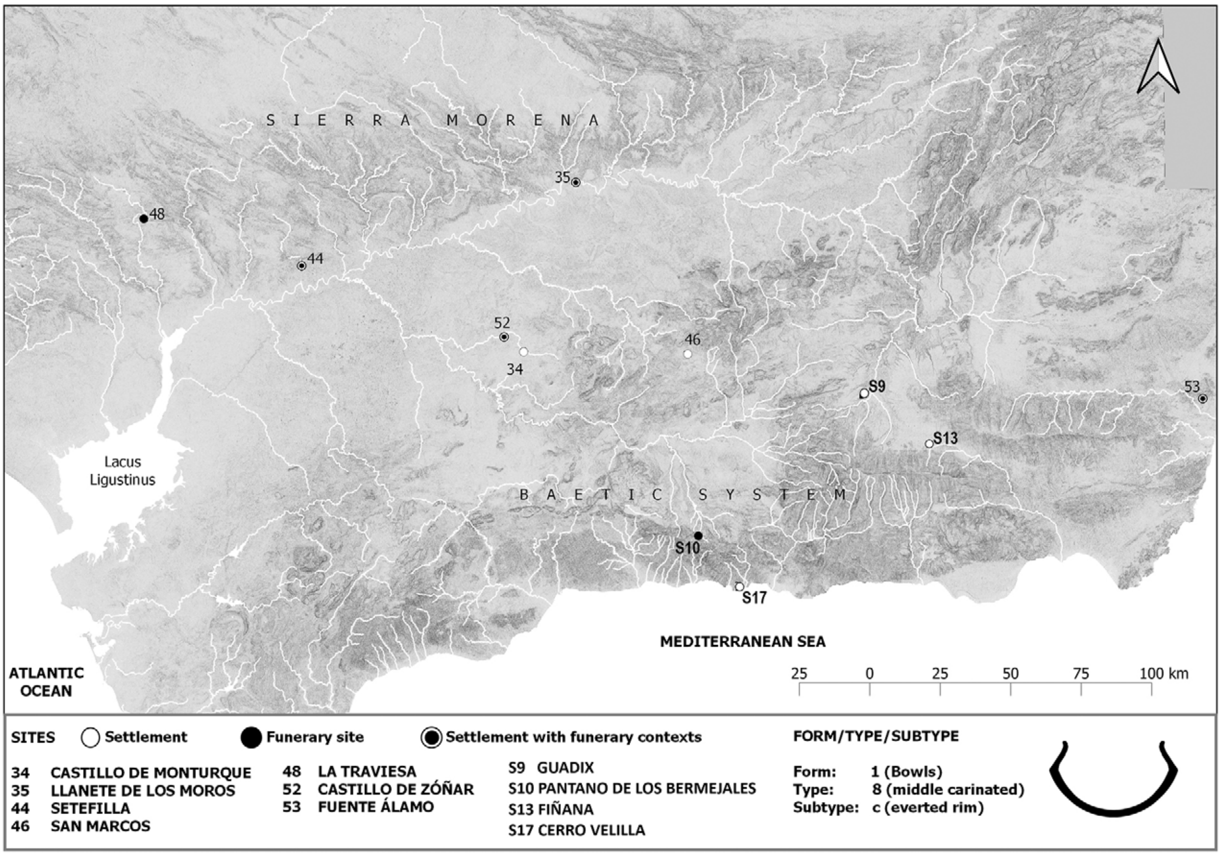
Map A22. Sites with pottery Form 1, Type 7, Subtype c.



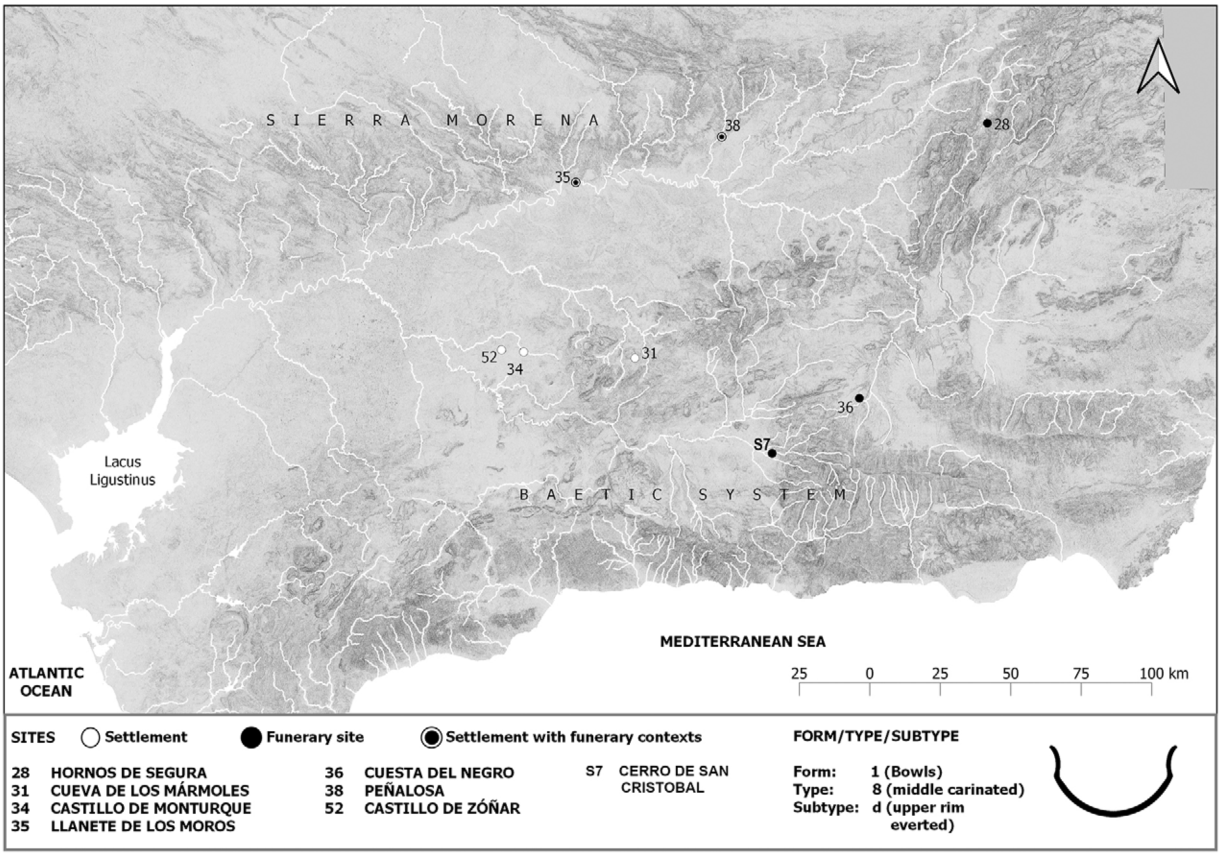
Map A23. Sites with pottery Form 1, Type 8, Subtype a.



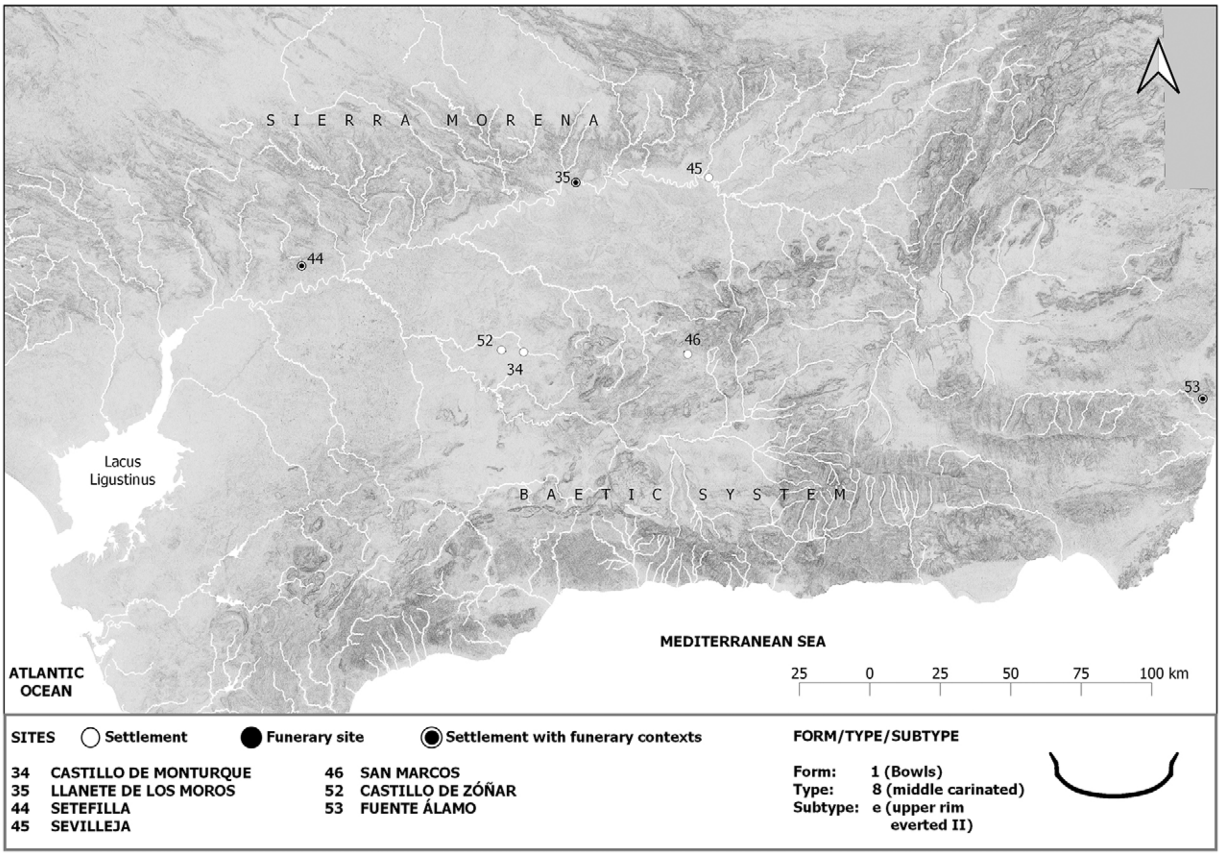
Map A24. Sites with pottery Form 1, Type 8, Subtype b.



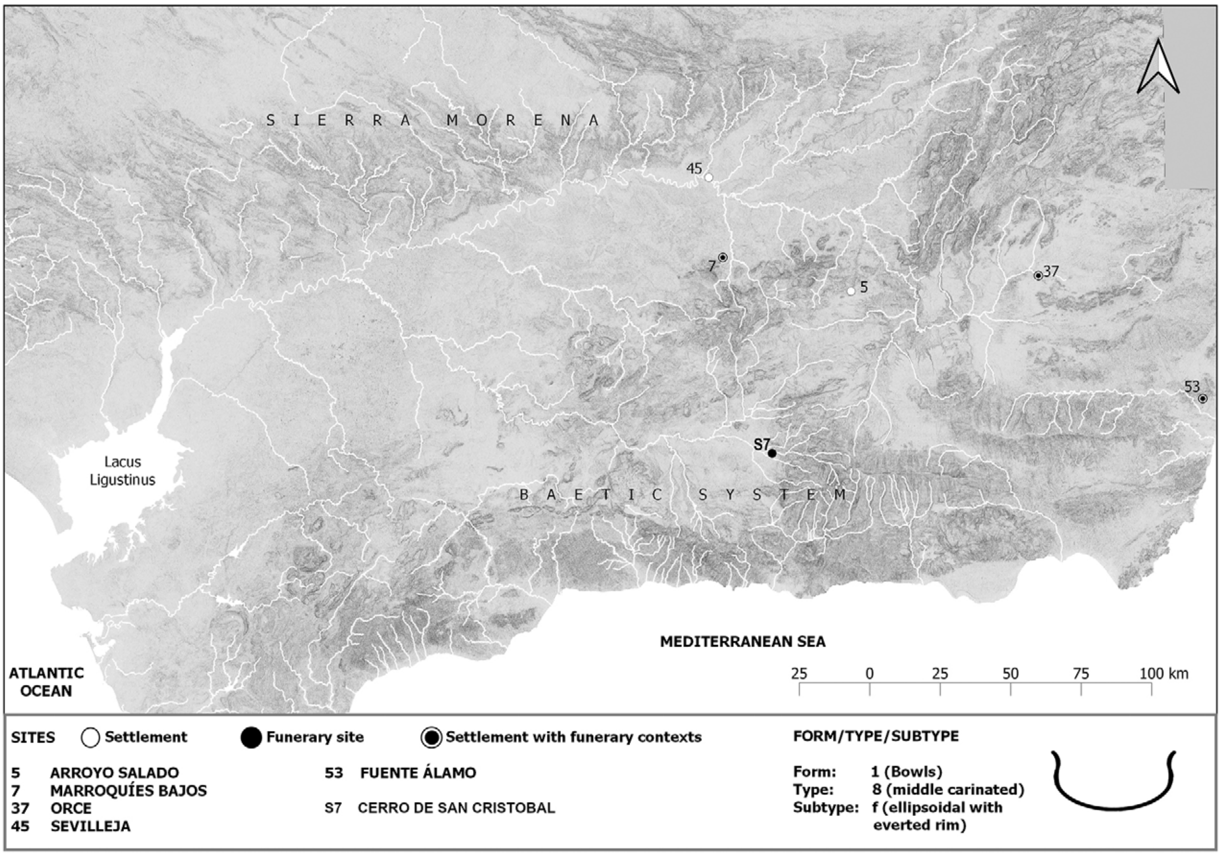
Map A25. Sites with pottery Form 1, Type 8, Subtype c.



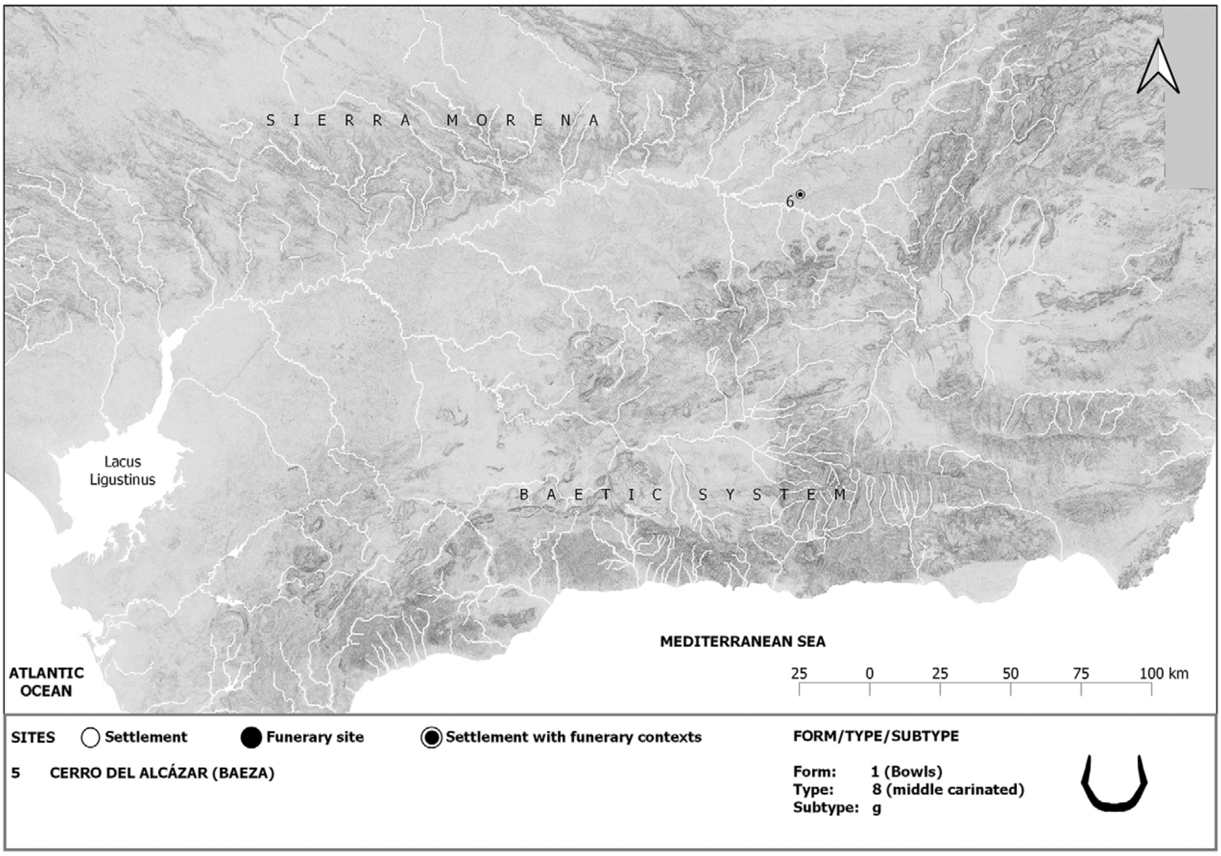
Map A26. Sites with pottery Form 1, Type 8, Subtype d.



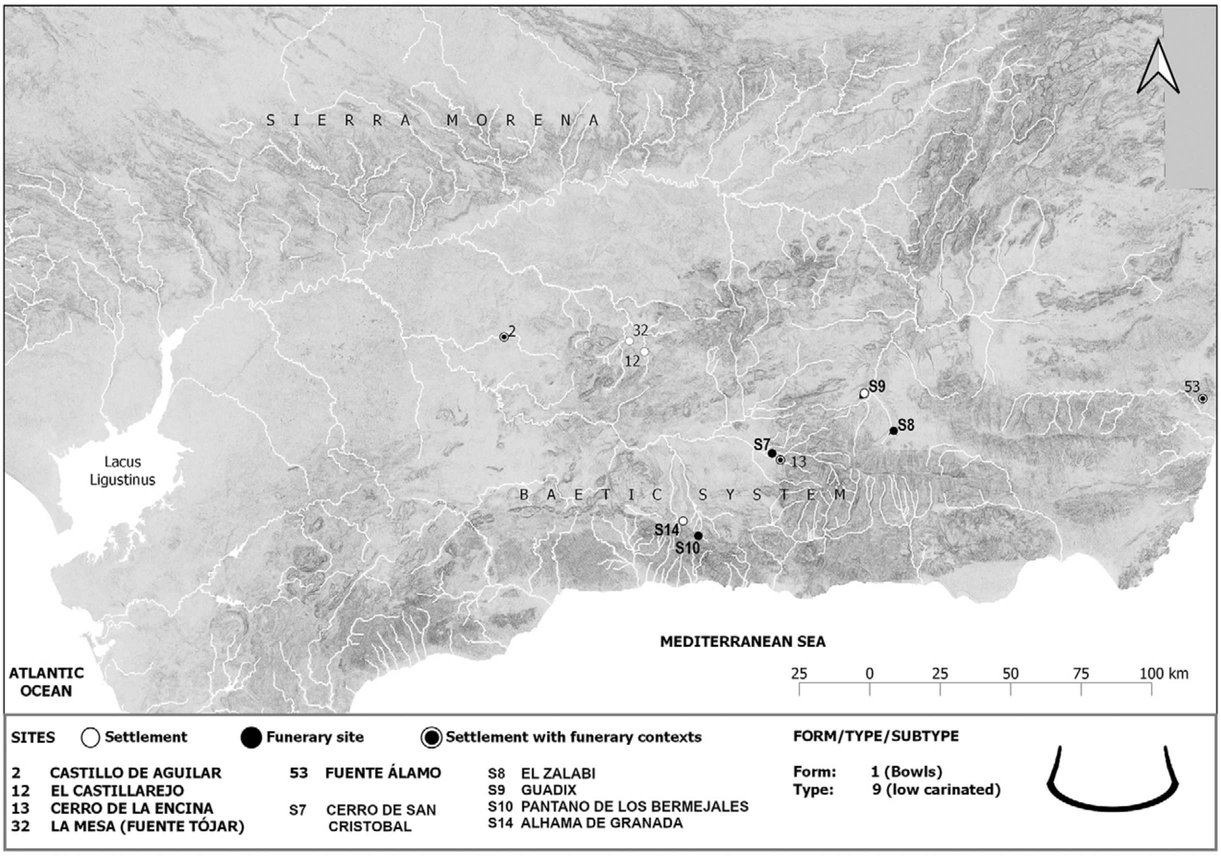
Map A27. Sites with pottery Form 1, Type 8, Subtype e.



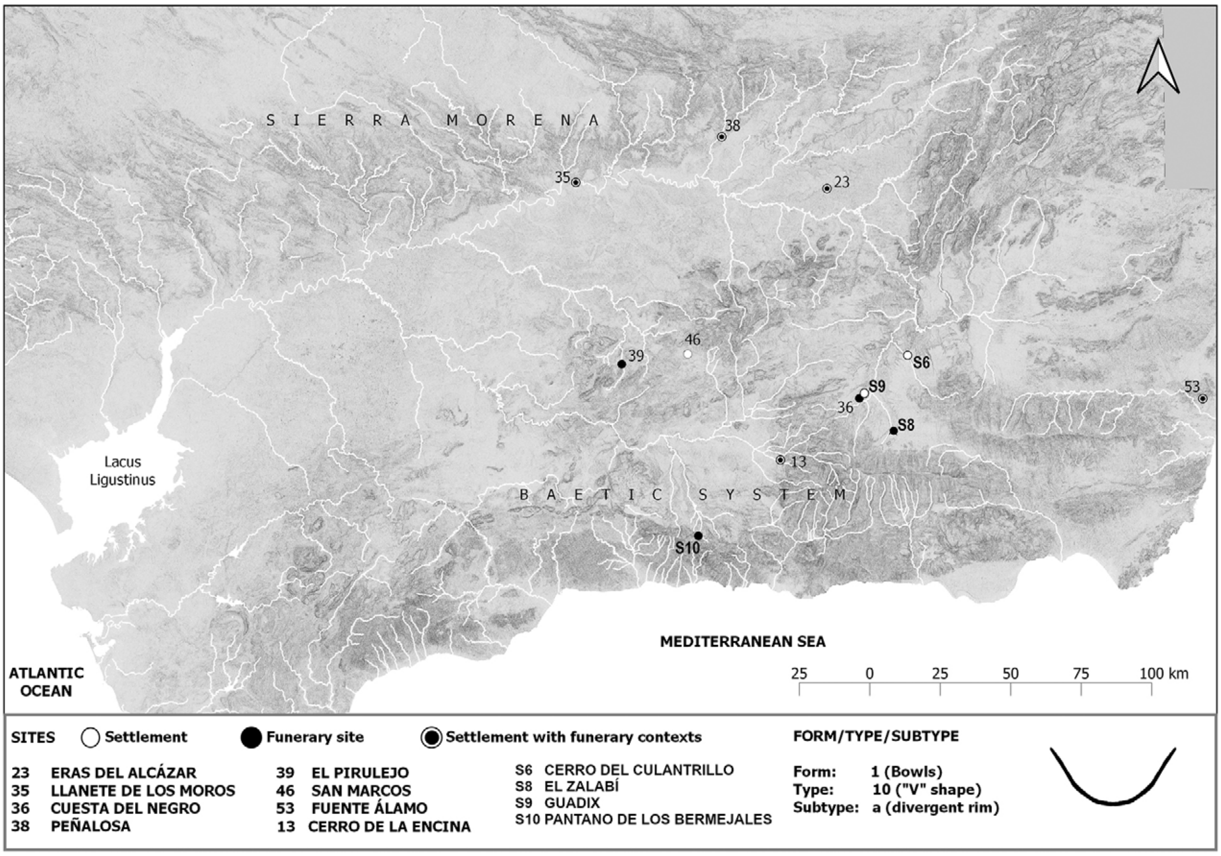
Map A28. Sites with pottery Form 1, Type 8, Subtype f.



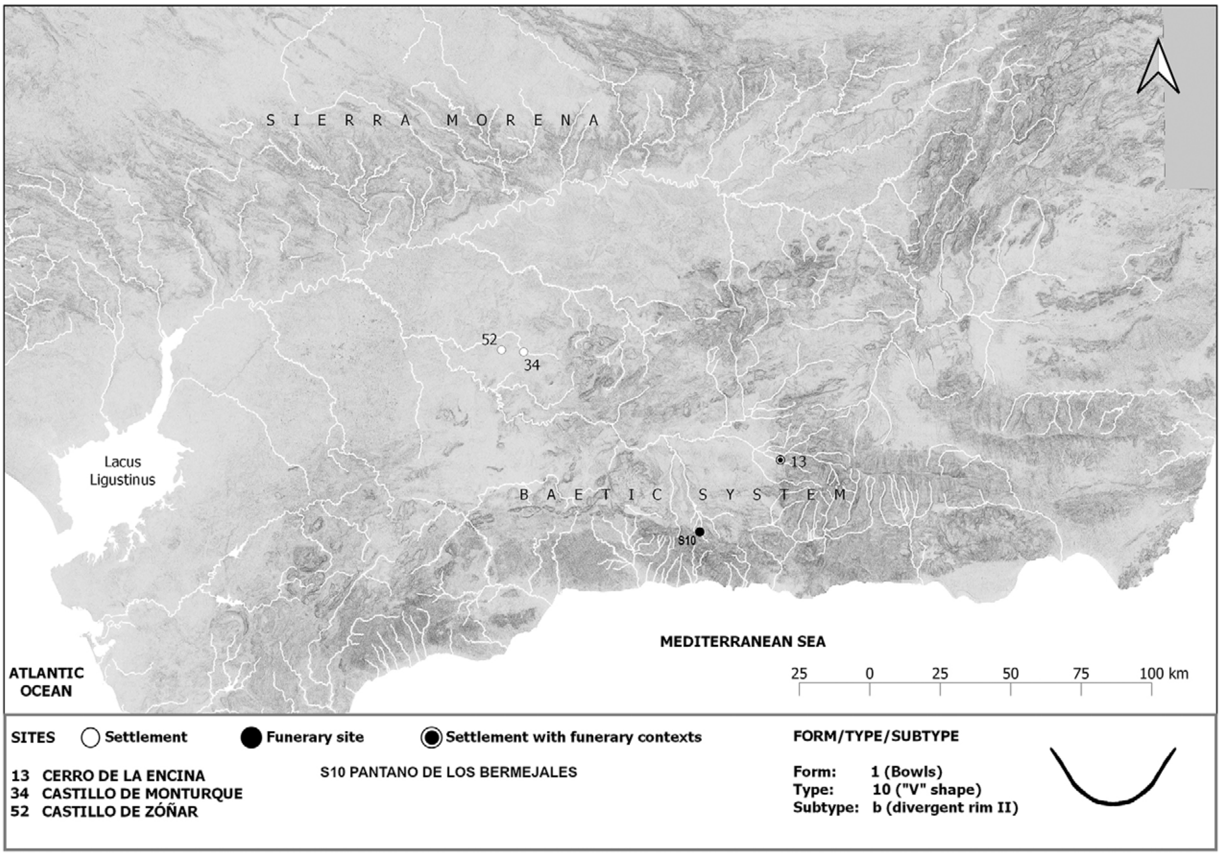
Map A29. Sites with pottery Form 1, Type 8, Subtype g.



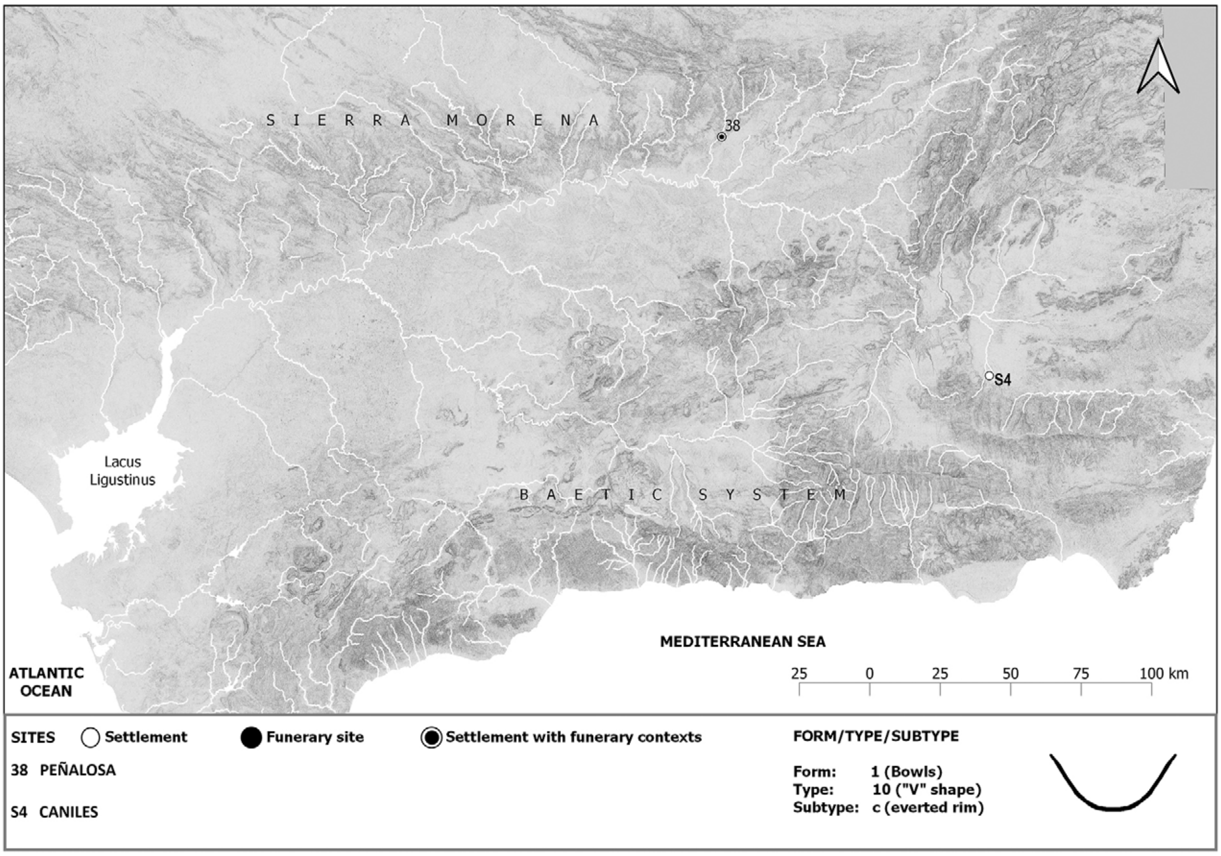
Map A30. Sites with pottery Form 1, Type 9.



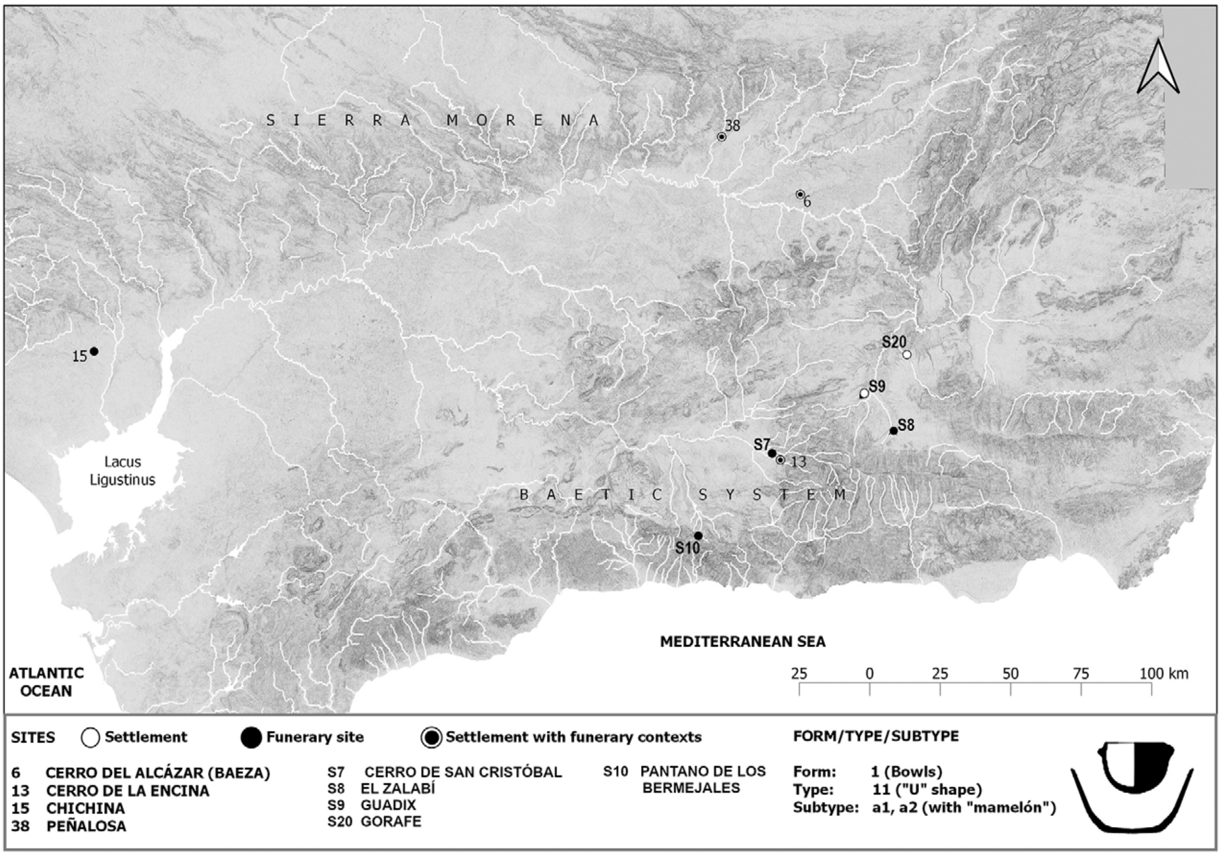
Map A31. Sites with pottery Form 1, Type 10, Subtype a.



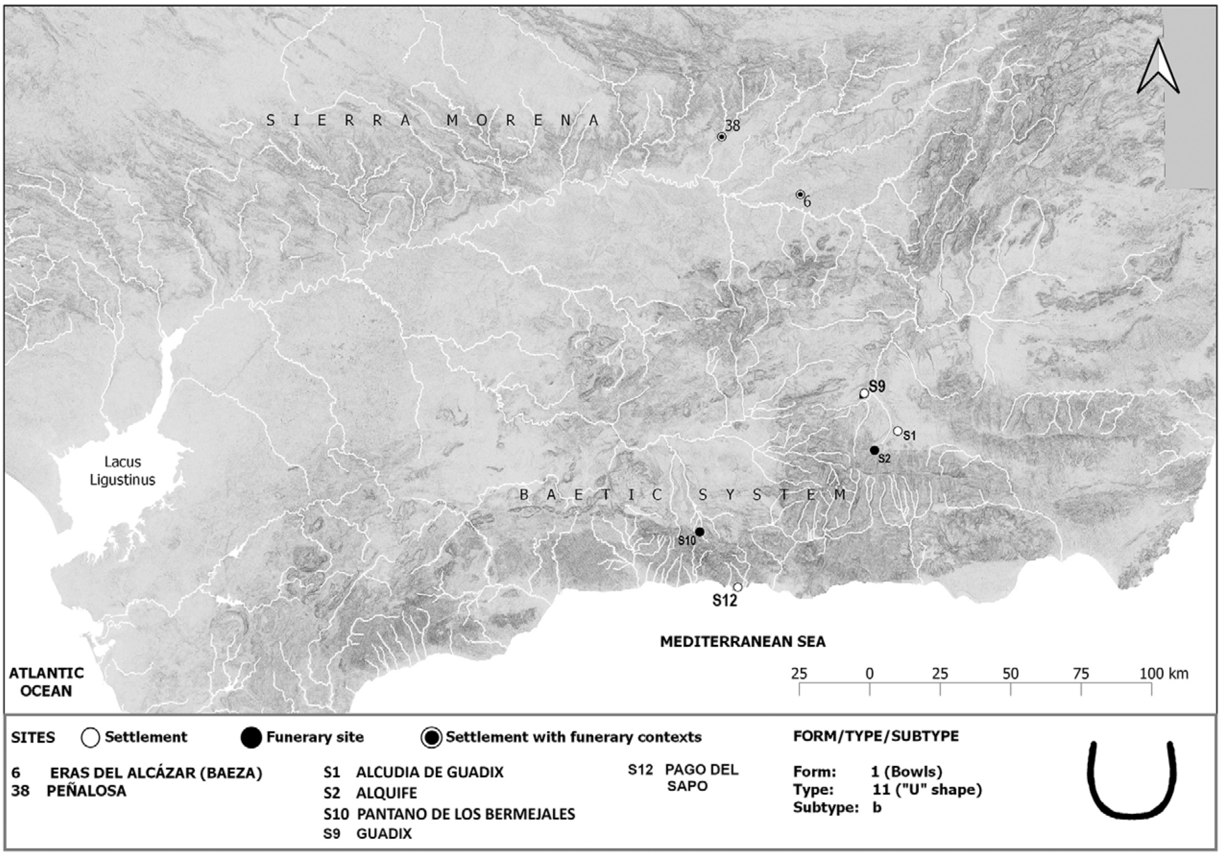
Map A32. Sites with pottery Form 1, Type 10, Subtype b.



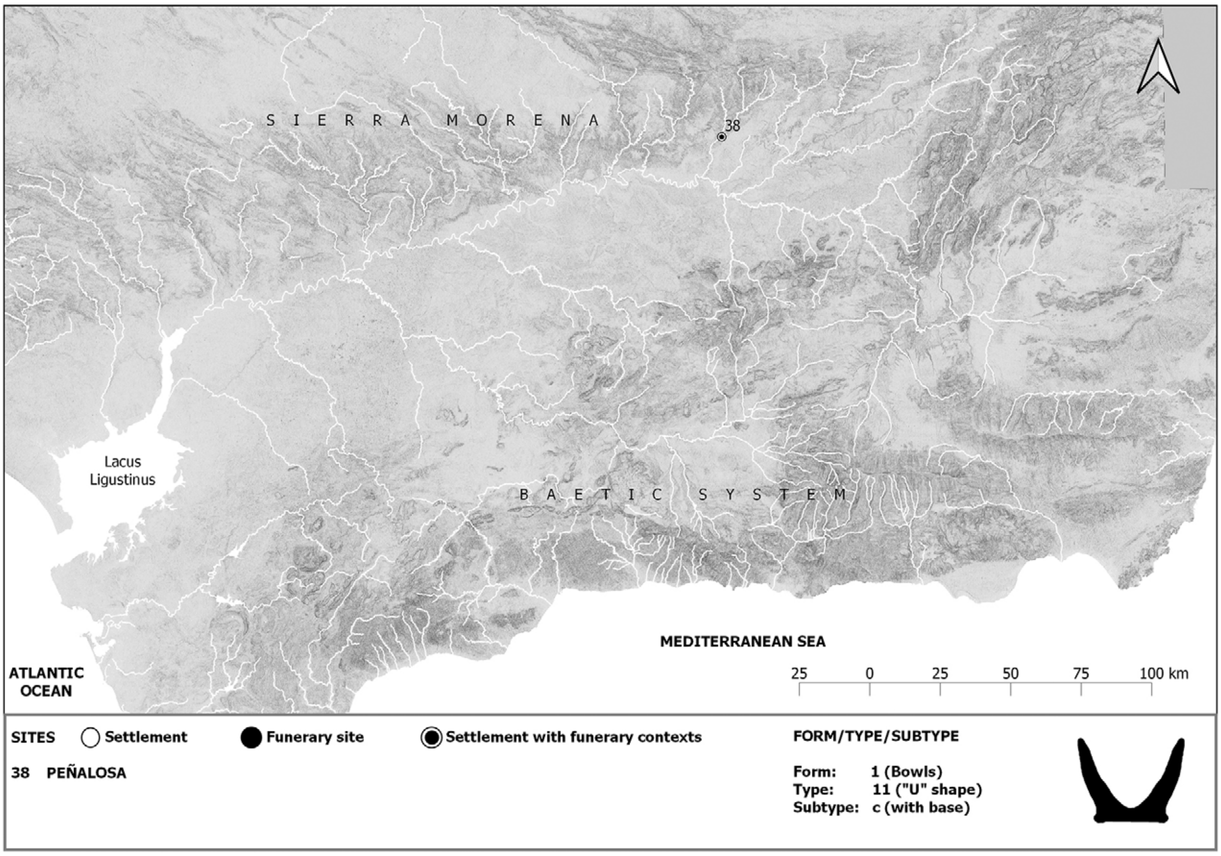
Map A33. Sites with pottery Form 1, Type 10, Subtype c.



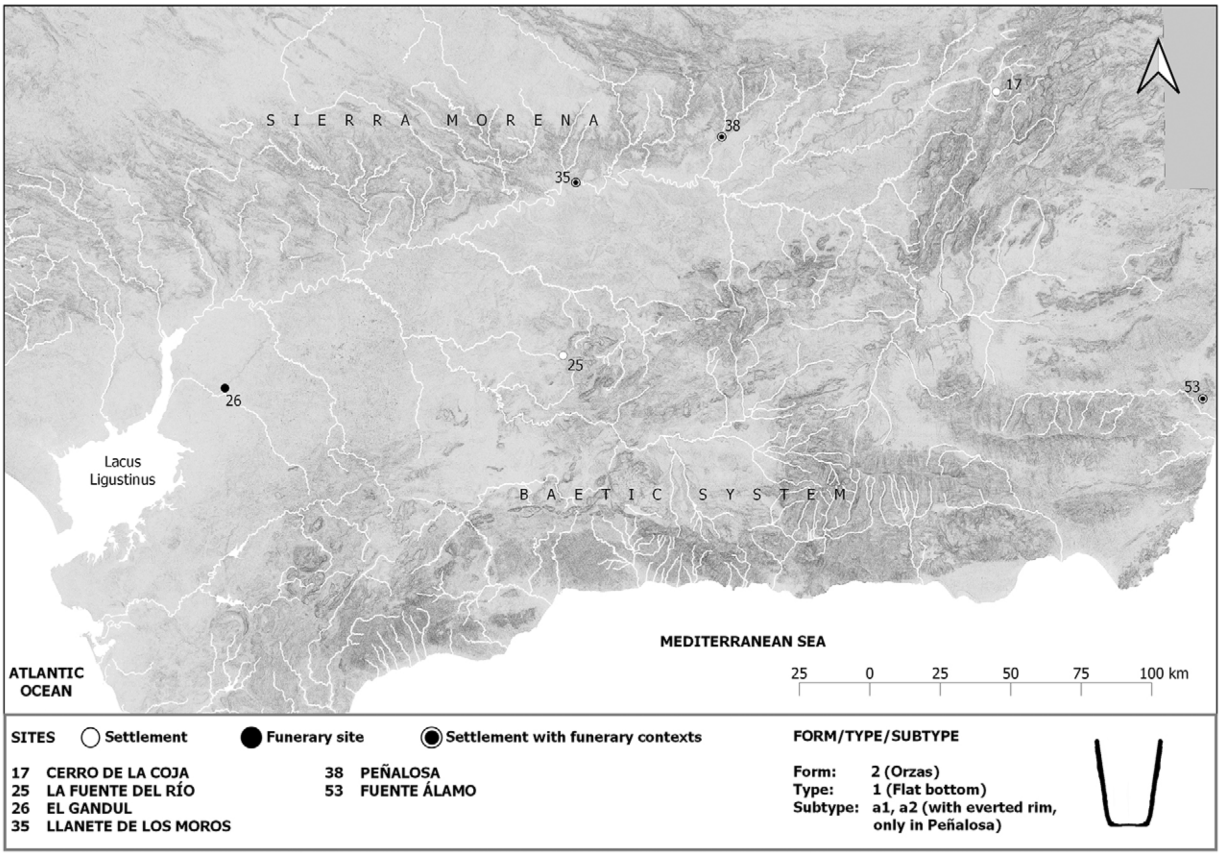
Map A34. Sites with pottery Form 1, Type 11, Subtype a.



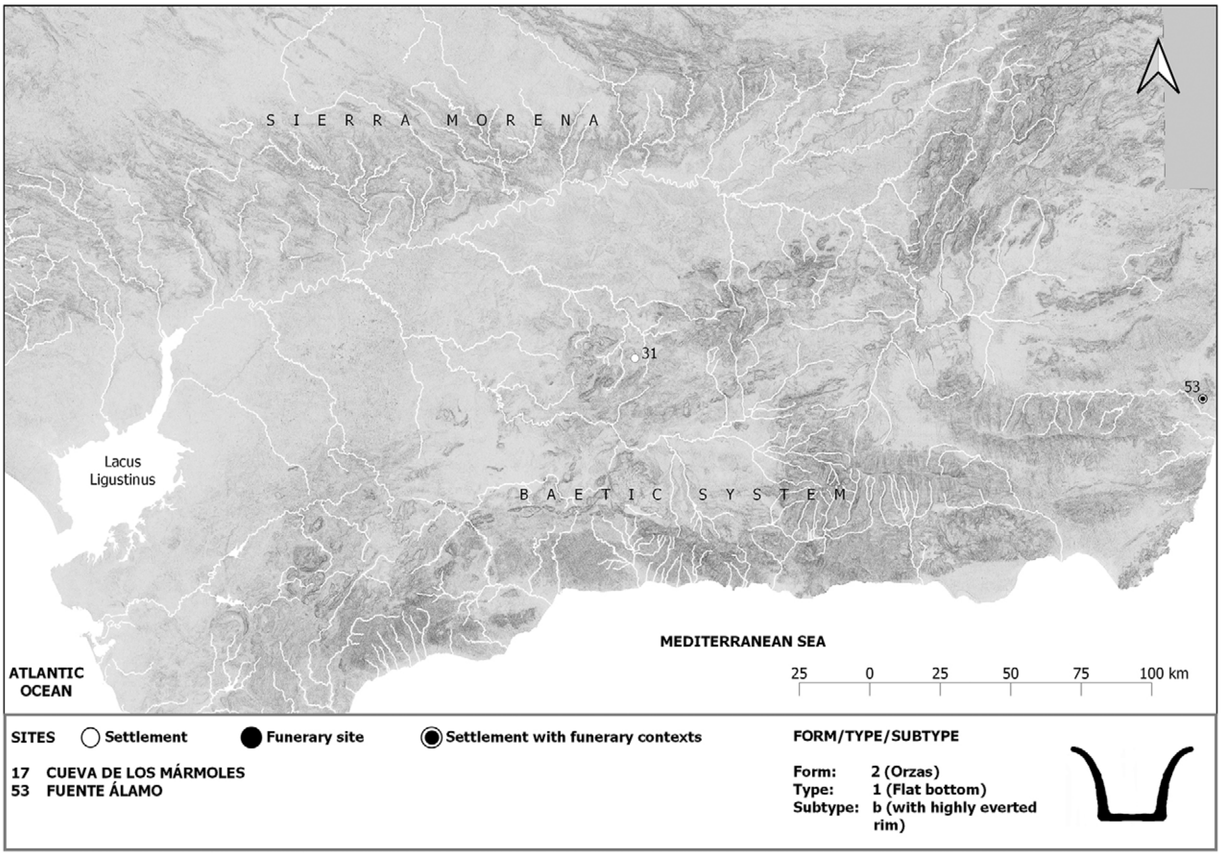
Map A35. Sites with pottery Form 1, Type 11, Subtype b.



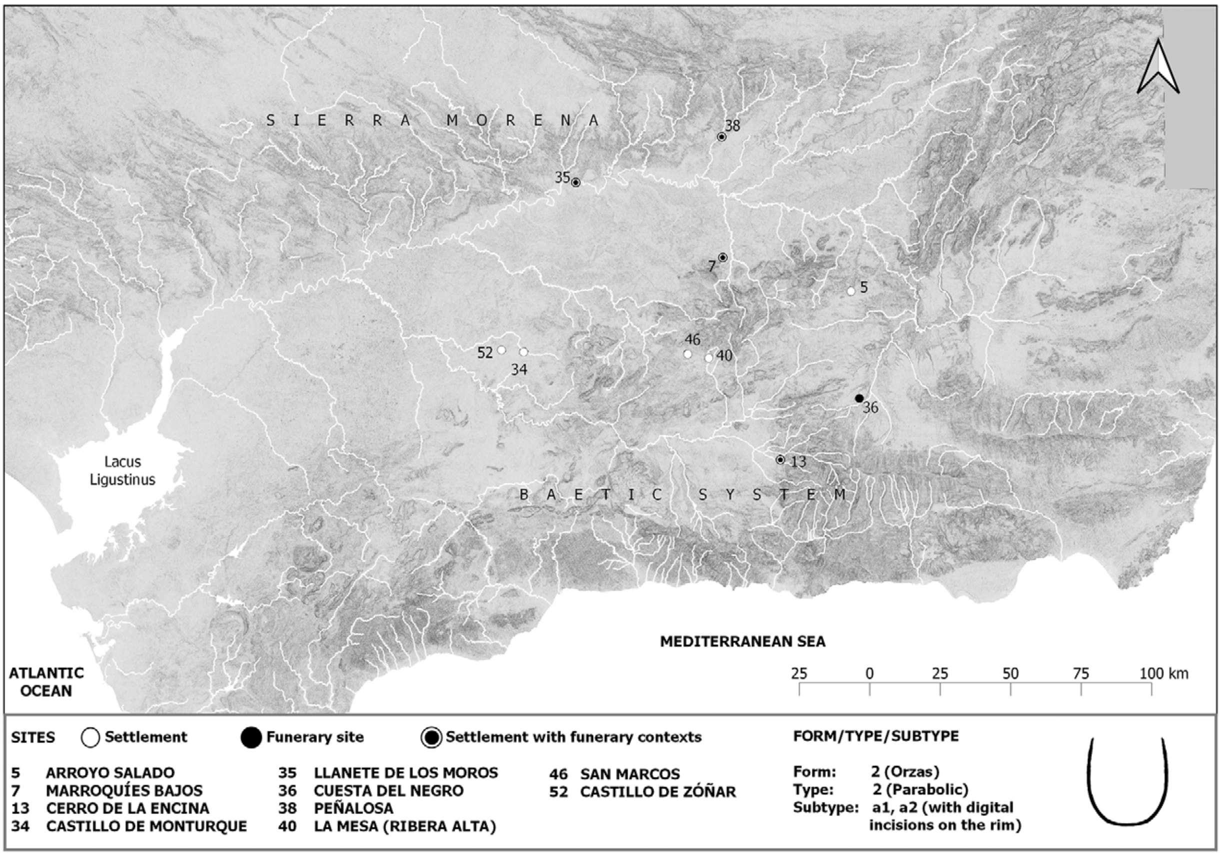
Map A36. Sites with pottery Form 1, Type 11, Subtype c.



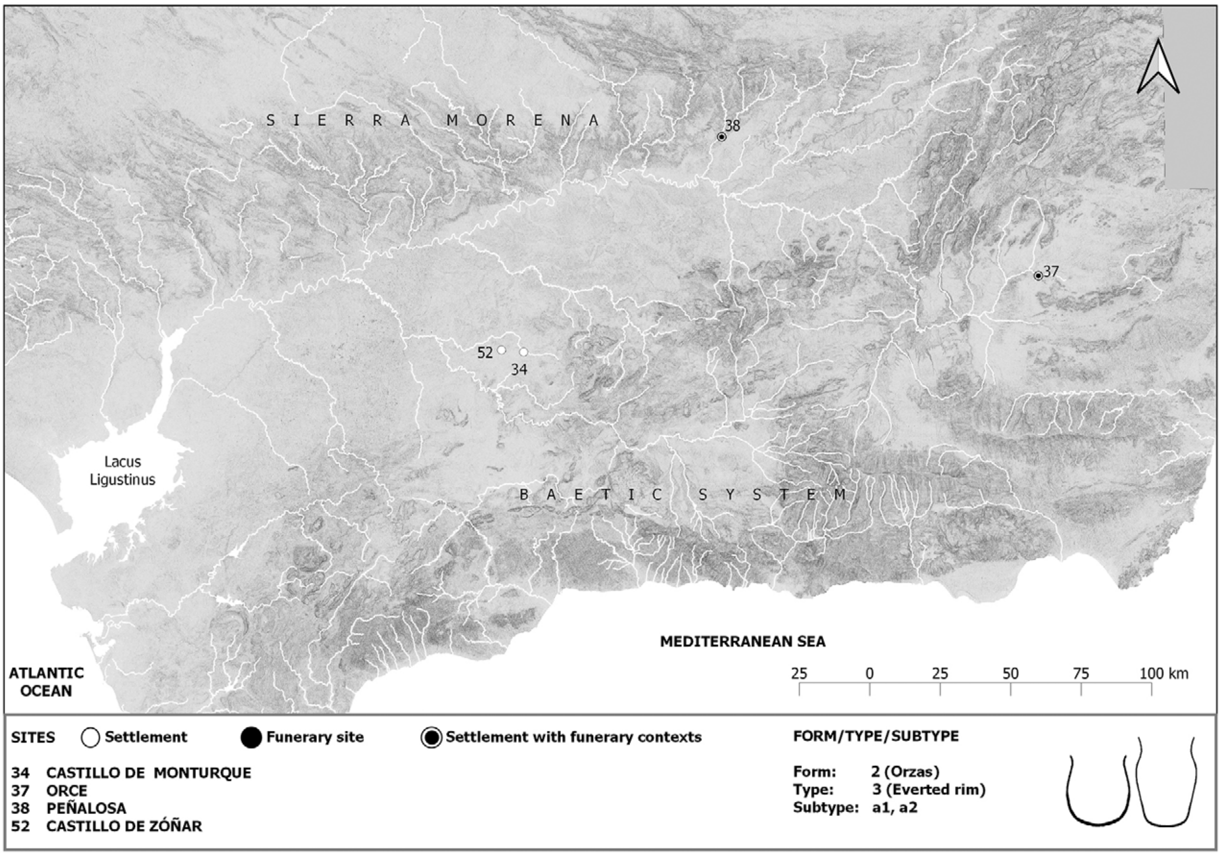
Map A37. Sites with pottery Form 2, Type 1, Subtype a.



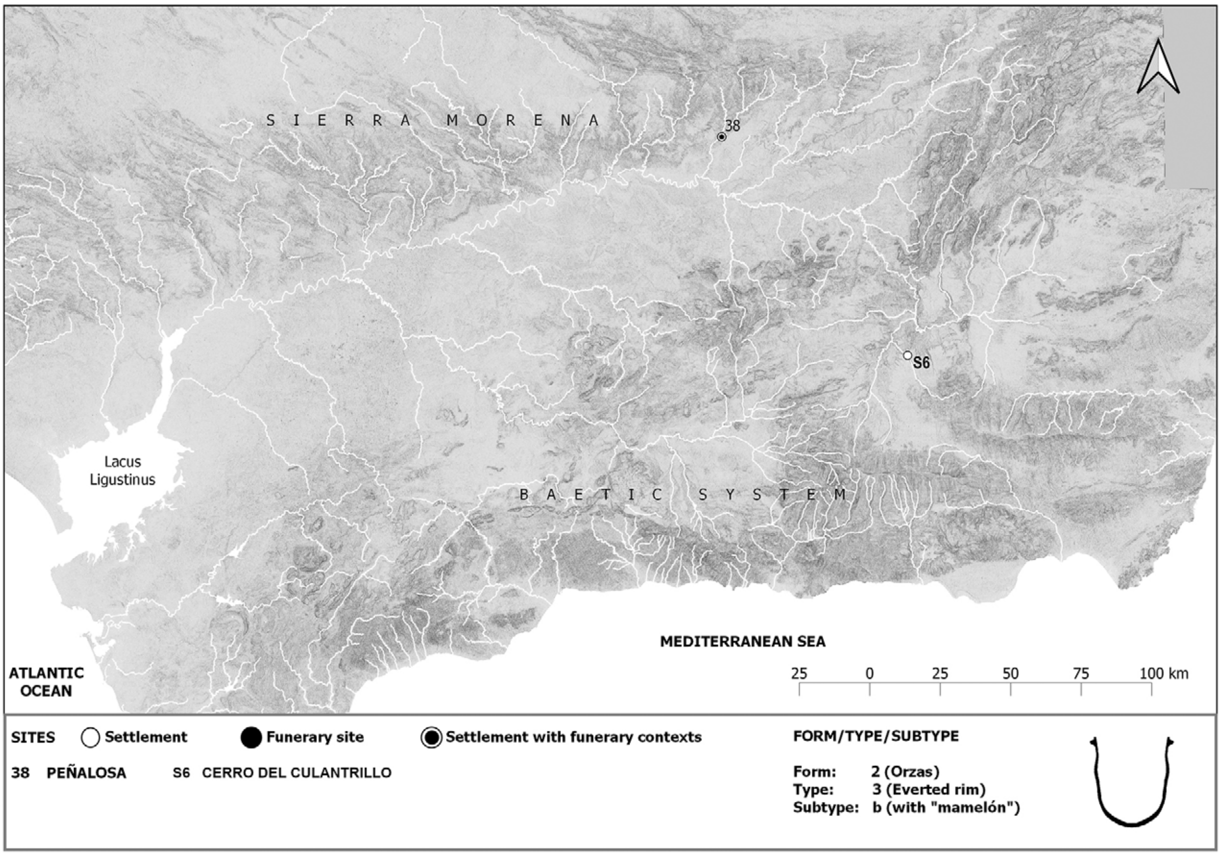
Map A38. Sites with pottery Form 2, Type 1, Subtype b.



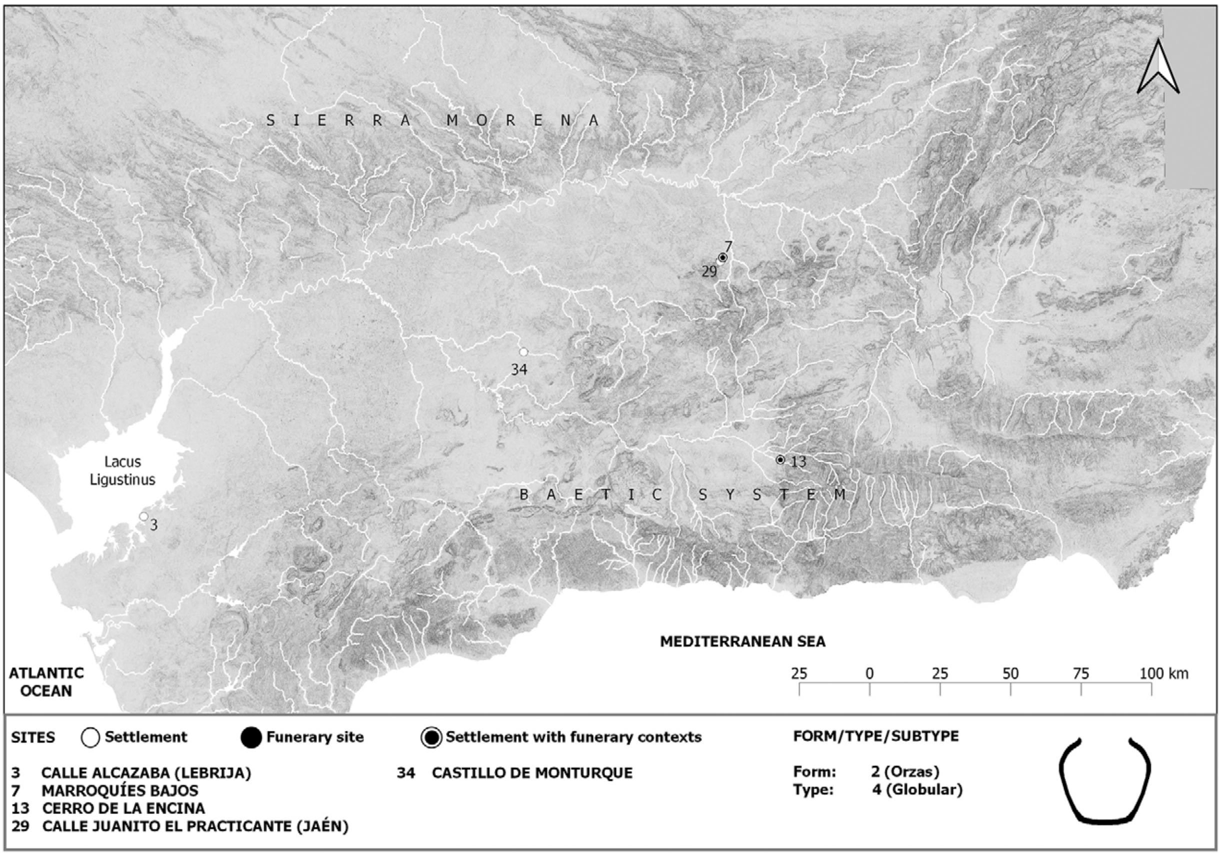
Map A39. Sites with pottery Form 2, Type 2, Subtype a.



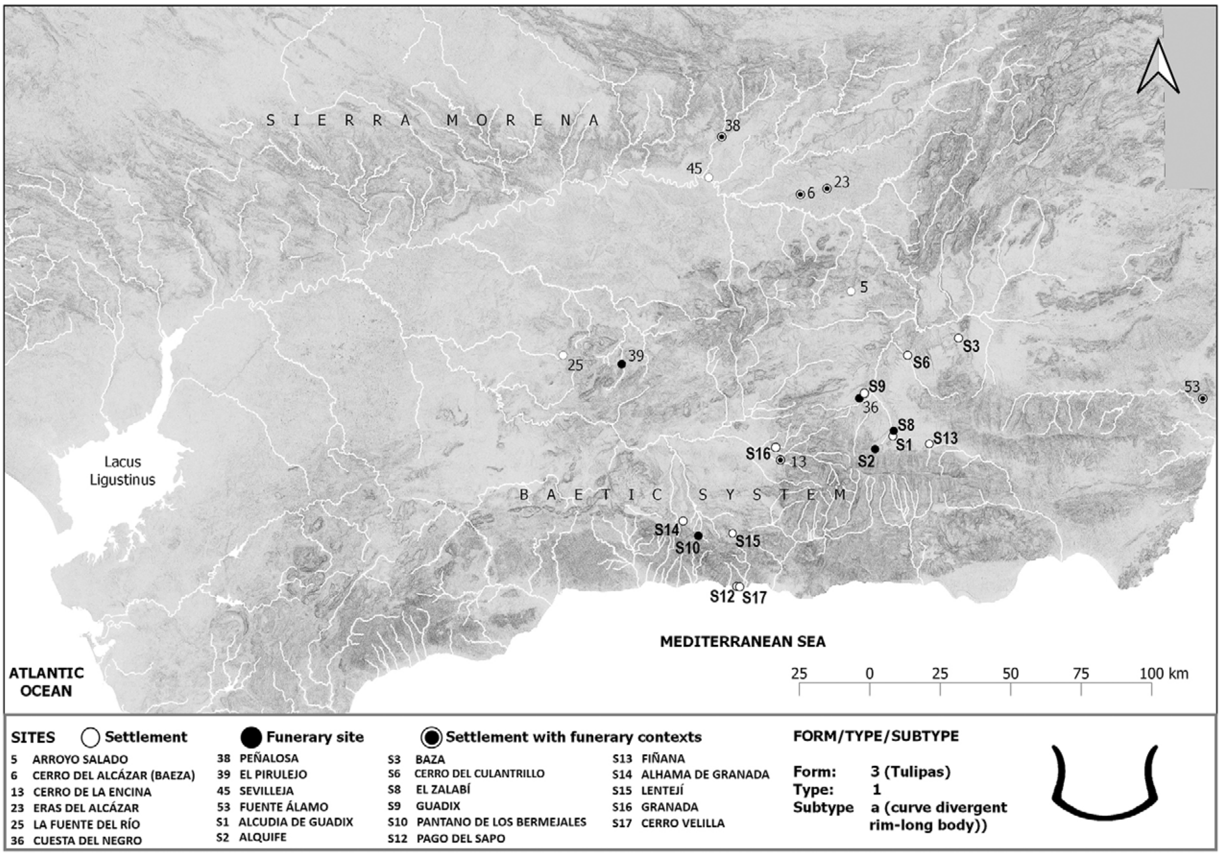
Map A40. Sites with pottery Form 2, Type 3, Subtype a.



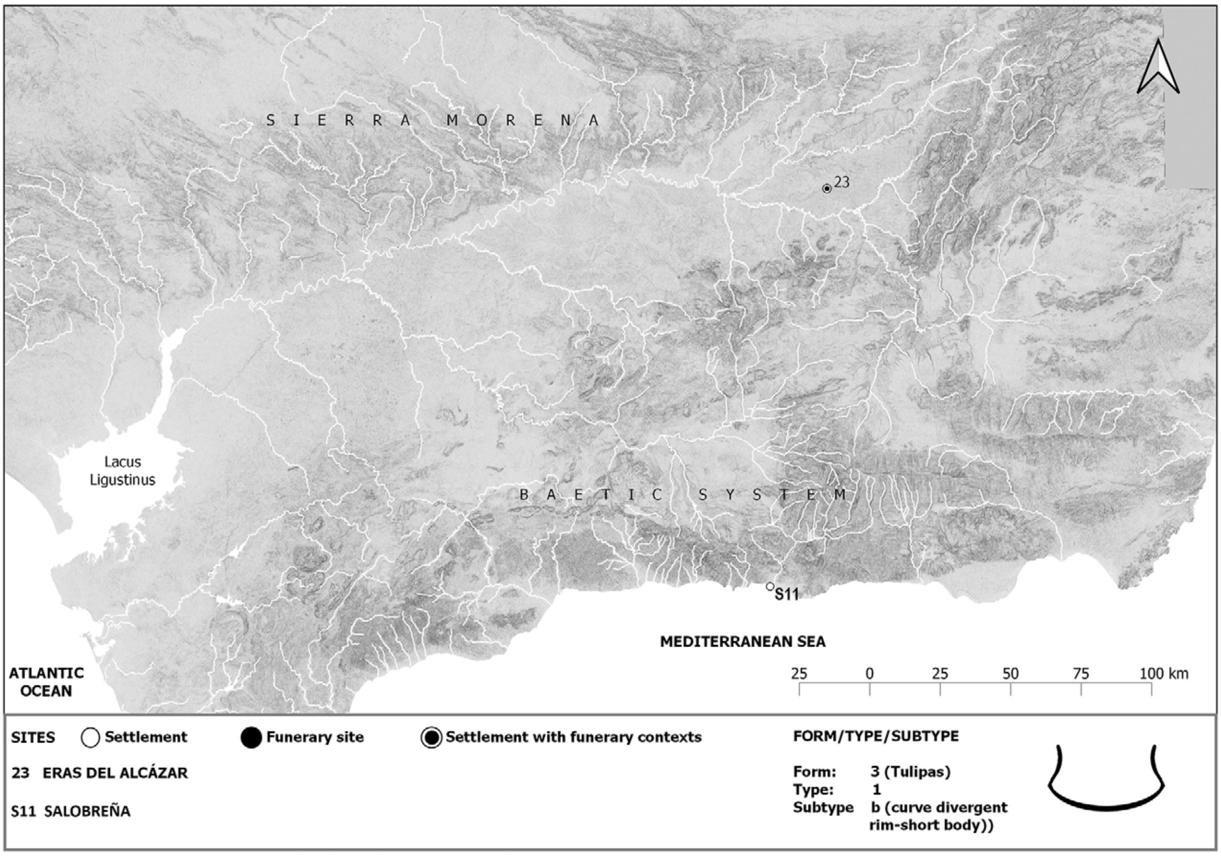
Map A41. Sites with pottery Form 2, Type 3, Subtype b.



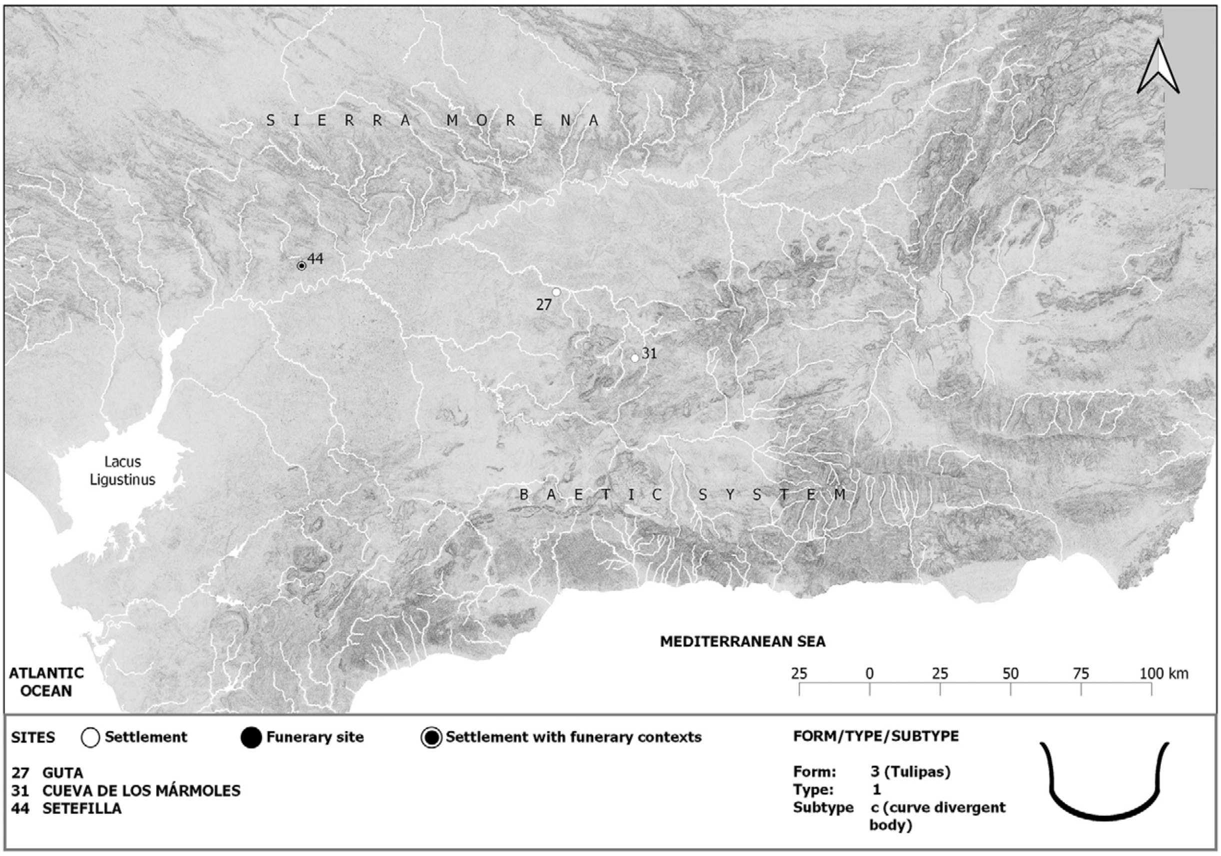
Map A42. Sites with pottery Form 2, Type 4.



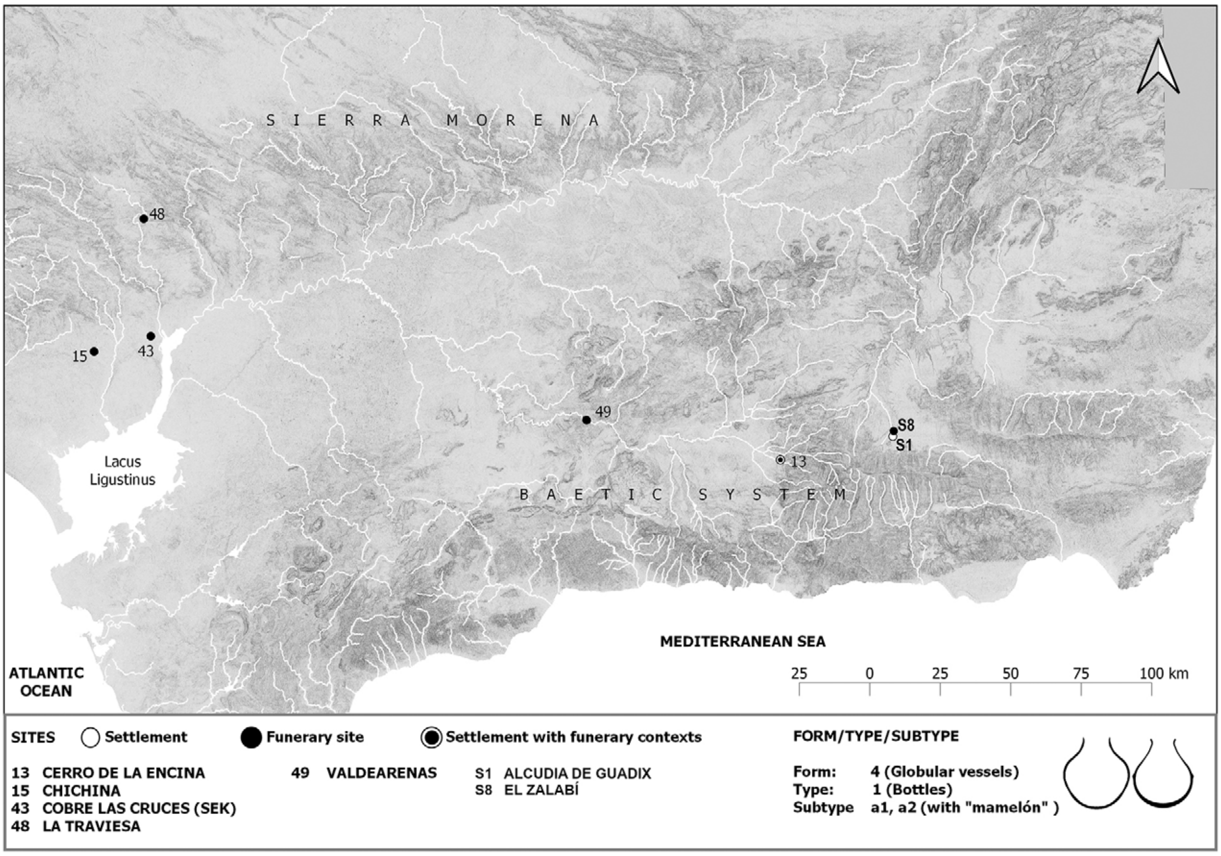
Map A43. Sites with pottery Form 3, Type 1, Subtype a.



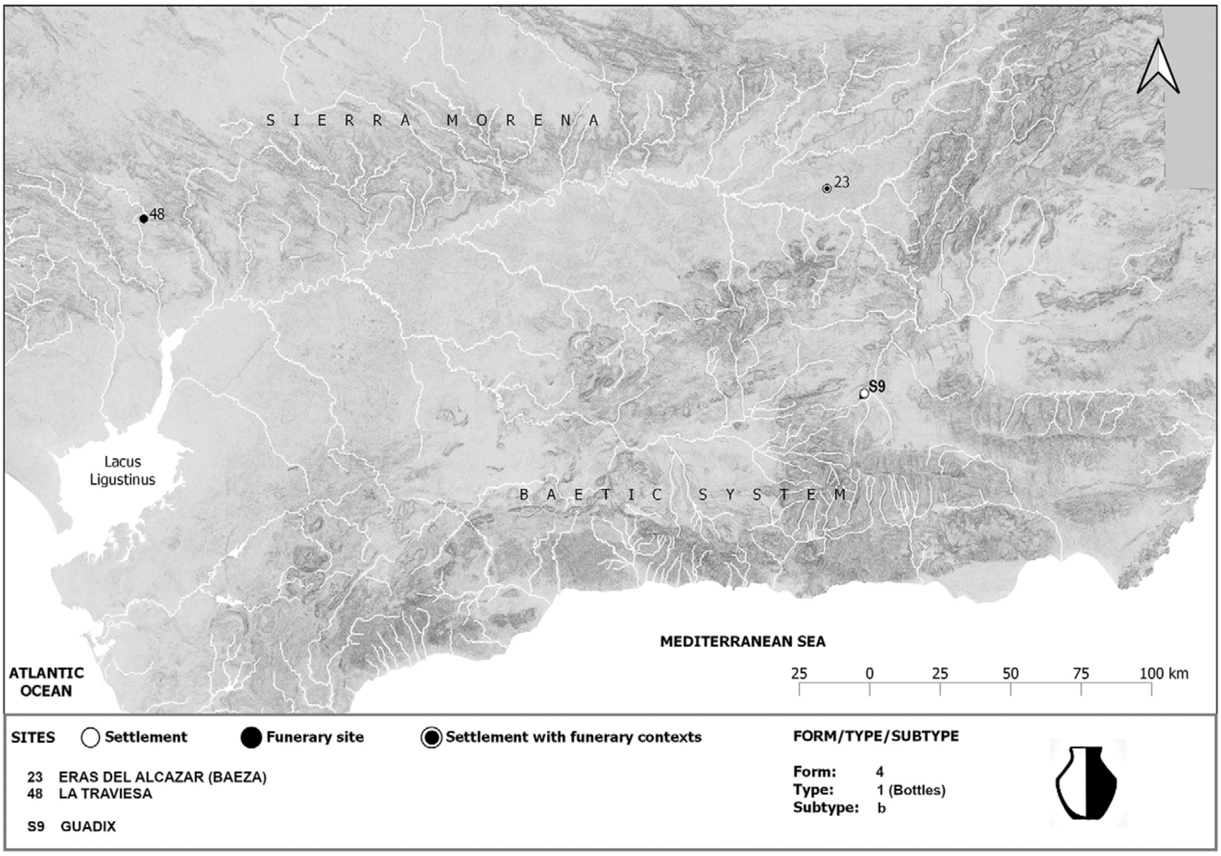
Map A44. Sites with pottery Form 3, Type 1, Subtype b.



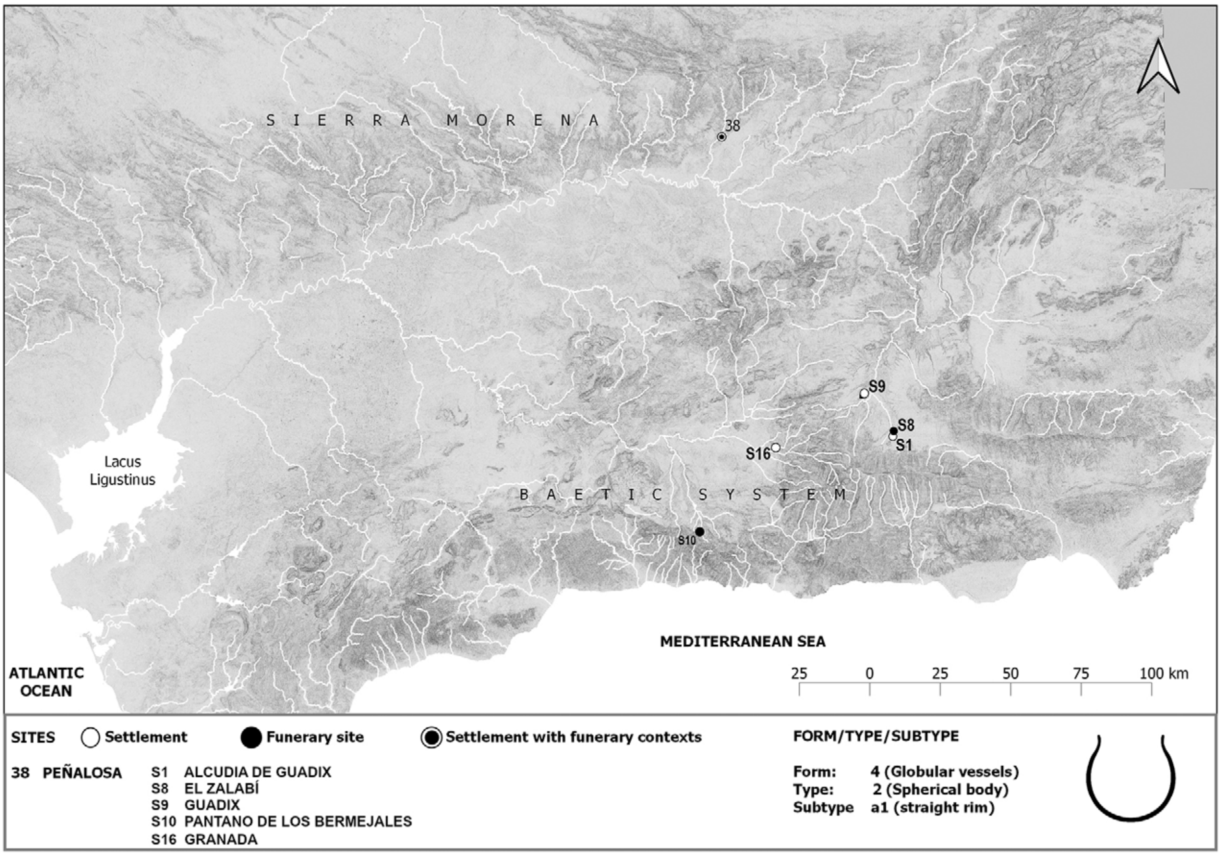
Map A45. Sites with pottery Form 3, Type 1, Subtype c.



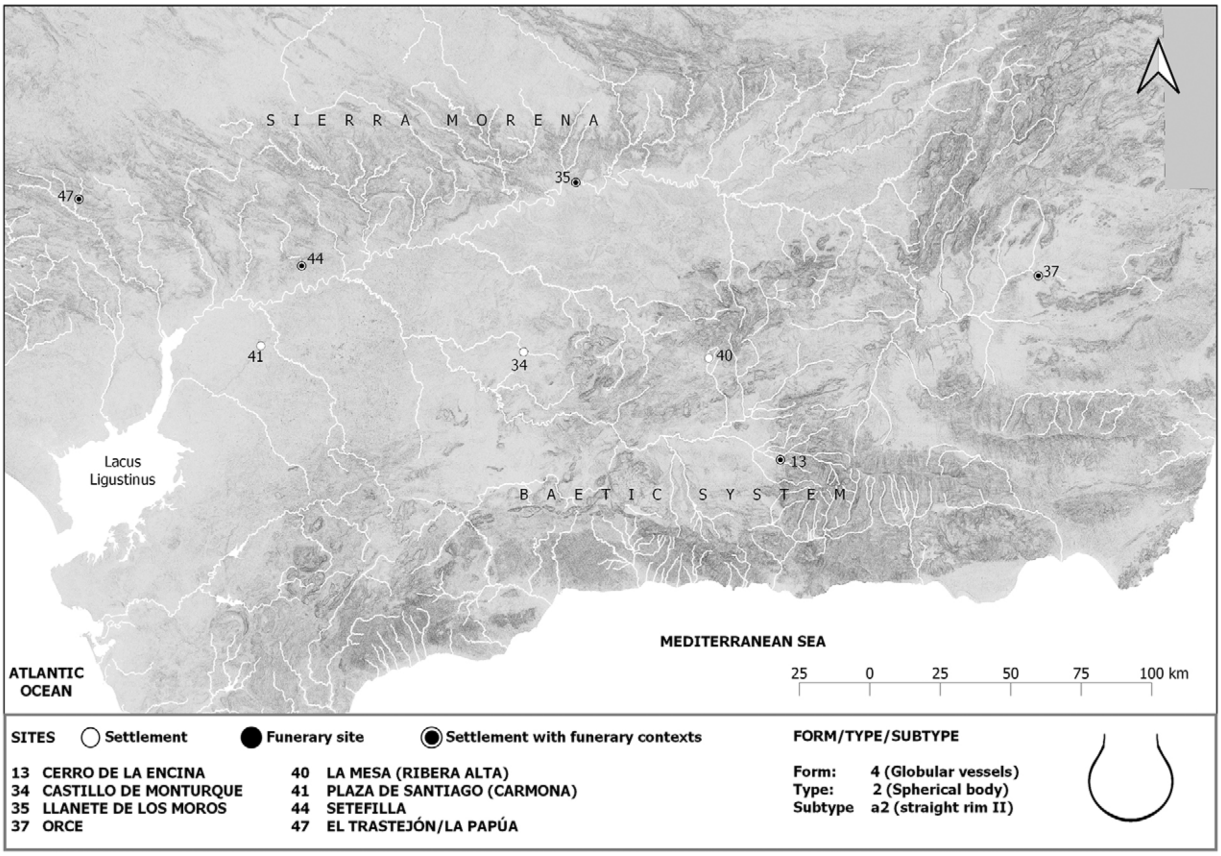
Map A46. Sites with pottery Form 4, Type 1, Subtype a.



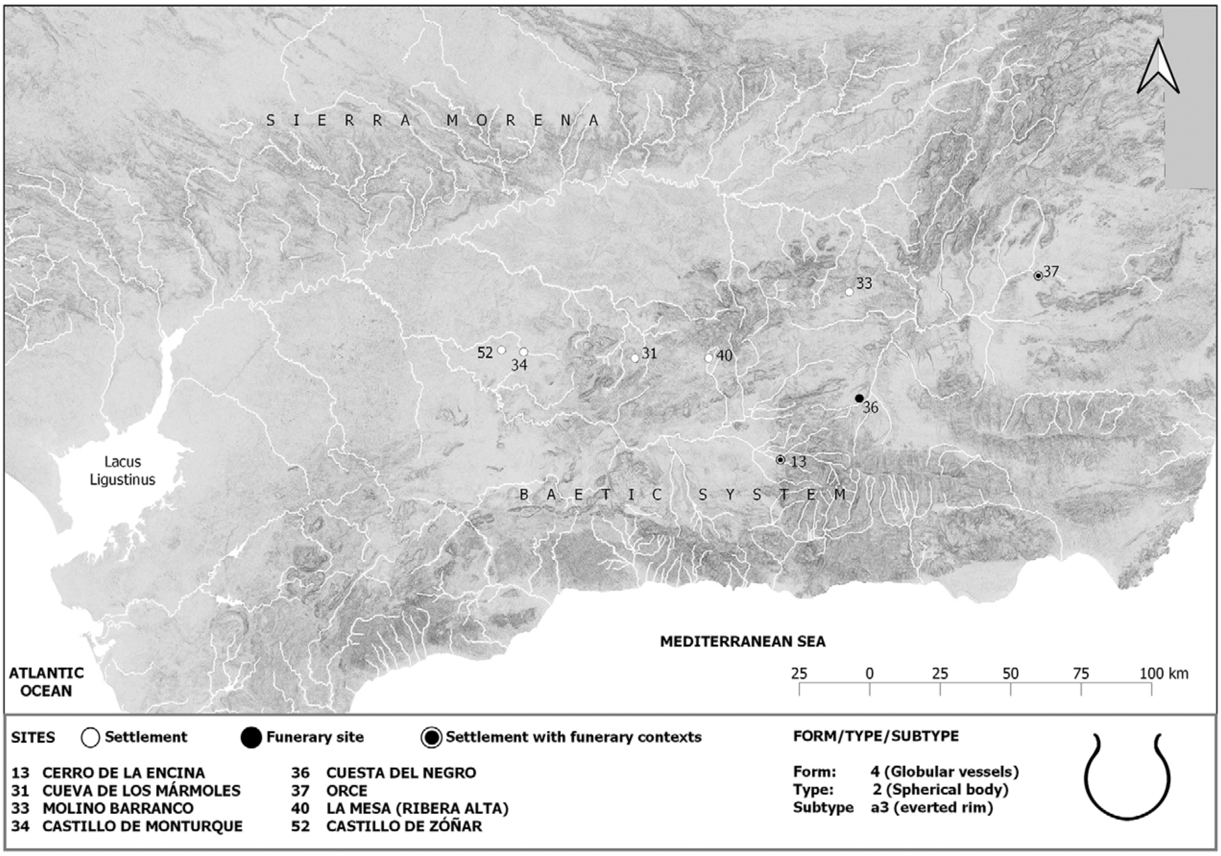
Map A47. Sites with pottery Form 4, Type 1, Subtype b.



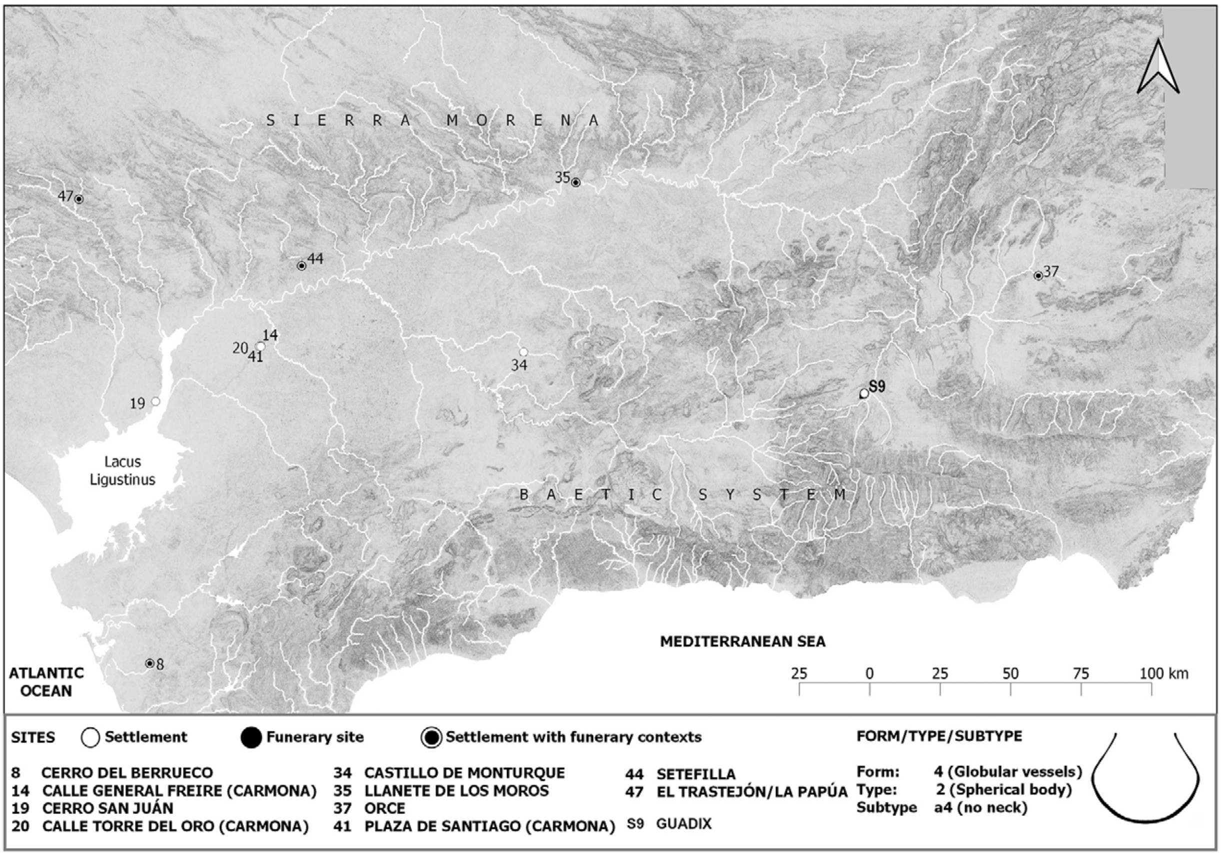
Map A48. Sites with pottery Form 4, Type 2, Subtype a1.



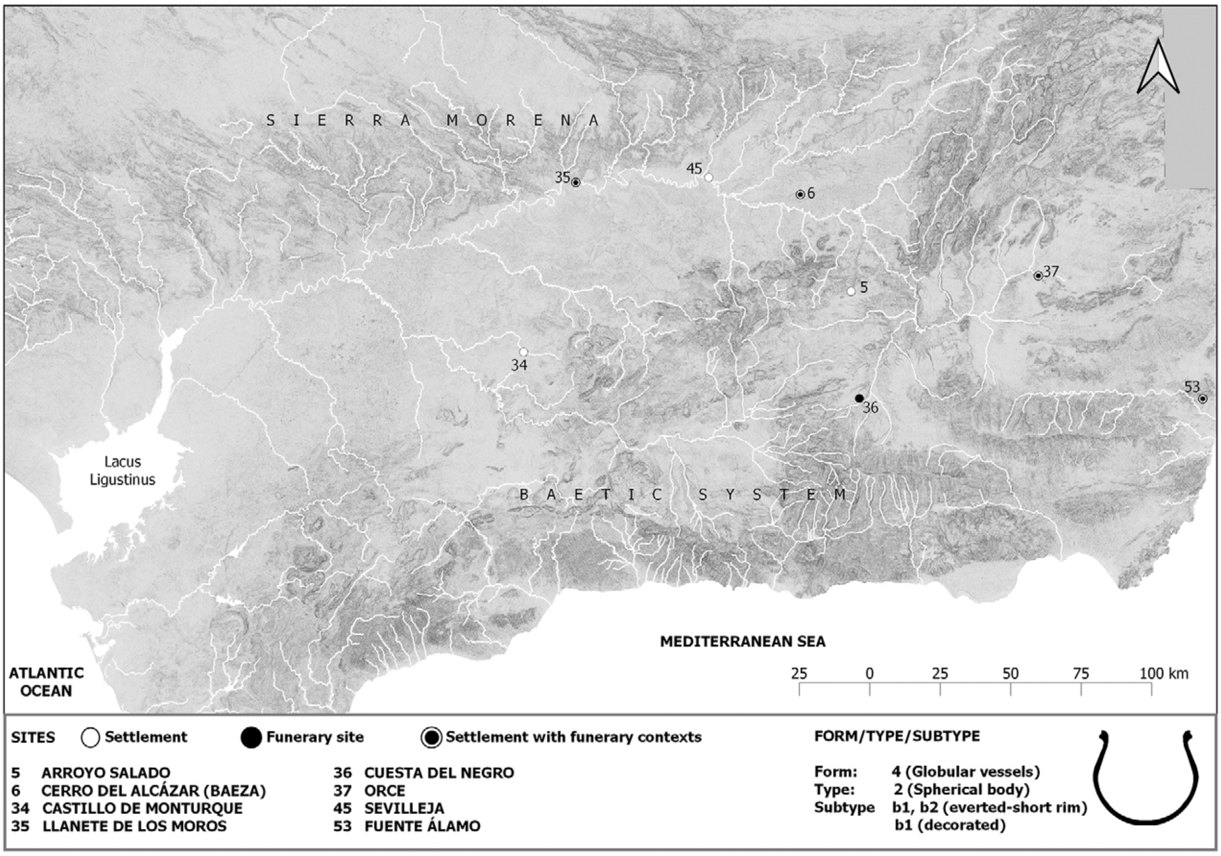
Map A49. Sites with pottery Form 4, Type 2, Subtype a2.



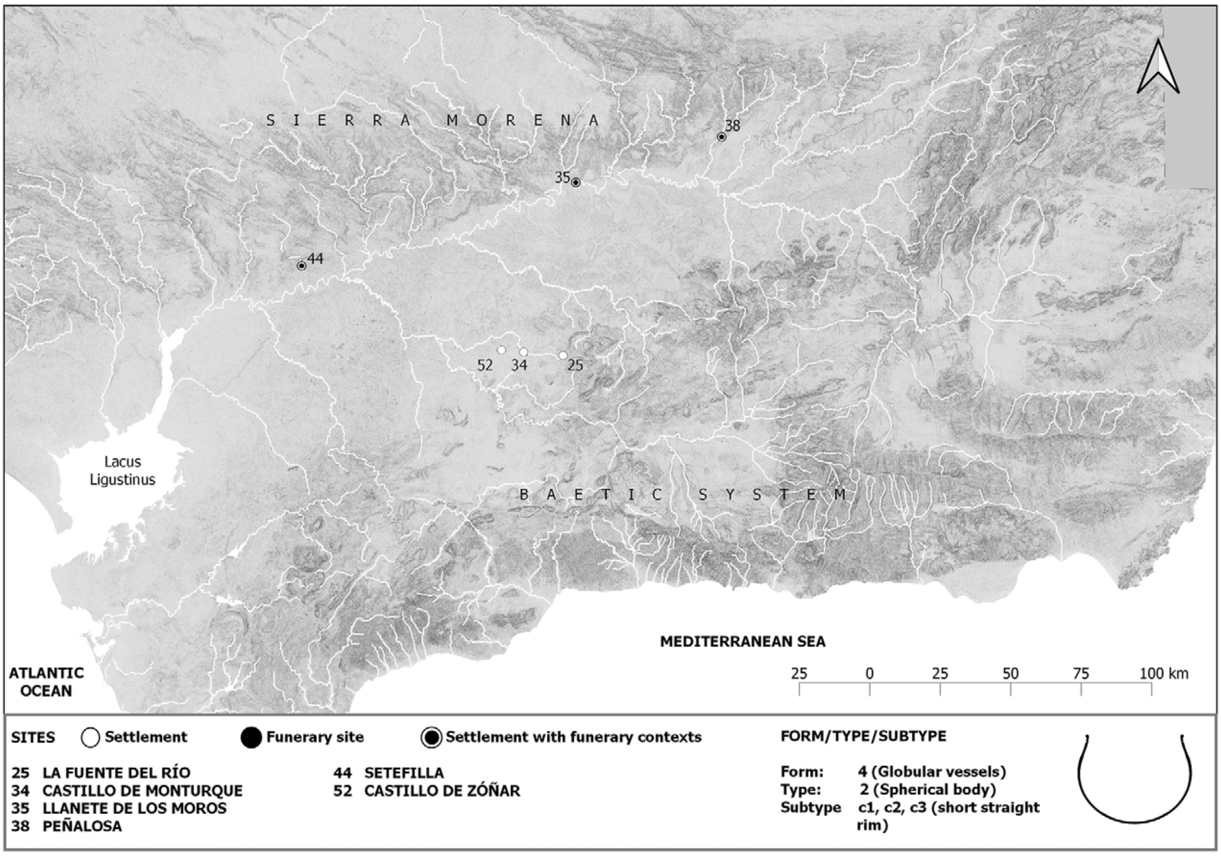
Map A50. Sites with pottery Form 4, Type 2, Subtype a3.



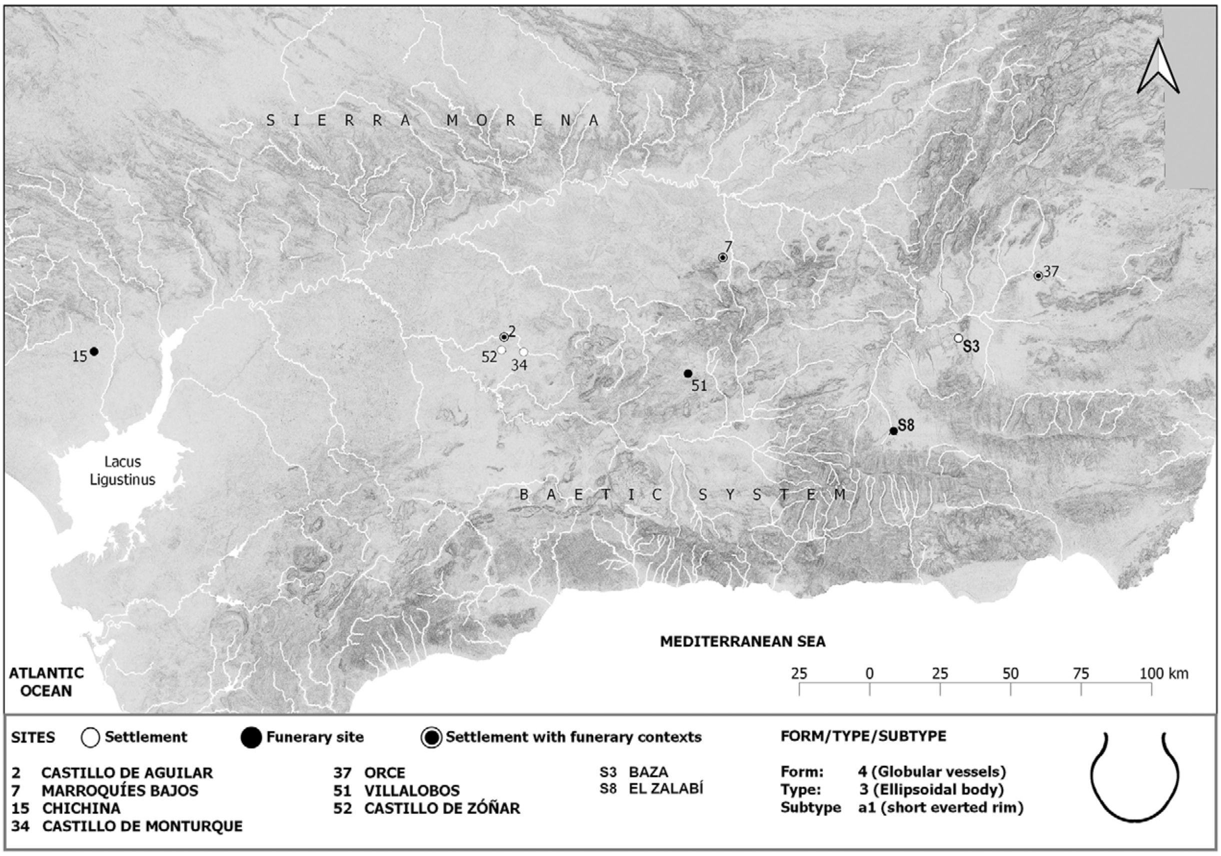
Map A51. Sites with pottery Form 4, Type 2, Subtype a4.



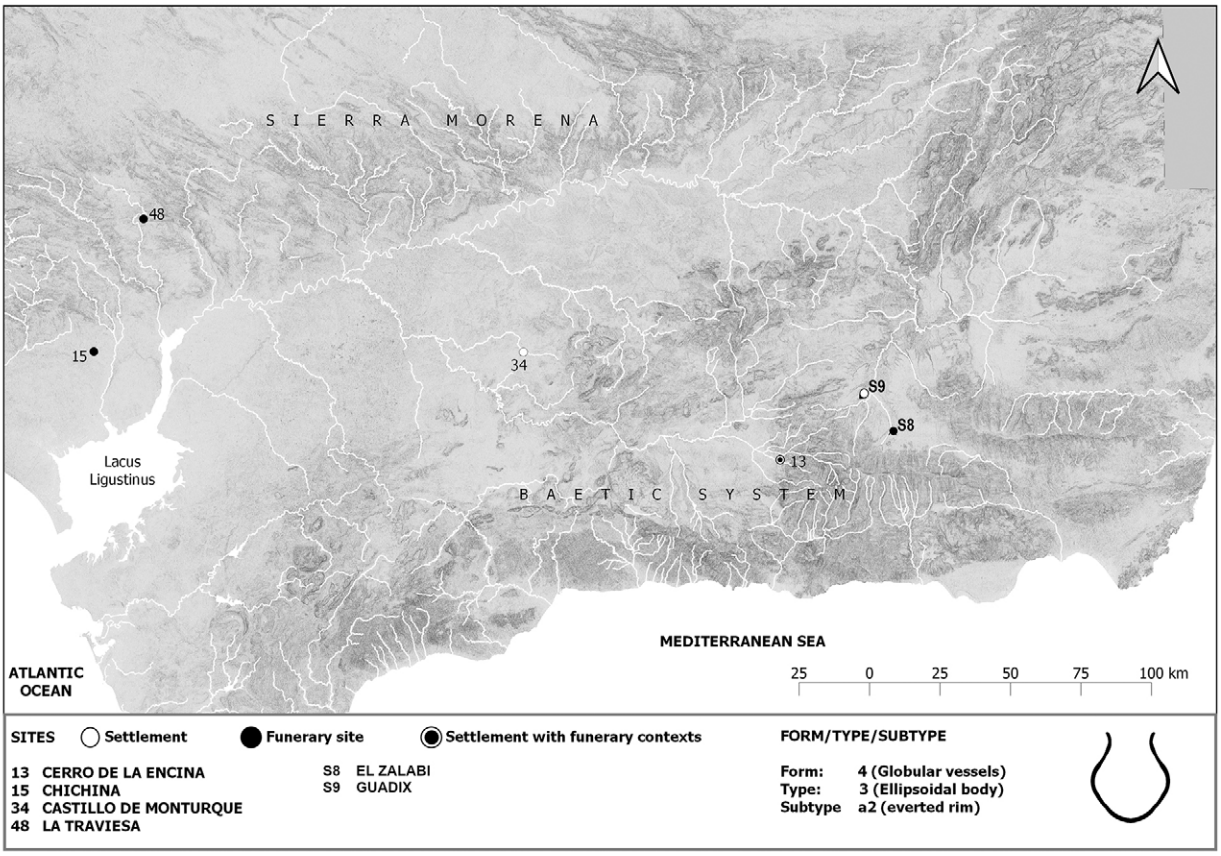
Map A52. Sites with pottery Form 4, Type 2, Subtype b.



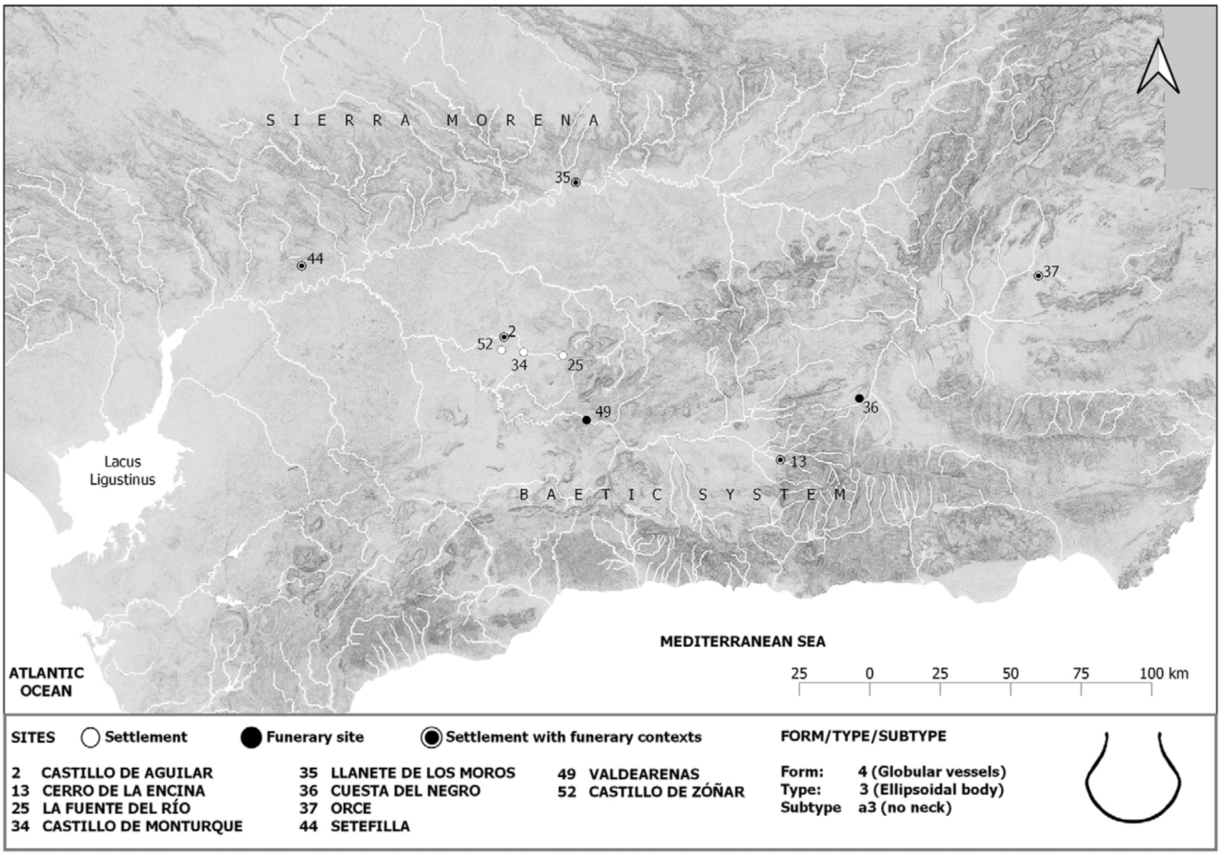
Map A53. Sites with pottery Form 4, Type 2, Subtype c.



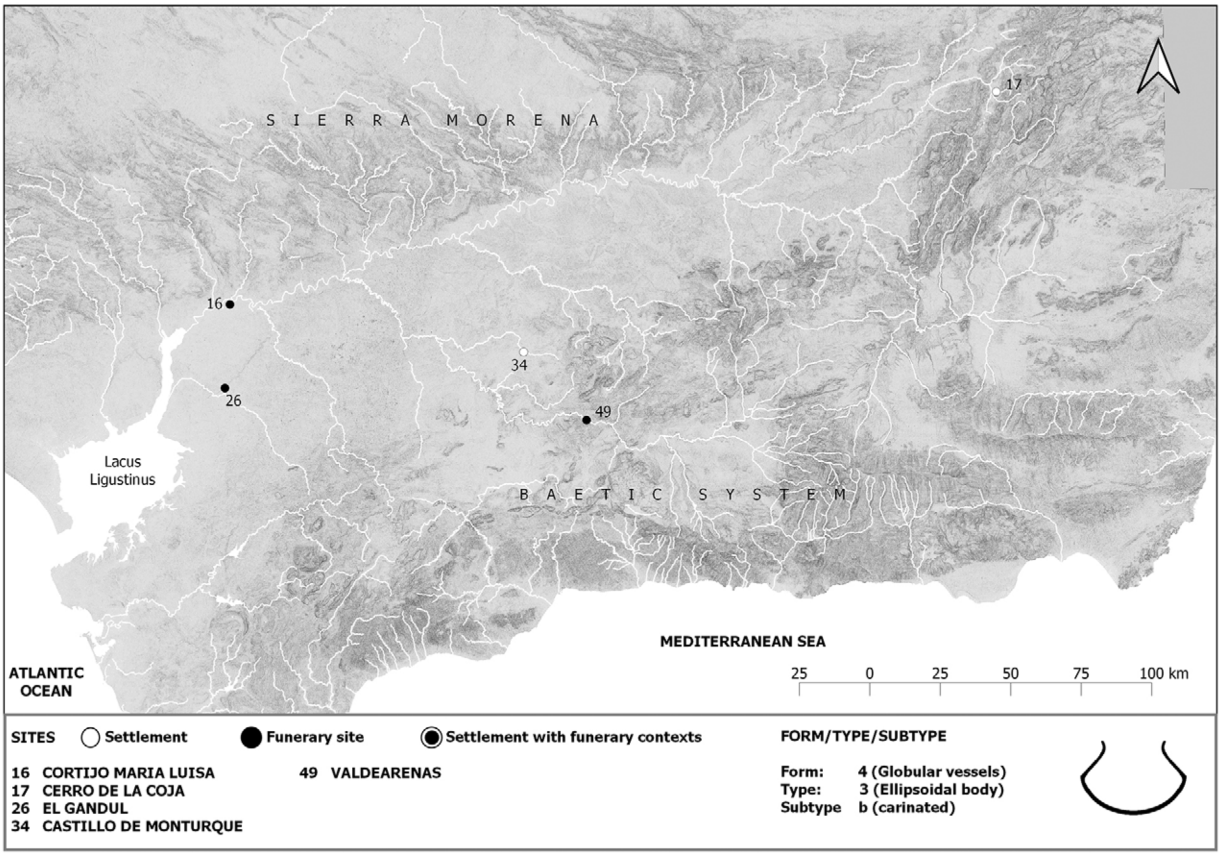
Map A54. Sites with pottery Form 4, Type 3, Subtype a1.



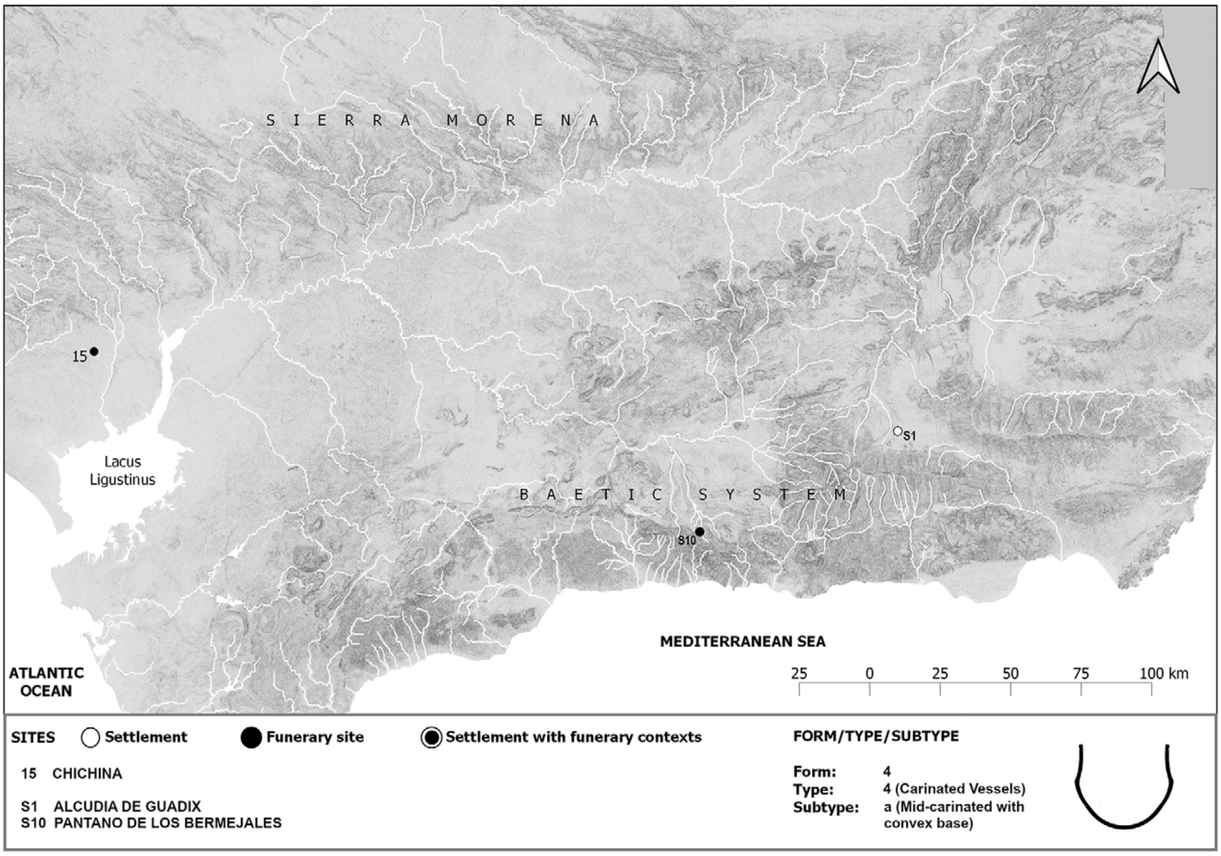
Map A55. Sites with pottery Form 4, Type 3, Subtype a2.



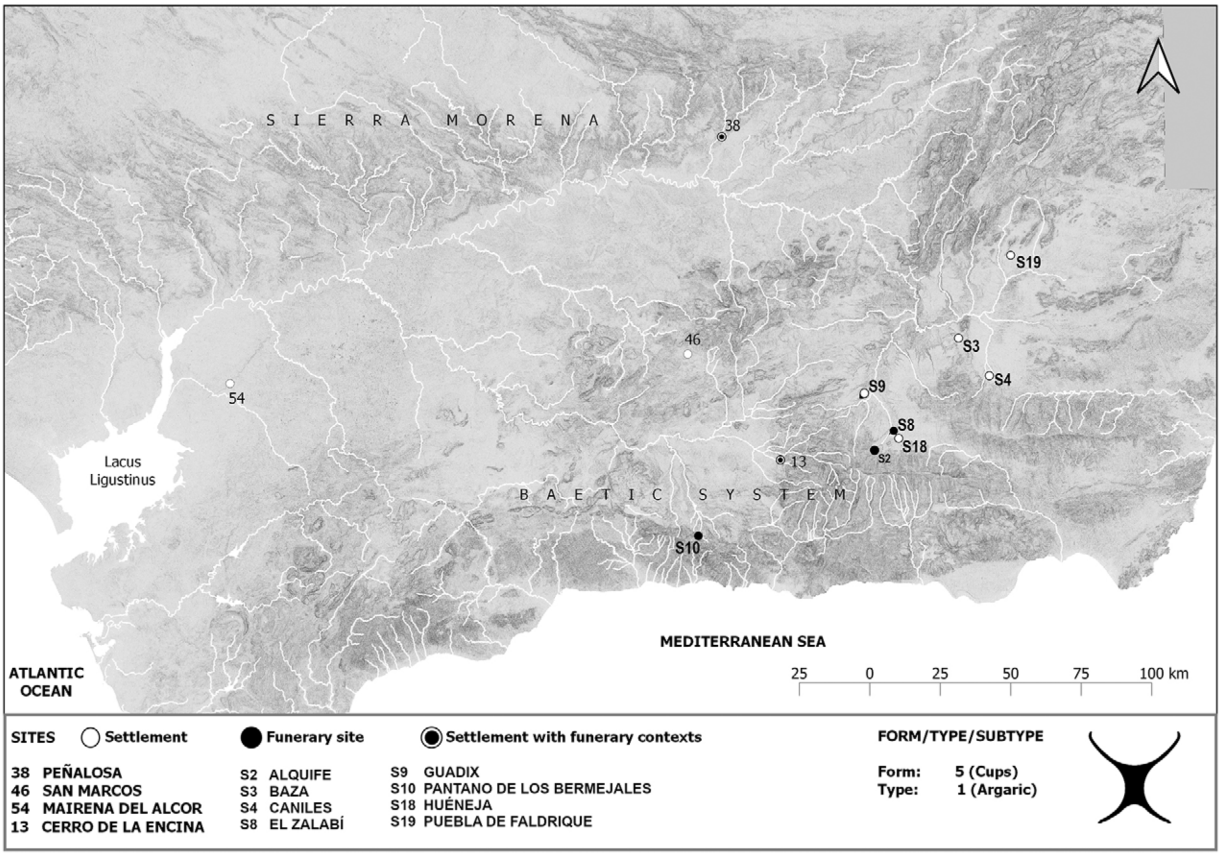
Map A56. Sites with pottery Form 4, Type 3, Subtype a3.



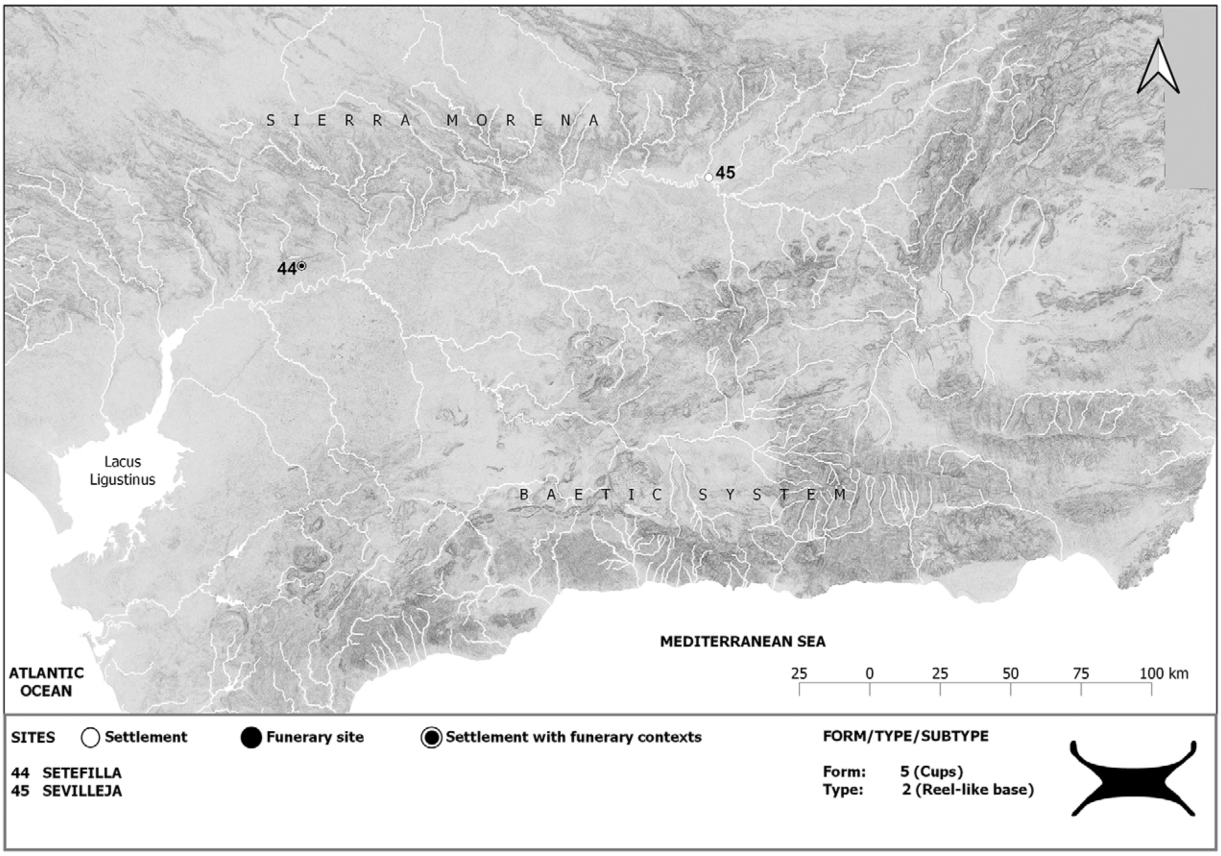
Map A57. Sites with pottery Form 4, Type 3, Subtype b.



Map A58. Sites with pottery Form 4, Type 4, Subtype a.



Map A59. Sites with pottery Form 5, Type 1.



Map A60. Sites with pottery Form 5, Type 2.

RESSOURCENKULTUREN 27

THE FULL BRONZE AGE IN THE MIDDLE AND LOW GUADALQUIVIR VALLEY

Archaeology has everything to do with the past, but it also concerns the present. The way contemporary societies perceive the material world influences how archaeologists approach different phenomena identified in the material record. This influence may lead to biases and restricted scientific fields oriented towards established paradigms and discourses, rather than questioning how such discourses and modes of thought developed.

This volume focuses on describing how archaeologists have perceived and presented the Bronze Age to the general public especially in the south of the Iberian Peninsula. The research makes use of the concepts of Subsistence Paradigm and Landscapes as Resources to propose alternative approaches for understanding mobility and interactions during the Bronze Age in the Middle and Low Guadalquivir Valley (Spain). The goal is to move beyond traditional models that reproduce power relationships, predatory use of materials and violence, not only in the field of Archaeology but in society as a whole.

rK SFB 1070
RessourcenKulturen

TÜBINGEN UNIVERSITY PRESS

ISBN 978-3-947251-94-0