

## Original Study

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# Essential Tensions: A Framework for Exploring Inequality Through Mortuary Archaeology and Bioarchaeology

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**Abstract:** Research on the emergence of institutionalized inequality has traditionally maintained an analytical divide between lived institutions that affect daily life and performed institutions materialized in mortuary contexts. Here, we argue that convergence or divergence between lived and performed contexts reveals key aspects of past social organization. When combined, mortuary archaeology and bioarchaeology provide a methodological framework well suited to evaluate the coherence or dissonance of such institutions. Three case studies from prehistoric Europe highlight how new insights gained by studying tension between institutions, identities and experiences across social dimensions can transform our understanding of the development of institutionalized inequality.

**Keywords:** Social organization, human osteology, coherence, dissonance, Neolithic, Copper Age, Bronze Age, Iberia, Ireland, Transylvania

“These squat buildings, constructed with huge boulders, are in fact very durable. This is obvious in the many abandoned villages where the houses have disappeared but the tombs are still standing. They are the symbols of the association of their builders with the village where they are situated, an unchanging association with an unchanging order. They are in this way the denial of the fluidity of Merina society and indeed of all the societies of the living. They are an assertion of an order where men are organized along clear-cut lines. *In other words, they are the demonstration of what the Merina feels his society was and ought to be*” (Bloch 1968:101, emphasis ours).

## 1 Introduction

“The dead do not bury themselves.” This oft repeated maxim has become a cornerstone of mortuary archaeology (Shanks, Tilley 1982, O’Shea 1996, Bradley 1998, Parker-Pearson 1999). Born out of a critique of early mortuary theory in which mortuary patterns were often described as static reflections of social organization and identities in the past (e.g., Saxe 1970, Binford 1971, Brown 1971), the phrase encapsulates the social dynamics at play within mortuary contexts. Death, treatment of the body, and burial are social events and processes in which any number of choices or broader lived institutions can affect the material record archaeologists encounter. Ideologies, performance, and raw human emotion have as much of an effect on the materialization of the archaeological record as socioeconomic systems, political organization, and personhood.

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A major consequence of the realization that the dead do not bury themselves is that archaeologists have maintained an analytical divide between mortuary contexts and non-mortuary contexts. Mortuary practices are contexts in which identities and institutions are *performed*, the material expression of select and idealized experiences of an individual that relate to their personal identity and role in society. *Lived* identities and institutions, in contrast, embody the entirety of an individual's experiences, preserved in osteological records of diet, labor, disease, and biological kinship. As such, *lived* identities, experiences, and institutions that affect daily life are distinct from *performed* identities, experiences, and institutions that are materialized in mortuary contexts. Lived experiences may overlap with performed experiences, but the two may also diverge sharply. But how should archaeologists reconcile similarities or differences between these distinct social dimensions<sup>[1]</sup>?

In this paper, we argue that the presence of similarities or differences between lived and performed social contexts are important sources of information about social organization in the past. We frame these holistic comparisons as investigations into the *coherence* or *dissonance* of social organization across multiple social dimensions. Prioritizing particular dimensions and archaeological measures (such as dietary variability within populations) and discounting others (such as performed inequalities in mortuary practice) risks minimizing the importance of all the fora in which social relationships are negotiated.

Bioarchaeology is uniquely positioned to provide the data necessary to compare whether inequality or equality in burial treatments corresponded with inequality or equality in the lives of those buried. Mortuary practices, as socially mediated institutions (North 1990, Wiessner 2002, Mills 2004) in which identities, rights, and obligations are performed (Inomata 2006), can reveal the idealized version of how a society portrays itself, while bioarchaeology can reveal the lived experience of individuals. Bioarchaeology thus provides a methodological framework with which to systematically evaluate tensions across social dimensions (e.g., economic, ideological, and political organization).

For our case studies, we focus on the emergence of institutionalized inequality in prehistoric Europe. The appearance of institutionalized inequality continues to be a critical issue in European archaeology (see Childe 1930, Childe 1951, Shennan 1982, O'Shea 1996, Parkinson 2002, Kristiansen, Larsson 2005, Chapman 2008, Earle, Kristiansen 2010, Duffy 2010, Kienlin 2010, Parkinson, Gyucha 2012, Nicodemus 2014, Duffy 2015). The mortuary record has provided evidence central to arguments for and against the emergence of institutionalized inequality at various times over the course of the European prehistoric record (see Renfrew 1983, Chapman 1995, O'Shea 1996, Quinn 2015).

As we will demonstrate, throughout European prehistory, many communities exhibited lived and performed equalities or inequalities that reveal existing tensions in larger society. We advocate a reconceptualization of how different dimensions of inequality are compared. Rather than creating an analytical hierarchy, in which lived inequality is treated as “real” and performed inequality is considered simply a mask of the “real” social organization, we accord each dimension equal analytical footing. Shifts in the coherence or dissonance of materialized inequalities across social dimensions are an important feature of the increasingly inegalitarian social organization of prehistoric Europe. This approach challenges archaeologists to go beyond simply identifying where and when social inequality became institutionalized. By examining coherence and dissonance between social identities, relationships, and status in life and in death, bioarchaeology can significantly expand our understanding of the structure and dynamics of ancient societies.

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<sup>1</sup> We use the term *social dimension* to discuss the series of distinct yet interdependent parts of a society that collectively constitute the society's social form (see O'Shea, Barker 1996, Duffy 2010). Examples of different social dimensions include economic, political, and ideological systems, which collectively constitute social organization. Dimensions are abstractions, which while not directly measurable, can be understood through their material traces. *Archaeological measures* are the analytical tools which transform the static material record into quantitative assessments of social dimensions. For example, diet breadth (the total range of wild and domestic food resources exploited by a particular community) is an archaeological measure that can provide data on the organization of economic systems, a social dimension.

## 2 Mortuary Practices and Inequality

Mortuary practices have long been studied to search for indicators of the emergence of institutionalized inequality (Renfrew 1973, O'Shea 1984, O'Shea 1996, Keswani 2004, Marcus, Flannery 2004). Increasingly, mortuary contexts have been approached as venues where social inequalities are performed, created, masked, challenged, and exaggerated (Shanks, Tilley 1982, Cannon 1989, Parker-Pearson 1993, Kuijt 1996, Parker-Pearson 1999, Kuijt 2000, Brück 2004a, Brück 2004b, Keswani 2004, Fowler 2005, Brück 2006, Kuijt 2008, Cerezo-Roman 2014, Kuijt et al. 2014, Quinn 2015). Rather than static reflections of social organization in the past, the mortuary record materializes identities, institutions, and relationships that the living themselves seek to commemorate.

Human skeletal remains are key for evaluating social inequality because they provide an alternate line of evidence that can be compared to evidence of inequality in the mortuary domain. Their importance stems from the ability of human remains to resist the kind of conscious or unconscious manipulation by the living that is such an integral part of mortuary practices. For example, communal burials cannot erase significant inter-individual differences in diet or regional affiliation (Petroutsas et al. 2007), and even the most elaborate golden burial masks cannot conceal osteologically preserved evidence of trauma and disease (Hawass et al. 2010).

This does not mean that the bioarchaeological analysis of skeletal remains produces an inherently objective or uncomplicated portrait of life in the past. As with every other domain of archaeological evidence, a number of significant biases still color the osteological record. For example, not all individuals are buried, not all diseases affect bone (DeWitte, Stojanowski 2015) and a suite of three particularly thorny problems – demographic nonstationarity, selective mortality, and hidden heterogeneity in risks – have crystallized into the significant analytical obstacle termed the “Osteological Paradox” (Wood et al. 1991). Finally, as with all archaeological evidence, human remains are subject to interpretative equifinality, as Martin et al. (2012), underscore in their evidence of trauma among a sample of Ancestral Pueblo females. At this site, the cranial and post-cranial trauma preserved in the remains of a number of low-status, potentially captive females could have been inflicted by either men or women in the local community (Martin et al. 2012). Though each gendered pathway of violence would have had different social implications, the identity of the individuals using violence as a social tool cannot be differentiated from the osteological remains alone. Similarly, the vast deposit of individuals in the Linearbandkeramik site of Herxheim, in the Upper Rhine valley of Germany, has been subject to multiple interpretations. This burial of more than 450 highly fragmentary individuals has been variously interpreted as a site of ritual torture and dismemberment, evidence of anthropophagy, or a ritual secondary burial ground (Gronenborn 2006). While bioarchaeologists have convincingly argued for a ritual interpretation of the site (Orschiedt, Haidle 2006), the Herxheim case aptly illustrates the interpretative equifinality posted by perimortem violence in the archaeological record, as it is often difficult to distinguish between ritualized or deliberate perimortem treatment of human remains, and perimortem violence that lead to death. Despite these limitations, contrasting the mortuary treatments in a given context with the osteological record of embodied inequality allows for an explicit assessment of the degree of coherence represented in other archaeological domains, relative to the osteological evidence of individual lived experience.

Archaeologists using mortuary practices to understand the emergence of institutionalized inequality are tasked with identifying the potential tensions between *lived* inequalities and *performed* inequalities. Because equalities and inequalities may be materialized in multiple dimensions (economic, political, ideological, etc.) there is an additional variable that operates above any single dimension: the relationship between dimensions and the manner in which they articulate. These different forms of articulation are addressed in our discussion of inter-dimensional coherence and dissonance. In particular, we will explore the significance of archaeological contexts in which lived and performed inequalities present similar or contrasting pictures of social relationships in the past.

## 2.1 Defining Coherence and Dissonance

Coherence, as a theoretical topic, has recently begun to receive greater archaeological attention. In his discussion of Mesopotamian urbanization, Adams (2012) draws attention to the issue of coherence as a means of evaluating whether the process of urbanization was “revolutionary.” Chesson (2015) has expanded on Adam’s discussion and provided a definition of coherence as “a synthetic qualitative ‘measurement’ combining multiple evidentiary lines (e.g., settlement patterns, community scales, economic complexity, social differentiation, political structures) to suggest an overall characterization of a society” (Chesson 2015:58). For Chesson, coherence describes how well or poorly different lines of archaeological evidence support a particular theoretical model of social organization.

Building on this perspective, we conceptualize coherence as both an archaeological issue (e.g. how multiple lines of evidence articulate to support a particular model), and also as a characteristic of societies. Specifically, different institutions (e.g., household organization; economic procurement and production; ritual and religious organization) come together to comprise the social architecture of a society. When these institutions act to reaffirm and reinforce one another, social organization can be described as coherent.

In contrast to coherence, where multiple social dimensions support each other in the cohesive construction of a particular form of social organization, other social contexts can be described as dissonant. Chesson describes these contexts as *lacking coherence*, but we believe that it is important to introduce a new term so as not to characterize alternate social contexts solely by a lack or absence. This distinction is particularly important because coherence is not necessarily a conscious goal of social networks or their participants. Social organization can be described as dissonant when different institutions encourage, legitimize, or establish alternative (and sometimes competing) forms of egalitarianism and inequality.

## 2.2 Modeling Coherence and Dissonance

Because they are formed by distinct institutions, lived and performed inequality in mortuary contexts can present evidence of coherence or dissonance within social organization. Alternative combinations of lived and performed inequality are shown in Table 1. The scenarios presented here represent modal archetypes that artificially partition a partially continuous variable (inequality) into discrete categories; these models should not be treated as an exhaustive summary of all of the ways lived and performed social organization articulate in human societies.

**Table 1:** Potential scenarios for different configurations of lived and performed inequality. Scenarios 1 and 4 reflect coherence across social dimensions while Scenarios 2 and 3 reflect inter-dimensional dissonance.

	Lived Equality	Lived Inequality
Performed Equality	Scenario 1 – Society with Effective Egalitarian Institutions (COHERENCE)	Scenario 2 – Society where Mortuary Practices Mask Incipient Inequality (DISSONANCE)
Performed Inequality	Scenario 3 – Society where Mortuary Practices Exaggerate Inequality (DISSONANCE)	Scenario 4 – Society with Fully Institutionalized Inequality (COHERENCE)

In Scenarios 1 and 4, social relationships are materialized in coherent ways across lived and performed contexts. Scenario 1 was likely the most common throughout the majority of the human evolutionary trajectory. Many small-scale hunter-gatherer social systems are predicated on promoting egalitarianism in order to pool and minimize risk. Egalitarian organization does not “just happen”, but rather must be created and actively maintained through cultural mechanisms (Whallon 1989:448). Ritual performances provide an opportunity to support institutions such as food sharing, combat wealth accumulation, and promote cooperation to encourage egalitarian social, economic, and political relationships. Mortuary rituals in particular can provide a means of promoting egalitarian relationships as well as promoting particular pathways of movement that are critical for supporting the social and economic lives of those living in small-scale societies (Woodburn 1982, Whallon 2006, Littleton, Allen 2007). In Scenario 4, political, economic,

and/or ideological inequalities are present across both lived and performed social contexts. One of the most obvious examples of this scenario can be found in archaeologically documented state societies like ancient Egypt, where the hierarchical state-level society is materialized in both life and death.

In Scenarios 2 and 3, the nature of social relationships as materialized in mortuary practices are different than lived relationships that are materialized in human remains. Scenario 2 describes contexts in which social inequalities present within a society are masked through mortuary practices that promote egalitarian social relationships. The Pre-Pottery Neolithic in the Southern Levant is one case in which emerging inequalities associated with the transition from foraging to farming and village life may have been tamped down through mortuary rituals (specifically plastered skulls and secondary mortuary practices) that promoted communal integration through depersonalized ancestors (see Kuijt 1996). Another example comes from Late Prehistoric South-Eastern Spain and Brittany, where Shennan (1982) argues that during the Late Copper Age, social differentiation was still expressed “in egalitarian ritual forms which had developed during the Early Neolithic”, but such symbolic expression became increasingly incompatible with the social inequality instantiated by the ability of elites to control novel forms of subsistence surplus. In Scenario 3, ritual performances promote a view of society in which there are significant inter-personal inequalities, but these inequalities are not actually experienced by community members in daily life contexts. Examples of this scenario can be seen in the case studies described below.

While mortuary politics within dissonant social contexts may be more overt, the active maintenance of coherence is also an important context for understanding political action and the role of mortuary practices within a society. Both coherence and dissonance can be maintained through bottom-up communal integration and interaction, or can be imposed through top-down leaders. Exploring the social dynamics that lead towards coherent or dissonant social organization can only be done by comparing the nature of identities and relationships across multiple social dimensions.

Prior to evaluating whether social organization presents coherent or dissonant institutions of equality and inequality, it is necessary to understand how inequality is materialized in mortuary contexts. In the next section, we discuss how a combination of mortuary archaeology and bioarchaeology can provide the analytical tools to identify and unpack the materialization of inequality in performed contexts (through mortuary practices) and lived contexts (through bioarchaeological analysis of human remains).

### 3 Materialization of Inequality Across Multiple Dimensions

The material remains of inequality have been discussed at length in the mortuary archaeology literature (see O’Shea 1984, O’Shea 1996, Parker-Pearson 1999, Parker-Pearson 2003). To briefly summarize, the primary ways in which inequality is materialized in mortuary archaeology is through patterned variation in (1) energy expenditure during the mortuary process (in treatment of the body; in grave goods; in funerary architecture; in the funeral process), (2) the rules concerning eligibility for burial (only certain individuals were eligible for burial or particular body treatments; sub-adults with rich grave assemblages indicating inherited status), (3) the spatial distribution of burials (different segments of society buried in distinct locations which are linked to markers of wealth and status), and (4) the presence of emblematic symbols of power, authority, or social rank (as observed through grave goods).

Bioarchaeological study is capable of contributing to analyses of *economic*, *ideological*, and *political* inequalities. Even a brief glance at contemporary headlines reveals that these forms of inequality are not sterile and separate, but rather feed back on one another to reinforce existing societal inequalities through various forms of structural violence, a pattern which has recurred throughout history (Klaaus 2012, Schug et al. 2013). However, for the time being we have parceled out the different forms of inequality in order to better demonstrate the uniquely informative analytical potential of bioarchaeology.

### 3.1 Economic Inequality Through a Bioarchaeological Lens

Bioarchaeological analysis has the capacity to reveal resource- and labor-based facets of economic inequality if they become embodied in the human skeleton. In archaeologically-known societies, economic inequality manifests skeletally in terms of either (i) unequal access to food or (ii) unequal labor burdens. There are, of course, other dimensions of economic inequality, such as unequal access to material culture (e.g. formal and functional variability in structures, variability in access to high-quality domestic or exotic goods), but these are preserved in the material, rather than osteological, record.

Unequal access to food in living populations can be preserved skeletally as significant inter-individual variability in diet, particularly if it correlates with other markers of biological stress like disease or short stature. One approach to this variability is through stable isotopic analysis of carbon and nitrogen. Within a given burial population, isotopic analysis can reveal relatively similar diets across the board with low inter-individual variability, as in the case of many Late Prehistoric Iberian populations (McClure et al. 2011, Waterman et al. 2014). Isotopic analysis can also demonstrate instances where differential mortuary treatment shows little relationship to diet during life. At the Copper Age cemetery of Varna, in Bulgaria, carbon and nitrogen analyses have shown that a small number of individuals buried in the most richly accoutered graves likely supplemented their diet with marine resources, but within the larger mortuary population there is no significant relationship between diet and the material wealth of graves (Honch et al. 2006). Finally, isotopic studies of diet can illuminate stark inter-individual differences in access to given types of subsistence resources, as in the contrast between the maize-heavy diets of low-status females buried in Mound 72 at Cahokia, and the higher animal protein content of the diets of high-status individuals (Ambrose et al. 2003).

Tellingly, at Mound 72, low-status graves could also be distinguished from high-status graves by their higher frequency of pathological indicators of nutritional stress. Skeletal indicators of nutritional stress range from the presence of enamel hypoplasias<sup>[2]</sup> to Harris lines<sup>[3]</sup>, to porotic hyperostosis and cribra orbitalia<sup>[4]</sup>. These pathological markers of interrupted growth or nutritional stress provide another line of osteological evidence that can highlight diachronic variability, as in research conducted on Late Woodland and Mississippian populations in Illinois (Cook 1984) or pre- and post-contact native populations in Florida (Larsen et al. 2001). Synchronic inter-individual variability in indicators of nutritional stress can also help to determine whether evidence of ranking or status drawn from other archaeological domains correlates with increased or decreased nutritional stress (Powell 1992).

In regards to the second dimension of economic inequality, indications of unequal labor burdens preserve skeletally through enthesopathies, also called musculoskeletal stress markers (MSMs). MSMs are osteophytes, irregularities, and projections of bone that demarcate the area where a tendon or ligament inserts. These increase in size and robusticity as muscles are used repeatedly. While there is still debate about the precise etiology of MSMs (Weiss 2007), focusing on the patterning of MSMs while controlling for body size and age differences can allow for the identification of differences in the types of customary activities, whether over time or between groups (Harrod 2012). For example, Hawkey and Merbs (1995) used MSMs to differentiate sex-specific activity patterns in an ancient Thule sample, using the patterning and robusticity of muscle attachment sites to recreate the activities males and females most likely habitually performed. Similarly, the presence of osteoarthritis<sup>[5]</sup> has been used to differentiate less taxing activity patterns of high-status individuals from more demanding activities of low-status groups (Tainter 1980).

Finally, estimates of living stature, as calculated through population-specific regression formulae that incorporate measurements of the maximum length of long bones, provide information about both

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2 Macroscopically visible defects on enamel crowns that occur as teeth are forming during childhood.

3 Areas of increased bone density that result from growth arrest that can be identified using radiography.

4 Macroscopic porosity on the flat bones of the cranium and orbits, potentially indicative of iron-deficiency anemia, though see Walker et al. (2009) for recent debates about the etiology of this insult.

5 Macroscopically visible bone-on-bone rubbing that presents as a combination of lipping, porosity, and eburnation caused due to deterioration of the joint surface, normally related to excessive use.

nutritional stress and labor burdens. Increased levels of nutritional stress during the growth period can lead to short adult stature, a phenomenon which has been documented archaeologically in a geographically broad sample of populations transitioning to agriculture (Mummert et al. 2011). In subadults, systemic stress that results from inadequate nutrition, infectious disease, and high levels of energy expenditure can be quantified with reference to growth velocity, which accounts for the relationship between growth and development by comparing individual subadult stature with estimations of age (Klaus, Tam 2009).

### 3.2 Ideological Inequality Through a Bioarchaeological Lens

Ideological inequality can be communicated through human skeletal remains via differential mortuary treatment related to biological attributes like sex, age, and ancestry. An accessible contemporary example of this form of differential access is the modern military cemetery. Because all graves share an identical form, at first glance the cemetery organization might suggest a communal ideology that incorporates all members of society. However, bioarchaeological analysis of the mortuary population would reveal that access to such cemeteries is highly circumscribed as it contains only a particular subset of the population, predominantly young males who had suffered significant antemortem and perimortem trauma.

One noteworthy example of an ideological distinction that is bioarchaeologically accessible is the differential burial treatment often accorded to subadults<sup>6</sup>. There is abundant ethnographic evidence that not all societies consider children to be full social beings before the successful survival of specific developmental stages (Ucko 1969, Conklin, Morgan 1996, Davis-Kimball 2002). The conceptualization of subadults as social and biological beings distinct from adults is often also visible in the bioarchaeological and mortuary record. In Roman Britain, for example, infants and neonates were excluded from formal burial in community cemeteries, and instead buried in domestic contexts such as hearths, hypocausts or bathhouses (Moore 2009). Similarly, in Anglo-Saxon England children represent only 10-15% of the mortuary population in cremation and inhumation cemeteries, while non-industrial juvenile mortality rates suggest this number should be closer to 50% (Crawford 2000). Excavations at the Agora of Athens have revealed a cache of 449 fetal and infant skeletons deposited in an abandoned well sheltered from the public areas of the neighborhood (Liston, Rotroff 2013). In the Middle Neolithic of central Italy, children were preferentially buried in caves, while adults were buried in settlements (Skeates 1991). At the Late Neolithic site of Polgár-Csőszhalom in eastern Hungary, researchers noted the disproportional absence of certain age groups in the mortuary population, with very few infants being buried despite a presumed high rate of infant mortality at the time (Raczky, Anders 2008:48-49). All of these case studies highlight instances of subadults being conferred a different ideological status than adults, generally a status with particular requirements for burial and mortuary treatment. When contextualized with information from other archaeological domains, such evidence provides indications of when and how individuals were considered adults or full-fledged members of society.

Like age, sex can also affect access to specific mortuary contexts. In Middle Woodland Illinois, the highest-status floodplain mound burials predominantly contained male individuals, while female burials were restricted to more localized and inclusive bluff top mounds, suggesting that males were prominent individuals with an influence that extended beyond their local communities while female influence may have been more localized (Ruby et al. 2005). At Polgár-Csőszhalom, there were no adult female burials among the 21 interments excavated in the central tell area of the site, though at the peripheral settlement adult females were interred at a higher rate ( $n=48$ ) than either adult males ( $n=33$ ) or subadults (Raczky, Anders 2008:45-49). This pattern suggests that sex affected an individual's eligibility for burial in certain districts of Late Neolithic settlements in eastern Hungary. In contrast, osteological and archaeological analyses of Sarmatian tombs in southwestern Russia revealed that some of the individuals buried with iron swords and bronze arrowheads were female, and in these contexts, females were generally buried with a wider variety and larger quantity of grave goods than males (Davis-Kimball 2002). Similar bioarchaeological

<sup>6</sup> The term subadult conventionally refers to an individual  $\leq 18$  years of age-at-death.

research in contexts as geographically and chronologically diverse as Late Prehistoric Spain and Maya Honduras has illuminated differential access to elite and typical burials related to sex and age (Bell 2002, Fernández-Crespo, de-la-Rúa 2015). In sum, bioarchaeological investigations of sex reveal the ideology underlying gendered access to specific mortuary treatments, indicative of the performance of specific roles and statuses in living societies.

In addition to aspects of social identity like age and sex, bioarchaeology is also capable of assessing individual patterns of mobility through strontium isotope studies of regional affiliation. Studies of individuals given nonlocal burial traditions in the Eastern Great Hungarian Plain have shown that early instances of such burials contain local individuals, with their adoption of non-local traditions perhaps related to exchange systems or other relational links to other regions. In contrast, later burials contain individuals with non-local strontium and oxygen isotope signatures, revealing possible migration from the eastern Apuseni Mountain region or the northern Pontic steppe (Gerling et al. 2012). At the LBK site of Tallheim in Germany, bioarchaeological evidence of violent injuries attests to a massacre of the local community. Here, strontium and oxygen isotopic analysis has shown that the community practiced some degree of transhumance, and that young local females were likely abducted during the massacre (Bentley et al. 2008). Additional studies of German LBK populations have demonstrated that females show greater variability in isotopic signatures than males, which has been used as evidence of patrilocality during the Late Neolithic (Bickle et al. 2011). At sites like Herxheim, future isotopic analyses could be used to test recent hypotheses that the site acted as a central place for multiple regional communities (Orschiedt, Haidle 2006). In addition to detailing aspects of individual life histories, strontium isotope analysis can reveal the geographical origin of individuals, and evaluate whether they are distinct from local peers in terms of access to resources, disease, or labor burdens.

### 3.3 Political Inequality Through a Bioarchaeological Lens

Political inequality can be conceived as differential access to decision-making and authority. This form of inequality is embodied in the skeleton obliquely, through a combination of the biological effects of pervasive economic and ideological inequalities. It is occasionally possible to identify explicit osteological traces of political power, as in the dental filing and artificial cranial deformation that could be used to bodily distinguish elite and lower-status individuals in Mesoamerica (Spence and White 2009; Romero-Vargas et al., 2010). However, in cultural contexts where cranial and dental deformation are not practiced, it is still possible to delineate the osteological traces of institutionalized oppression. Where economic and ideological disparities converge, it is likely that political inequalities are also at play. If there is a social group that is osteologically distinct due to disparities in nutritional stress, higher burdens, decreased stature, and pathology, particularly if these biocultural burdens can be tied to ancestry or social class, it is likely that economic and ideological marginalization has been compounded by a lack of political power. Bioarchaeologically, instances of political inequality have been profitably explored in a number of contexts, ranging from historically known colonial polities to slave states in North America and the Caribbean.

Klaus and Tam (2009) have convincingly argued that marked political inequalities produce not only a record of *physical* trauma, but also leave clear traces of more insidious structural violence that has marked biological effects. In their study of the impact of Spanish colonialism on native groups in Peru, the authors highlight pronounced shifts in indigenous health, particularly for vulnerable groups like women and children. Compared to an earlier pre-colonial sample, growth velocity and fertility decreased, and the prevalence of porotic hyperostosis and periosteal inflammation increased in a later colonial sample of individuals from Mórrope, Peru. This diachronic sampling strategy has also been used to trace the osteological signature of colonial power structures in North America through an exploration of skeletal samples drawn from Spanish Florida. Larsen et al. (2001) found that a combination of subsistence and environmental factors related to the appearance of Europeans, including the increased focus on maize, the deliberate concentration of populations (*congregación*), and the adoption of a draft-labor system involving heavy physical labor, contributed to significant declines in native health during the post-contact period. After an extensive study combining multiple osteological lines of evidence, researchers found that even



though “life for native populations did not simply go from good to bad” (2001:71) due to evidence of disease and heavy labor pre-contact, native health was exacerbated by the economic and political structures associated with Spanish colonization.

In addition to illuminating the biological impact of colonialism, bioarchaeology has also begun to trace the signatures of slavery on the human body. In their comparison of black slave populations to free blacks and middle-class whites during the nineteenth century, Rathbun and Steckel (2002) emphasize that the slave sample demonstrated the poorest health of all groups examined, with high incidences of hypoplasias, low childhood stature, and anemia suggesting childhood nutritional stress, and high rates of antemortem tooth loss among females. The skeletons of enslaved populations in the Caribbean also bear discernible marks of institutionalized political oppression. Drawing on a sample of 46 individuals from Newton Plantation, Barbados, Shuler (2011) found that individuals who had been enslaved during life died earlier than urban enslaved populations. At Newton Plantation young adult females were particularly affected by the biocultural burdens of slavery; they “would have been highly stressed from the combined effects of pregnancy, childbirth and intensive labour”, while males “may have been buffered through internal social relations in the slave community... [and] preferenced by plantation managers since adult men were valued for their strength and ability labour” (Shuler 2011:75). In this example, the social group with the least political power and ability to affect decision-making is osteologically identifiable based on a significantly lower average age at death than other contemporary populations. These studies of slave populations in both the United States and Barbados demonstrate the potential for bioarchaeological differentiation between enslaved and oppressing populations.

Finally, the rise of complex socio-political structures also leaves an imprint on human remains. In contrast to traditional interpretations of Harappan society as a relatively peaceful, heterarchically-organized polity, bioarchaeological investigations of this Indus Valley center revealed a differential inter-individual risk of violence. Robbins Schug et al. (2012) examined a sample of 58 crania from three different mortuary areas at Harappa, and found that the risk of severe perimortem or antemortem cranial trauma differed between mortuary areas. As the authors argue, this reflects the fact that “violent injury was a fact of life for some of the city’s residents. Some Harappan people experienced, enacted, and witnessed violence. This violence varied in prevalence by sex, age, mortuary rites and mode of interment” (Robbins Schug et al. 2012:145).

In sum, even though decision-making capacity is not directly encoded in human skeletal remains, it is often possible to make an educated assessment of which individuals or sub-groups were *not* accorded political authority or capital based on marked differences in diet, pathology, labor burdens, or life expectancy. Bioarchaeological analysis provides a strategy by which to examine political marginalization by comparing particularly stressed groups with their synchronic or diachronic counterparts to determine whether such stress is related to changes in the political organization of the larger society.

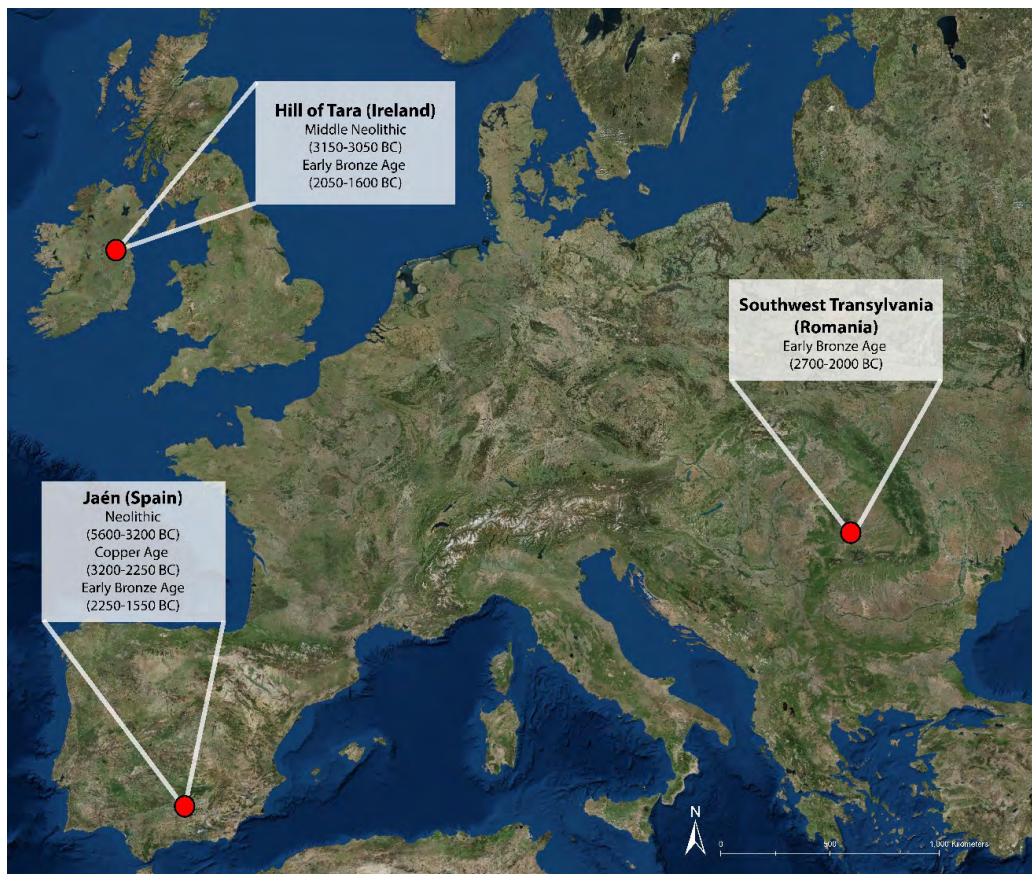
### 3.4 Approaching Variability in Energy Expenditure and Chronology

Two final complicating dimensions of mortuary treatment that can be illuminated with reference to bioarchaeological analysis are energy expenditure and chronology. Barrett (1990) has highlighted the problematic fact that not all ritual expenditure preserves archaeologically. In particular, energetically expensive public staging of funerary rituals may leave few archaeological traces. For example, if feasts or other conspicuous consumption events associated with the burial process take place away from a cemetery, their material remains may be difficult to locate or associate with mortuary practices. Secondary burial practices, such as cremation and skull removal, include activities away from the final burial location that may not preserve archaeologically (see Kuijt 1996). It is important to consider the full process from death to burial and beyond to fully understand the energy expenditure of mortuary rituals (Kuijt 1996, Kuijt, Quinn 2013).

Radiocarbon dating and aDNA analysis of human remains also have the potential to provide relevant information about prehistoric inequalities. Mortuary analyses are predicated on comparisons that identify patterned variation across cemeteries and regions (O’Shea 1984, Beck 1995). However, some mortuary

variability within and between cemeteries may be due to change through time rather than synchronic differences in mortuary treatments across a population (Quinn, Kuijt 2013, Quinn 2015). Accurate dating is necessary to test whether variation in material signatures of inequality (e.g., energy expenditure, access to burial, diet, etc.) is due to change over time, or if it instead reflects the materialization of lived or performed inequalities in the past. The time depth revealed by radiocarbon dating can also problematize the over-used theoretical construct of ancestors (Whitley 2002). If ancestor veneration is a strategy that elites employ as a justification for differential concentration of political power, absolute dating of human remains relative to the use of mortuary features can indicate whether such politically potent ancestors were a generation removed from the community, or whether elites were co-opting the symbols of other earlier groups (Kuijt, Quinn 2013, Cooney 2014, Schurr, Cook 2014). Similarly, if unequal access to resources or differential mortuary treatment is related to kinship and genealogy, ancient DNA (aDNA) analysis of human skeletal remains, in tandem with investigations of spatial organization and mortuary treatment, has the potential to be of great utility for archaeologists (Usher et al. 2002). Recent applications of social network analysis to mortuary contexts have also revealed novel patterns of similarities and dissimilarities between burials that complement traditional spatial, multivariate statistical, and aDNA techniques for exploring kinship, identity, and inequality (e.g., Sosna et al. 2013).

Armed with the methodological tools to identify both lived and performed inequalities in mortuary contexts, we turn to a series of case studies from prehistoric Europe (Figure 1). These case studies highlight the importance of both coherence and dissonance as theoretical approaches for understanding the structure and dynamics of inequality in the past.



**Figure 1:** Map of Europe with case study locations marked. (Base map from ESRI World Imagery).

## 4 Case Studies

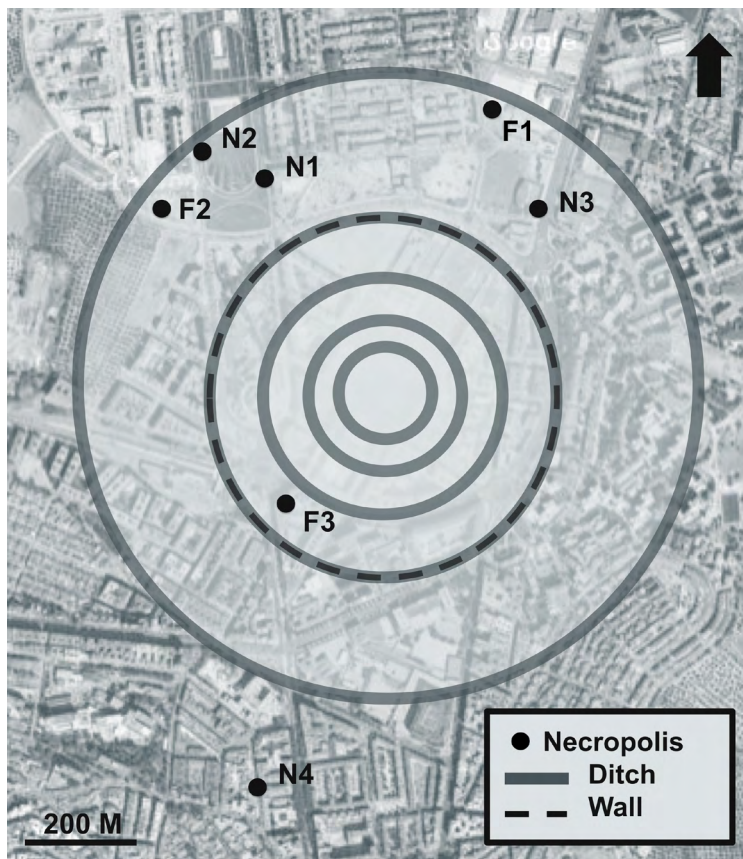
To highlight the utility of this approach across a variety of geographic and cultural contexts, we have selected case studies from across prehistoric Europe, during periods of social change and emergent inequality. Prehistoric Spain, Ireland, and Romania are ideal laboratories in which to explore issues of coherence and dissonance within social organization during the long-term emergence of institutionalized inequality for several reasons. First, there is a long tradition of examining inequality in Neolithic, Copper Age, and Bronze Age contexts across Europe. Second, the different case studies highlight the diversity in long-term trajectories in the timing and nature of the development of inequality. This variability is only revealed by considering examples from different ecological zones and positions within emerging long-distance trade networks throughout Late Prehistoric Europe. Third, all cases share comparable lines of evidence, including human remains, a rich mortuary record, and additional non-mortuary data that can provide multiple demonstrations of performed and lived identities. Fourth and finally, the cases also have significant potential for future research informed by the approach to exploring inequality and social organization presented in this study.

Archaeological and bioarchaeological work in Spain, Ireland and Romania demonstrates that institutional coherence and dissonance varies across space and time. In the Irish and Romanian case studies, much of the bioarchaeological work has yet to be conducted. As a result, when discussing these examples we incorporate alternative archaeological measures of lived inequalities, experiences, and institutions. We focus particularly on settlement patterns, domestic organization, and material culture analyses. Each case study highlights the potential contributions that further study of human skeletal remains can make to explorations of coherence and dissonance in social institutions and emergent inequality. Our use of preliminary archaeological research is intended to demonstrate the utility of this theoretical approach and methodological framework while suggesting avenues for future bioarchaeological research.

### 4.1 Spain

The archaeological record of Late Prehistoric Iberia provides an example of distinct diachronic patterning in the emergence of coherence and dissonance in southern Europe. In the Neolithic (c. 5600-3200 BC), evidence suggests a tight relationship between lived social organization and the performed identities and relationships materialized in mortuary practices. During this period, individuals were accorded largely egalitarian mortuary treatment and buried communally in caves and rock shelters (Díaz-del-Río 2006, García Sanjuán 2006, Lillios et al. 2010). This equal opportunity approach to burial, where individuals of all ages and both sexes received similar mortuary treatment, complements the archaeological record of short-term and small-scale settlements experimenting with incipient forms of agriculture and demonstrating little intra- or inter-site economic and political differentiation (Forenbaher 1999, Chapman 2008). While the practice of communal burial continued into the Copper Age (c. 3200-2250 BC), there was significant transformation in settlement. Communities aggregated into large, complexly-organized settlements that replaced the previous more ephemeral Neolithic occupations. Agrarian economies intensified, communities invested in the construction of permanent architectural features like walls and irrigation ditches, and the number and size of long-term settlements increased (Harrison 1985, Chapman 2008, García Sanjuán, Murillo-Barroso 2013). As Lillios (2015) has indicated, the amount of space available in tombs and caves grew increasingly constricted during this period, further constraining more traditional collective approaches to interment. Finally, during the Early Bronze Age (c. 2250-1550 BC), mortuary practices were brought into lockstep with increasingly hierarchical forms of organization. The incorporation of greater numbers of luxury and symbolic goods into specific graves, and the increased number of child burials attest to the growing emphasis on social inequality and the identity of individuals, rather than communities or lineage groups (Mathers 1984, Lull 2000). This period also witnessed the rise of subfloor household burials, a trend believed to signify the growing importance of the nuclear family at the expense of the clan or extended family (Lull 2000, Lull et al. 2005, García Sanjuán 2006).

The Copper Age record is especially intriguing because of the dissonance between collective or communal mortuary practices and increasingly complex forms of social organization that were beginning to emerge at this time. In particular, the appearance of large-scale matrix village sites like Los Millares, Valencina de la Concepción, and Marroquíes Bajos warrant particularly stringent archaeological examination (Zafra de la Torre et al. 1999, Zafra de la Torre et al. 2003, Díaz-del-Río 2011, García Sanjuán et al. 2013). Marroquíes Bajos is characterized by an impressive degree of communal labor investment in architectural features, including the five concentric ditches and the 2 km long adobe wall that demarcate the boundaries of the site. The settlement also includes at least seven different mortuary areas (Zafra de la Torre et al. 1999, Díaz-del-Río 2004) (Figure 2). The large spatial scale, more complex internal organization, and significant labor investment in site architecture at the 113 hectare Marroquíes Bajos suggest that a degree of social restructuring was necessary to found and maintain the first ‘matrix villages’ in southern Iberia. Intriguingly, burials at such sites were collective or communal, in tholos tombs, underground mortuary structures, or artificial caves. However, closer examination of some of these features reveals the incipient emergence of spatial differentiation, as in the side-niches of and chambers of the Los Millares tholos tombs (Mathers 1984) or the appearance of symbols of authority and increasing numbers of ornaments and idols in graves at more concentrated settlements (García Sanjuán 2006). At Marroquíes Bajos, initial bioarchaeological analyses suggest that mortuary treatment was not restricted by age or sex, but that burial may have been related to membership in lineages or sodalities (Beck 2015). Díaz-del-Río (2004) has suggested that friction between these sorts of groups led to the eventual collapse of the site. Through examining inter-individual and spatial variability in diet through carbon and nitrogen isotope analyses, regional affiliation and mobility through strontium analyses, and diachronic change through radiocarbon dating of human bone, ongoing bioarchaeological research has the potential to reveal whether the dissonance preserved in the archaeological record is rooted in individual inequalities in lived experience.

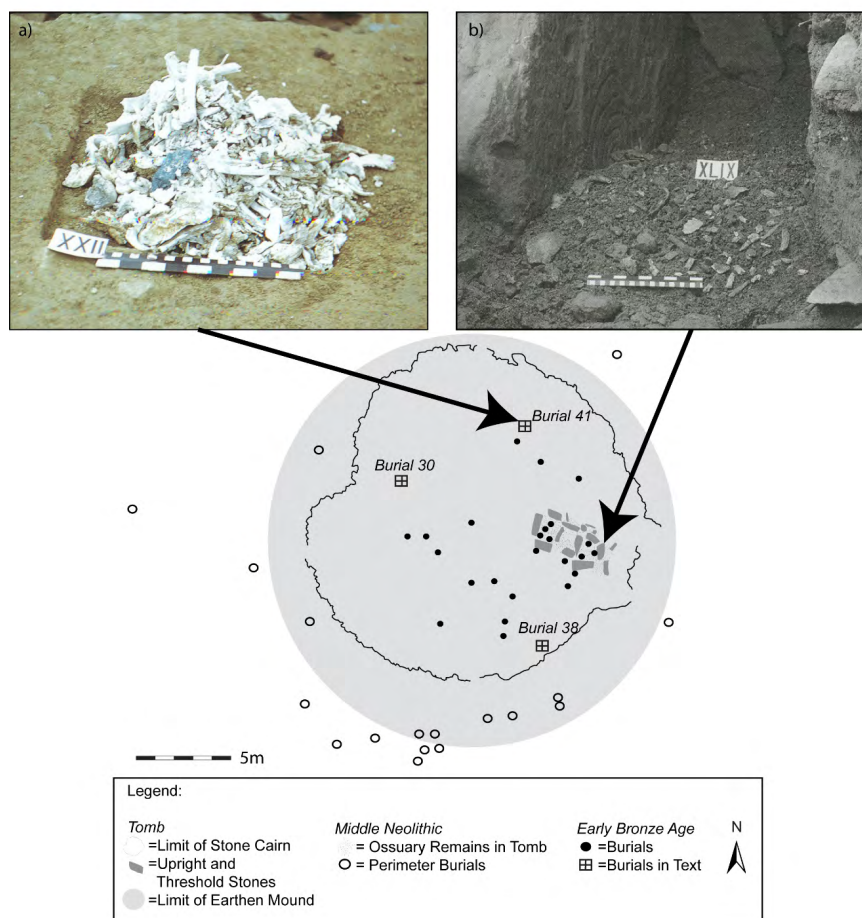


**Figure 2:** Schematic map of Marroquíes Bajos outlining the location of mortuary areas relative to the ditches and adobe wall surrounding the settlement. F = fossa común, N = Necropolis.



## 4.2 Ireland

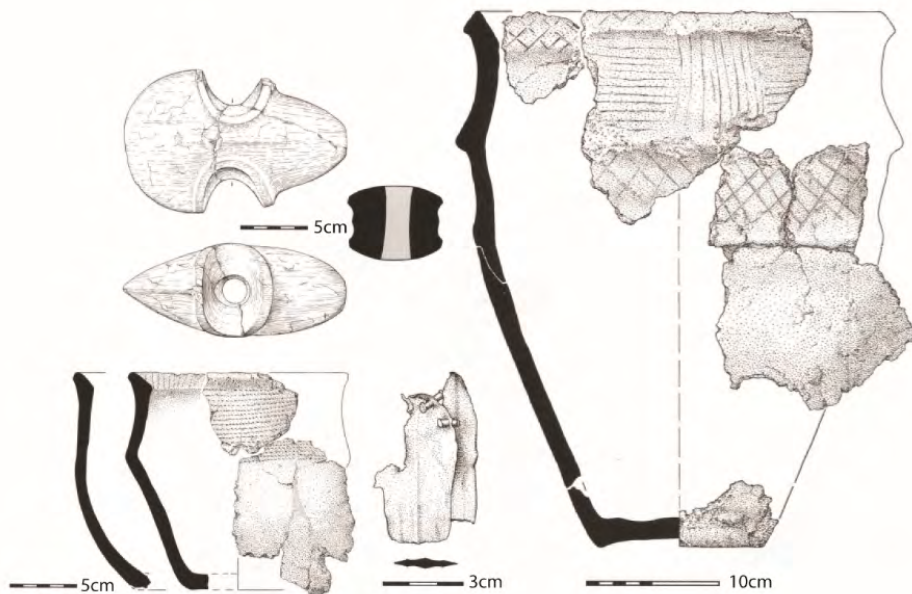
The Neolithic and Early Bronze Age cemetery of the Mound of the Hostages on the Hill of Tara, Co. Meath, is one of the most important and most intensively studied cemeteries in Ireland (Waddell 1990, O'Sullivan 2005, O'Sullivan et al. 2013, Quinn 2015) (Figure 3). The passage tomb was originally constructed and used during the Middle Neolithic, from 3150-3050 cal. BC. It was reused by Early Bronze Age peoples between 2050-1600 cal. BC, initially as a small community cemetery, then as a regional mortuary center, and finally as a place for a single burial after a period of abandonment at the end of the Early Bronze Age (Mount 2013, Quinn, Kuijt 2013, Quinn 2015). The human remains in the Mound of the Hostages have been subject to only preliminary bioarchaeological analysis (though see Sheridan [2013] for further analysis of Burial 30). This is in part because the majority of human remains were cremated, but is also due to a temporal gap between the excavation of the cemetery during the 1950s, and the initial analysis during the late 20th century, prior to the broader recognition of the analytical potential of cremations (see O'Sullivan 2005, Schmidt, Symes 2008, Cerezo-Roman, Williams 2014, Williams 2015). Additional work, particularly focused on aDNA and strontium analyses of the unburned Neolithic skulls, can reveal whether the human remains encode a trajectory of lived inequalities similar to those performed in the mortuary practices. In the meantime, we can compare the performed inequalities in mortuary practices with lived inequalities observed in non-mortuary contexts, particularly settlement and residential patterns, even though these dimensions are less well understood than contemporaneous mortuary practices (see Cooney, Grogan 1994, Waddell 2010).



**Figure 3:** Plan map of the Mound of the Hostages, Hill of Tara with photos representative of the different depositional contexts: (a) single Early Bronze Age deposit of cremated remains in mound (Burial 41) with a fire-damaged copper dagger, (b) comingled deposit of Neolithic cremated remains from the central passage of the tomb. Burials mentioned in text (30, 38, 41) marked. (After O'Sullivan 2005: Figure 97, Plate 13; Quinn 2015: Figure 6)

There was minimal performance of interpersonal inequality during the Neolithic. The main burial rite was cremation and then deposition and comingling within the communal tomb (O'Sullivan 2005). Grave goods were limited and burial at Tara was open to all adults within the community (Quinn 2015). However, children and infants were significantly underrepresented (Kuijt and Quinn 2013, Cooney 2014) which may indicate that subadults were not afforded full personhood within the society (see Cerezo-Roman 2014). In addition to cremation and burial in the communal tomb, some individuals were interred in spatially distinct cists off of the main passage, and several non-cremated complete human skulls were also discovered (Kuijt, Quinn 2013). It is unclear why the skulls of only certain individuals were interred in the Mound while the rest of their bodies were either cremated or buried away from Tara. The comingling of remains and the lack of symbols of authority in grave goods suggest that the community was performing a minimal amount of inequality, where key individuals like lineage heads may have received special treatment that could have been quantitatively, but not qualitatively, different than that of other adults. During the Neolithic, communities lived in large houses, potentially structured along lineage lines, with relatively little overt signaling of inequality either within or between households.

The Early Bronze Age reuse of the Mound of the Hostages can be divided into a number of subphases, in particular an early phase in which the mound was used as a communal cemetery, and a later phase when it was transformed into a regional cemetery that drew together communities from across the region for mortuary rituals (Quinn 2015). During the early period (2050-1900 cal. BC), there was a gradual evolution in mortuary practices from inhumation in the passage to cremation in the overlaying earthen cairn. The burial rate during this period suggests that the mortuary rite may not have been extended to all members of the community, though most of the community could have participated in the funerary process (Quinn 2015). Demographic models and analysis of the spatial distribution of burials have shown that by the second phase of the Early Bronze Age use of the site (1900-1850 cal. BC), the Mound had transformed into a regional cemetery where burial access continued to be restricted to a small portion of the adults in the wider region. All burials were cremations and individuals were buried in spatially discrete graves, often in funerary urns (O'Sullivan 2005). There was a spike in the materialization of inequality as some grave goods that appear to be symbols of authority, like the large polished stone axehead recovered from Burial 38 (O'Sullivan 2005: Plate 3) (Figure 4), were unevenly distributed across the graves. The emergence of Tara as a regional cemetery was as brief as it was unique within the Irish Early Bronze Age landscape. The Early Bronze Age residential pattern shifted



**Figure 4:** Grave goods from Burial 38, Mound of the Hostages, Hill of Tara. Note the polished stone battle axe and fire-damaged bronze dagger. (After O'Sullivan 2005: Figures 163-164).



towards smaller structures for nuclear, rather than extended, families (Doody 2008). Again, inequalities within and between households were limited, and there is currently no evidence for the existence of large-scale regional polities (which would emerge in Ireland by the Late Bronze Age – see Grogan 2005, Cotter 2012).

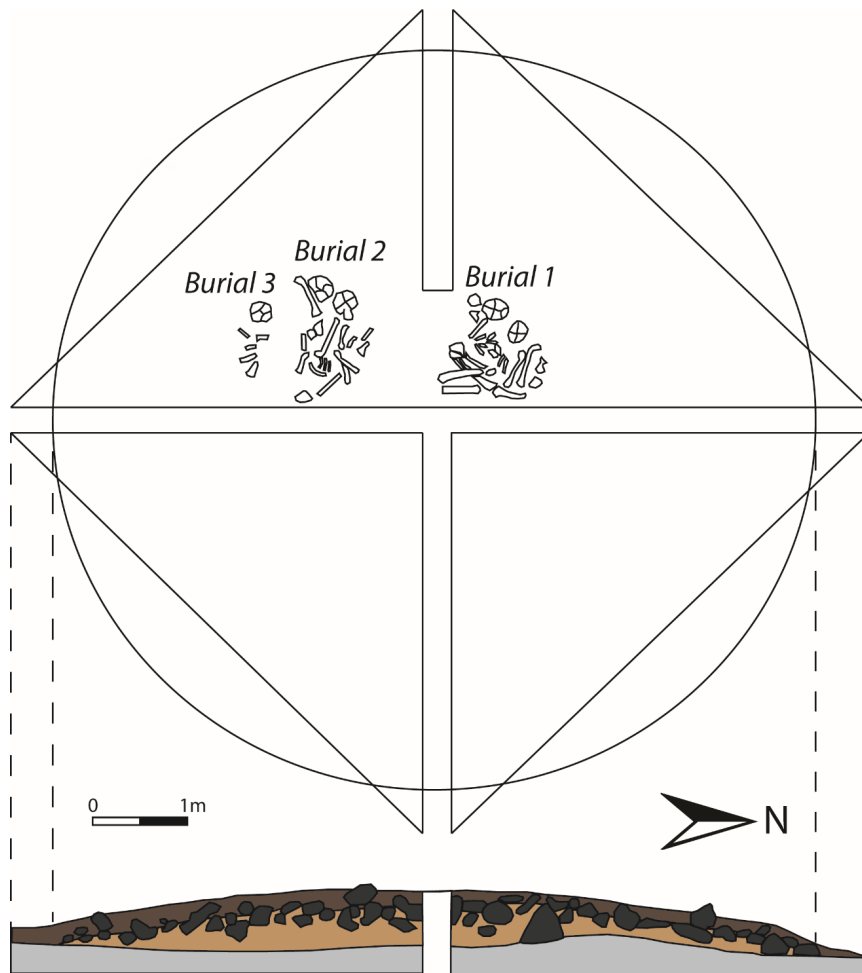
The record at Tara reflects increasing dissonance between mortuary indicators of performed inequality and archaeological signatures of relatively undifferentiated residential and settlement patterns. While Neolithic social organization was broadly coherent across performed and lived institutions, Early Bronze Age practices, particularly between 1900-1850 cal. BC, were highly dissonant, with more exaggerated performed inequalities than evidence in lived contexts. It is possible that this substantial dissonance between lived and performed contexts contributed to the rapid abandonment at Tara and dissolution of the only regional mortuary center during the Early Bronze Age. In sum, this case study shows that coherence and dissonance can rapidly change within a given regional record, with such transformations reflecting potentially significant shifts in the stability of social institutions.

### 4.3 Romania

The Early Bronze Age in Transylvania (2700-2000 BC) was a period of potential social, ritual, and economic transformation (Ciugudean 1996, Ciugudean 2011). Southwest Transylvania is home to some of the richest copper, gold, and tin deposits in the world (Papalas 2008), which played a key role in the development of institutionalized inequality in southeast Europe (Duffy 2010, Earle, Kristiansen 2010, O'Shea 2011). Within southwest Transylvania, the Early Bronze Age landscape was dotted with stone-topped tomb cemeteries that covered primary and secondary inhumations (Ciugudean 1995, Ciugudean 1996:128-134, Ciugudean 1997, Popa et al. 2009:270-281, Ciugudean 2011:23-27) (Figure 5). Cemeteries contained between 1 and 16 tombs, and each tomb contained anywhere from 2 to 10 individuals (Figure 6). Most interments contained adult individuals, though there are several instances of infant and juvenile burials (e.g., Tomb II, Grave 4 at Ampoița-Peret) (Ciugudean 1996, 2011).



**Figure 5:** An Early Bronze Age tomb on a ridge in Rameț, Alba County, Romania. (Photo credit: C. Quinn).



**Figure 6:** Plan and profile of an Early Bronze Age tomb at the site of Țelna-Rupturi (Tomb 1) excavated by H. Ciugudean in 1990. Note the tomb includes primary and secondary inhumations, single individuals and collective burials. (After Ciugudean 1996: Figure 39).

Early Bronze Age mortuary rites in Transylvania reflect a moderate amount of performed inequality. As each tomb usually contained less than 10 individuals, most of whom were adults, it is unlikely that all individuals were afforded the opportunity to be buried in these formal tomb cemeteries. Grave goods, which were generally limited, included ceramics and adornment items, though a significant amount of wealth can be found in some burials, as indicated by golden earrings found at Ampoița-Peret (Ciugudean 1996:127-128). The co-occurrence of primary and secondary burials in tombs may reflect intra-community segmentation in identity, though there is no correlation between grave goods and any particular body treatment. Early investigations suggest that neither all tombs in a given cemetery, nor all burials in a given tomb, were contemporaneous. As a result, at least some of the mortuary variability between and within tombs is the result of diachronic change and may not reflect contemporaneous social inequalities.

Bioarchaeological investigations of mortuary remains in Bronze Age Transylvania have been limited. One important contribution has been the isotopic work conducted by Gerling and Ciugudean (2013). In their study, Gerling and Ciugudean measured  $^{87}\text{Sr}/^{86}\text{Sr}$  and  $\delta^{18}\text{O}$  isotopic ratios from six individuals across four Transylvanian Early Bronze Age tomb cemeteries. The analyses provided preliminary evidence that people buried in Early Bronze Age tombs were local community members participating in small-scale movements, likely related to logistical mobility in connection with pastoral economies (Gerling, Ciugudean 2013:14-15). Additional bioarchaeological analyses, such as those described in Section 3, may reveal whether or not local individuals experienced significant lived inequalities.



As in the Irish case study, the best alternate arena for understanding lived inequalities prior to bioarchaeological study is through an analysis of settlement systems. Throughout the Early Bronze Age, there is minimal evidence for social inequality within or between settlements (Ciugudean 1996). Larger settlements (over 2 hectares) only emerged in the last few centuries of the Early Bronze Age, just as use of tomb cemeteries began to decline. While there are metal objects in graves, evidence for the organization of metal production is thus far sparse (e.g., isolated evidence of casting at Pianu de Jos [Ciugudean 1996]), suggesting that metallurgical activity at Early Bronze Age settlements was conducted on a small, household scale, similar to contemporaneous production in the Carpathian Basin (Papalas 2008).

The application of bioarchaeological techniques to the growing corpus of mortuary data from tombs in southwest Transylvania, combined with future archaeological work in settlements, has significant potential for assessing lived inequalities during the Early Bronze Age. For now, it appears that the performed inequalities outpaced those in lived contexts, creating a dissonant system in which any lived inequalities were over-emphasized in mortuary contexts.

## 5 Discussion

Integrating concepts of coherence and dissonance into explorations of social organization in the past can increase our understanding of the dynamic processes that led to the development of institutionalized inequality in several ways. First, bioarchaeologists and mortuary archaeologists must continue to situate the study of human remains within a broader analytical framework. The model of social organization materialized in cemeteries may be similar to, or drastically different from, its depiction in any other social dimension. Our case studies have highlighted the unique insights produced by comparing multiple different archaeological and social domains. As archaeology and archaeological subfields such as bioarchaeology have become more specialized, opportunities for broad comparison have dwindled. Mortuary evidence, whenever possible, must be contextualized, compared, and contrasted with non-mortuary archaeological evidence. In light of the more specialized archaeology that has developed over the past several decades, more large-scale collaborative projects are needed.

Second, much of the archaeological debate over the presence, nature, and degree of social inequality in past societies may result from different researchers prioritizing either particular archaeological measures of inequality (e.g., settlement patterns), or particular social dimensions (e.g., organization of food production). As a result, there are many well-reasoned yet contrasting opinions about the degree of inequality in different archaeological contexts. Returning to European archaeology, the issue of the presence, influence, and roles of elites continues to be the subject of extensive debate from the Neolithic (Porčić, 2012; Arponen et al. 2015) through the Copper Age (Díaz-del-Río & García Sanjuán 2006; Honch et al. 2006; Chapman 2008; Kienlin 2010; Nocete et al. 2010; Gilman 2013) and the Bronze Age (see Gilman 1981, Harding 1984, O'Shea 1996, Earle 2002, Parkinson 2002, Duffy 2010, Earle, Kristiansen 2010, Harding 2011, Kienlin, Zimmerman 2012, Nicodemus 2014, Duffy 2015, Kristiansen, Earle 2015). The multiple positions scholars have taken on the degree of inequality that characterized European societies in Late Prehistory is often informed by the geopolitical context of localized case studies (e.g., as part of a Mediterranean interaction network; in procurement or consumption zones – see Sherratt 1993), variable importance being placed on metal as an index of elites (see Pare 2000; Nocete 2006), or by their interpretation of particular archaeological measures that are often subject to significant inter-project variation in data production and resolution (see Duffy [2015] for a discussion of analytical and interpretive variability in settlement patterns).

While the diversity of opinions regarding inequality in Late Prehistoric Europe will likely persist, we argue that some of the current variability in perceptions of inequality among prehistoric European societies can be attributed to prioritizing particular archaeological measures and social dimensions at the expense of others. Within mortuary contexts, the performed inequalities materialized in funerary rites should be given the same priority as the lived inequalities materialized in skeletons. No social dimension is more “correct” or “real” than another. Using the concepts of coherence and dissonance provides a new strategy with which

to make balanced comparisons of different archaeological measures and social dimensions to produce a holistic reconstruction of social life and organization in the past.

Third, prehistoric societies demonstrate institutional coherence and dissonance that varies across space and time. For the study of middle range societies, the issue then becomes defining the ways in which different institutions were either coherent or dissonant, and evaluating the impact of these essential tensions within social organization on the lives of individuals and communities in the past. However, identifying the degree of coherence or dissonance in prehistoric institutions should not be the ultimate goal. Instead, the tensions within middle range societies should be approached as a fertile source of comparative data necessitating new and augmented social theory.

Fourth and finally, tensions across coherent and dissonant institutions have important implications for exploring how social organization changes over time. Just as institutions have the capacity to transform when new people, events, and historical processes come into play, inter-institutional characterizations of coherence and dissonance can and will change over time. Shifts between coherent and dissonant mortuary practices can reveal larger societal ruptures (see Bloch 1968, Beck et al. 2007, Bolender 2010), and provoke a number of key questions about the tempo and trajectory of the emergence of inequality. Are transformations in inequality preceded by periods of broader social institutional coherence or dissonance? Can institutional dissonance limit the breadth, scale, and speed of transformations in inequality? Should changes between different dissonant institutional forms of inequality be granted the same weight as shifts which involve a novel coherence of institutions that supports and reinforces inequality in social relationships? Do coherence or dissonance have an adaptive value that may have been fostered or co-opted by emerging elites to create or maintain their position?

These complex questions necessitate tracing historical trajectories of coherence and dissonance over long periods of time, with a particular focus on the tempo and nature of change that can only be elucidated through fine-grained chronologies in addition to other analytical tools at the disposal of bioarchaeologists and mortuary archaeologists. These questions also highlight that exploring tensions in social organization can lead to novel questions that will guide future research into the emergence of inequality. Additional work to generate the large data sets required to evaluate the utility of this approach is needed, and is an important goal for future research.

## 6 Conclusions

The concepts of coherence and dissonance provide a novel framework within which to examine the emergence of social inequality in prehistory. Addressing and evaluating tensions between institutions requires the explicit comparison of multiple social dimensions, including political, economic, and ideological dimensions. In particular, contrasting the evidence of performed inequality materialized in the mortuary record to evidence of lived inequality materialized in human skeletal remains can delineate the extent and nature of the essential tensions operating within a society at a particular period in time. By focusing on a broader analytical scale rather than evidence drawn from a single social dimension, this approach produces new insights into the ways in which social institutions articulate to reinforce or undermine emergent forms of inequality. A framework developed to evaluate tensions, rather than an approach that prioritizes a single social dimension, is capable of uncovering dynamics that would otherwise be overlooked. The evaluation of coherence and dissonance also necessitates expanding the scope of archaeological investigations of prehistoric social dynamics, encouraging the incorporation of multiple lines of evidence through large-scale, collaborative projects.

In sum, incorporating coherence and dissonance into archaeological investigations of inequality in the prehistoric past, particularly through the comparison of evidence derived from mortuary archaeology and bioarchaeology, provides a more holistic understanding of how and when institutionalized social inequality emerged, and why inequality increased, persisted, diminished, or collapsed in past populations.

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## References

- Adams, R. M. (2012). Ancient Mesopotamian urbanism and blurred disciplinary boundaries. *Annual Review of Anthropology*, 4, 1-20.
- Ambrose, S. H., Buikstra, J. E., & Krueger, H. W. (2003). Status and gender differences in diet at Mound 72, Cahokia, revealed by isotopic analysis of bone. *Journal of Anthropological Archaeology*, 22, 217-226.
- Arponen, V. P. J., Müller, J., Hofmann, R., Furholt, M., Ribeiro, A., Horn, C., & Hinz, M. (2015). Using the capability approach to conceptualise inequality in archaeology: The case of the Late Neolithic Bosnian site Okolište c. 5200–4600 BCE. *Journal of Archaeological Method and Theory*, 1-20, published online 14 May 2015.
- Barrett, J. C. (1990). The monumentality of death: The character of Early Bronze Age mortuary mounds in southern Britain. *World Archaeology*, 22(2), 179-189.
- Beck, J. (2015). Part of the family: Age, identity and burial in Copper Age Iberia. In A. Osterholtz (Ed.), *Theoretical approaches to analysis and interpretation of commingled human remains*. (pp. 47-73). Cham: Springer International.
- Beck, L. A. (1995). *Regional approaches to mortuary analysis*. New York: Plenum Press.
- Beck, R. A., Bolender, D. J., Brown, J. A., & Earle, T. K. (2007). Eventful archaeology: The place of space in structural transformation. *Current Anthropology*, 48(6), 833-860.
- Bell, E. E. (2002). Engendering a dynasty: A royal woman in the Margarita tomb, Copan. In T. Arden (Ed.), *Ancient Maya women*. (pp. 89-104). Walnut Creek, CA: AltaMira Press.
- Bentley, R., Wahl, J., Price, T., & Atkinson, T. C. (2008). Isotopic signatures and hereditary traits: snapshot of a Neolithic community in Germany. *Antiquity*, 82, 290-304.
- Bickle, P., Hofmann, D., Bentley, R., Hedges, R., Hamilton, J., Lainghas, F., Nowell, G., Pearson, D., Grupe, G., & Whittle, A. (2011). Roots of diversity in a Linearbandkeramik community: isotope evidence at Aiterhofen (Bavaria, Germany). *Antiquity*, 85, 1243-1258.
- Binford, L. (1971). Mortuary practices: Their study and potential. *Memoirs of the Society for American Archaeology*, 25, 6-29.
- Bloch, M. (1968). Tombs and conservatism among the Merina of Madagascar. *Man*, 3(1), 94-104.
- Bolender, D. J. (Ed.) (2010). *Eventful archaeologies: New approaches to social transformation in the archaeological record*. Buffalo: SUNY Press.
- Bradley, R. (1998). *The significance of monuments*. London: Routledge Press.
- Brown, J. A. (1971). *Approaches to the social dimensions of mortuary practices*. Washington DC: *Memoirs of the Society for American Archaeology*.
- Brück, J. (2004a). Early Bronze Age burial practices in Scotland and beyond: Differences and similarities, In I. Shepherd, G. Barclay (Eds.), *Scotland in Ancient Europe*. (pp. 179-188). Edinburgh: Society of Antiquaries of Scotland.
- Brück, J. (2004b). Material metaphors: The relational construction of identity in Early Bronze Age burials in Ireland and Britain. *Journal of Social Archaeology*, 4, 307-333.
- Brück, J. (2006). Fragmentation, personhood and the social construction of technology in Middle and Late Bronze Age Britain. *Cambridge Archaeological Journal*, 16, 297-315.
- Cannon, A. (1989). The historical dimension in mortuary expressions of status and sentiment. *Current Anthropology*, 30(4), 437-458.
- Cerezo-Roman, J. (2014). Pathways to personhood: Cremation as a social practice among the Tucson Basin Hohokam. In I. Kuijt, C. Quinn & G. Cooney (Eds.), *Transformation by fire: The archaeology of cremation in cultural context*. (pp. 148-167). Tucson: University of Arizona Press.
- Cerezo-Roman, J., & Williams, H. (2014). Future directions for the archaeology of cremation. In I. Kuijt, C. P. Quinn & G. Cooney (Eds.), *Transformation by fire: The archaeology of cremation in cultural context*, (pp.240-255). Tucson: University of Arizona Press.

- Chapman, R. (2008). Producing inequalities: Regional sequences in Later Prehistoric southern Spain. *Journal of World Prehistory*, 21(3-4), 195-260.
- Chapman, R. (1995). Ten years after - megaliths, mortuary practices, the territorial model. In L. A. Beck (Ed.), *Regional approaches to mortuary analyses*. (pp. 29-51). New York: Plenum.
- Chesson, M. S. (2015). Reconceptualizing the Early Bronze Age southern Levant without cities: Local histories and walled communities of EB II-III society. *Journal of Mediterranean Archaeology*, 28(1), 51-79.
- Childe, V. G. (1930). *The Bronze Age*. Cambridge: Cambridge University Press.
- Childe, V. G. (1951). *Social Evolution*. New York: Schuman.
- Ciugudean, H. (1995). The Later Eneolithic/Early Bronze Age tumulus-burials in central and south-western Transylvania (I). *Apulum*, 32, 13-32.
- Ciugudean, H. (1996). *Epoca Timpurie a Bronzului în Centrul și Sud-Vestul Transilvaniei*. Bucharest: Ministerul Invatamantului.
- Ciugudean, H. (1997). The Later Eneolithic/Early Bronze Age tumulus-burials in central and south-western Transylvania (II). *Apulum*, 34, 43-47.
- Ciugudean, H. (2011). Mounds and mountains: Burial rituals in Early Bronze Age Transylvania. In S. Berecki, R. Németh & B. Rezi (Eds.), *Bronze Age rites and rituals in the Carpathian Basin: Proceedings of the international colloquium from Târgu Mureș*, (pp.21-57). Târgu Mureș: Mega.
- Conklin, B. A., & Morgan, L. M. (1996). Babies, bodies, and the production of personhood in North America and a native Amazonian society. *Ethos*, 24(4), 657-694.
- Cook, D. C. (1984). Subsistence and health in the Lower Illinois Valley: Osteological evidence. In M. Cohen & G. Armelagos (Eds.), *Paleopathology at the origins of agriculture*. (pp. 235-269). Orlando: Academic Press.
- Cooney, G. (2014). Role of cremation in mortuary practices in the Irish Neolithic. In I. Kuijt, C. Quinn & G. Cooney (Eds.), *Transformation by fire: The archaeology of cremation in cultural context*. (pp. 189-206). Tucson: University of Arizona Press.
- Cooney, G., & Grogan, E. (1994). *Irish prehistory: A social perspective*. Dublin: Wordwell.
- Cotter, C. (2012). *The western stone forts project: Excavations at Dún Aonghasa and Dún Eoghanachta*. Dublin: Wordwell.
- Crawford, S. (2000). Children, grave goods and social status in Early Anglo-Saxon England. In J. Sofaer Deverenski (Ed.), *Children and material culture*. (pp. 169-179). London: Routledge.
- Davis-Kimball, J. (2002). *Warrior women: An archaeologist's search for history's hidden heroines*. New York: Warner Books.
- DeWitte, S. N., & Stojanowski, C. M. (2015). The osteological paradox 20 years later: Past perspectives, future directions. *Journal of Archaeological Research*, 23(4), 397-450.
- Díaz-del-Río, P. (2004). Factionalism and collective labor in Copper Age Iberia. *Trabajos de Prehistoria*, 61(2), 85-98.
- Díaz-del-Río, P. (2006). An appraisal of social inequalities in central Iberia (c. 5300-1600 CAL BC). In P. Díaz-del-Río & L. García Sanjuán (Eds.), *Social inequality in Iberian Late Prehistory*. (pp. 67-76). Oxford: Archaeopress.
- Díaz-del-Río, P. (2011). Labor in the Making of Copper Age Iberian Lineages. In K. Lillios (Ed.), *Comparative archaeologies: The American Southwest (AD 900-1600) and the Iberian Peninsula (3000-1500 BC)*. (pp. 37-56). Oxford: Oxbow Books.
- Díaz-del-Río, P., & García Sanjuán, L. (Eds.). (2006). *Social Inequality in Iberian Late Prehistory*. Oxford: Archaeopress.
- Doody, M. (2008). *The Ballyhaura Hills project. Discovery Programme Monograph*. Dublin: Wordwell.
- Duffy, P. (2010). *Complexity and autonomy in Bronze Age Europe: Assessing cultural developments in Eastern Hungary*. (Unpublished doctoral dissertation). University of Michigan, Ann Arbor, MI.
- Duffy, P. (2015). Site size hierarchy in middle-range societies. *Journal of Anthropological Archaeology*, 37, 85-99.
- Earle, T.K. (2002). *Bronze Age economics: The beginnings of political economies*. Boulder, CO: Westview.
- Earle, T.K., & Kristiansen, K. (2010). *Organizing Bronze Age societies: The Mediterranean, central Europe, and Scandinavia compared*. Cambridge: Cambridge University Press.
- Fernández-Crespo, T., & de-la-Rúa, C. (2015). Demographic evidence of selective burial in the megalithic graves of northern Spain. *Journal of Archaeological Science*, 53, 604-617.
- Forenbaher, S. (1999). *Production and exchange of bifacial flaked stone artifacts during the Portuguese Chalcolithic*. Oxford: Archaeopress.
- Fowler, C. (2005). Identity politics: Personhood, kinship, gender and power in Neolithic and Early Bronze Age Britain. In E. Casella & C. Fowler (Eds.), *The archaeology of plural and changing identities: Beyond identification*. (pp. 109-134). New York: Kluwer Academic/Plenum Publishers.
- García Sanjuán, L. (2006). Funerary ideology and social inequality in the Late Prehistory of the Iberian south-west (c. 3300-850 Cal BC). In P. Díaz-del-Río & L. García Sanjuán (Eds.), *Social inequality in Iberian Late Prehistory*. (pp. 149-169). Oxford: Archaeopress.
- García Sanjuán, L., & Murillo-Barroso, M. (2013). Social complexity in Copper Age Southern Iberia (c. 3200-2200 Cal BC): Reviewing the 'state' hypothesis at Valencina de La Concepción (Seville, Spain). In M. Cruz Berrocal, L. García Sanjuán & A. Gilman (Eds.), *The prehistory of Iberia: Debating early social stratification and the state*. (pp. 181-217). New York: Routledge.
- García Sanjuán, L., Lucíañez Triviño, M., Schumacher, T., Wheatley, D., & Banerjee, A. (2013). Ivory craftsmanship, trade and social significance in the southern Iberian Copper Age: the evidence from the PP4-Montelirio sector of Valencina de la Concepción (Seville, Spain). *European Journal of Archaeology*, 16(4), 610-635.

- Gerling, C., Heyd, V., Pike, A., Bánffy, E., Dani, J., Köhler, K., Kulcsár, G., Kaiser, E., & Schier, W. (2012). Identifying kurgan graves in eastern Hungary: A burial mound in light of strontium and oxygen isotope analysis. In J. Burger, E. Kaiser & W. Schier (Eds.), *Population dynamics in prehistory and early history: new approaches using stable isotopes and genetics*. (pp. 165-176). Boston: De Gruyter.
- Gerling, C., & Ciugudean, H. (2013). Insights into the Transylvanian Early Bronze Age using strontium and oxygen isotope analyses: A pilot study. In V. Heyd, G. Kulcsár & V. Szeverényi (Eds.), *Transitions to the Bronze Age: Interregional interaction and socio-cultural change in the Third Millennium BC Carpathian Basin and neighbouring regions*. (pp. 181-202). Budapest: Archaeolingua.
- Gilman, A. (1981). The development of social stratification in Bronze Age Europe. *Current Anthropology*, 22(1), 1-23.
- Gilman, A. (2013). Were There States during the Later Prehistory of Southern Iberia? In M. Cruz Barrocal, L. García Sanjuán & A. Gilman (Eds.), *The prehistory of Iberia: Debating early social stratification and the state*. (pp. 1-46). New York: Routledge.
- Grogan, E. (2005). The North Munster project. *Discovery Programme Monograph No. 6*. Bray: Wordwell.
- Gronenborn, D. (2006). Climate change and socio-political crises: Some cases from Neolithic Central Europe. *Journal of Conflict Archaeology*, (2)1, 13-32.
- Harding, A. (1984). Aspects of social evolution in the Bronze Age. In J. Bintliff (Ed.), *European social evolution: Archaeological perspectives*. (pp. 135-145). Bradford: University of Bradford.
- Harding, A. (2011). The Bronze Age. In S. Milisauskas (Ed.), *European prehistory: A survey*. Second Ed. (pp. 327-403). New York: Springer.
- Harrison, R. (1985). The “policultivo ganadero”, or the secondary products revolution in Spanish Agriculture, 5000-1000 BC. *Proceedings of the Prehistoric Society*, 51, 75-102.
- Harrod, R. P., (2012). Centers of control: Revealing elites among the Ancestral Pueblo during the “Chaco Phenomenon. *International Journal of Paleopathology*, 2(2-3), 125-135.
- Hawass, Z., Gad, Y. Z., Ismail, S., Khairat, R., Fathalla, D., Hasan, N., Ahmed, A., Elleithy, H., Ball, M., Gaballah, F., Wasef, S., Fateen, M., Amer, H., Gostner, P., Selim, A., Zink, A., & Pusch, C. M. (2010). Ancestry and pathology in King Tutankhamun's family. *The Journal of the American Medical Association*, 303(7), 638-647.
- Hawkey, D.E., & Merbs, C.F. (1995). Activity-induced musculoskeletal stress markers (MSM) and subsistence strategy changes among Ancient Hudson Bay Eskimos. *International Journal of Osteoarchaeology* 5, 324-338.
- Honch, N. V., Higham, T. F. G., Chapman, J., Gaydarska, B., & Hedges, R. E. M. (2006). A palaeodietary investigation of carbon ( $^{13}\text{C}/^{12}\text{C}$ ) and nitrogen ( $^{15}\text{N}/^{14}\text{N}$ ) in human and faunal bones from the Copper Age cemeteries of Varna I and Durankulak, Bulgaria. *Journal of Archaeological Science*, 33, 1493-1504.
- Inomata, T., (2006). Politics and theatricality in Mayan society. In T. Inomata & L. Coben (Eds.), *Archaeology of performance: Theaters of power, community, and politics*. (pp. 187-222). Lanham, MD: AltaMira Press.
- Keswani, P. (2004). *Mortuary ritual and society in Bronze Age Cyprus*. London: Equinox.
- Kienlin, T. L. (2010). Traditions and transformations: Approaches to Eneolithic (Copper Age) and Bronze Age metalworking and society in eastern central Europe and the Carpathian Basin. *BAR International Series 2184*. Oxford: Archaeopress.
- Kienlin, T. L., & Zimmerman, A. (Eds.). (2012). *Beyond elites: Alternatives to hierarchical systems in modelling social formations*. Bonn: Rudolf Habelt.
- Klaus, H. D. (2012). The bioarchaeology of structural violence: A theoretical model and a case study. In D. Martin (Ed.) *The bioarchaeology of violence*. (pp. 29-62). Gainesville, FL: University Press of Florida.
- Klaus, H. D., & Tam, M. E. (2009). Contact in the Andes: Bioarchaeology of systemic stress in colonial Mórrope, Peru. *American Journal of Physical Anthropology*, 138(3), 356-368.
- Kristiansen, K., & Earle T. K. (2015). Neolithic versus Bronze Age social formations: A political economy approach. In K. Kristiansen, L. Šmejda & J. Turek (Eds.), *Paradigm found: Archaeological theory - present, past and future*. (pp. 234-247). Oxford: Oxbow.
- Kristiansen, K., & Larsson, T. B. (2005). *The rise of Bronze Age society: Travels, transmissions and transformations*. Cambridge: Cambridge University Press.
- Kuijt, I. (1996). Negotiating equality through ritual: A consideration of Late Natufian and Pre-Pottery Neolithic A period mortuary practices. *Journal of Anthropological Archaeology*, 15, 313-336.
- Kuijt, I. 2000. Keeping the peace: Ritual, skull caching, and community integration in the Levantine Neolithic. In I. Kuijt (Ed.), *Life in Neolithic farming communities: Social organization, identity, and differentiation*. (pp. 137-163). New York: Kluwer Academic/Plenum Publishers.
- Kuijt, I. (2008). The Regeneration of life: Neolithic structures of symbolic remembering and forgetting. *Current Anthropology*, 49, 171-197.
- Kuijt, I., & Quinn, C. P. (2013). Biography of the Neolithic body: tracing pathways to cist II, Mound of the Hostages, Tara. In M. O'Sullivan, C. Scarre & M. Doyle (Eds.), *Tara: From the past to the future: Towards a new research agenda*. (pp. 130-143). Bray: Wordwell & UCD School of Archaeology.
- Kuijt, I., Quinn, C. P., & Cooney, G. (Eds.). (2014). *Transformation by fire: The archaeology of cremation in cultural context*. Tucson: University of Arizona Press.

- Larsen, C. S., Griffin, M. C., Hutchinson, D. L., Noble, V. E., Norr, L., Pastor, R. F., Ruff, C. B., Russell, K. F., Schoeninger, M. J., Schultz, M., Simpson, S. W., & Teaford, M. F. (2001). Frontiers of contact: Bioarchaeology of Spanish Florida. *Journal of World Prehistory*, 15(1), 69-123.
- Lillios, K. T. (2015). Practice, process, and social change in third millennium BC Europe: A view from the Sizandro Valley, Portugal. *European Journal of Archaeology*, 18(2), 245-258.
- Lillios, K. T., Waterman, A. J., & Artz, J. A. (2010). The Neolithic-Early Bronze Age mortuary rockshelter of Bolores, Torres Vedras, Portugal. *Journal of Field Archaeology*, 35(1), 19-39.
- Liston, M. A., & Rotroff, S. I. (2013). Babies in the well: Archaeological evidence for newborn disposal in Hellenistic Greece. In J. Grubs, T. Parkins & R. Bell (Eds.), *The Oxford Handbook of Childhood and Education in the Classical World*. (pp. 1-16). Oxford: Oxford University Press.
- Littleton, J., & Allen, H. (2007). Hunter-gatherer burials and the creation of persistent places in southeastern Australia. *Journal of Anthropological Archaeology*, 26, 283-298.
- Lull, V. (2000). Argaric society: death at home. *Antiquity*, 74, 581-590.
- Lull, V., Micó Pérez, R., Herrada, C. R., and Risch, R. (2005). Property relations in the Bronze Age of south-western Europe: An archaeological analysis of infant burials from El Argar (Almeria, Spain). *Proceedings of the Prehistoric Society*, 71, 247-268.
- Marcus, J., & Flannery, K. V. (2004). The coevolution of ritual and society: New C14 dates from ancient Mexico. *Proceedings of the National Academy of Science*, 101, 18257-18261.
- Martin, D. L., Harrod, R. P. & Fields, M. (2010). Beaten down and worked to the bone: Bioarchaeological investigations of women and violence in the ancient Southwest. *Landscapes of Violence*, 1(1), 1-19.
- Mathers, C. (1984). Beyond the grave: The context and wider implications of mortuary practice in south-eastern Spain. In T. Blagg, R. Jones & S. Keay (Eds.), *Papers in Iberian Archaeology*. (pp. 13-46). Oxford: British Archaeological Reports.
- McClure, S. B., García, O., Roca de Togores, C., Culleton, B. J., & Kennett, D. J. (2011). Osteological and paleodietary investigation of burials from Cova de La Pastora, Alicante, Spain. *Journal of Archaeological Science*, 38(2), 420-428.
- Mills, B. J. (2004). The establishment and defeat of hierarchy: inalienable possessions and the history of collective prestige structures in the Pueblo Southwest. *American Anthropologist*, 106, 238-251.
- Moore, A. (2009). Hearth and home: The burial of infants within Romano-British domestic contexts. *Childhood in the Past*, 2(1), 33-54.
- Mount, C. (2013). The context of the Early Bronze Age cemetery in the Mound of the Hostages. In M. O'Sullivan, C. Scarre & M. Doyle (Eds.), *Tara: From the past to the future: Towards a new research agenda*. (pp. 184-195). Bray: Wordwell & UCD School of Archaeology.
- Mummert, A., Esche, E., Robinson, J., & Armelagos, G. J. (2011). Stature and robusticity during the agricultural transition: Evidence from the bioarchaeological record. *Economics and Human Biology*, 9(3), 284-301.
- Nicodemus, A. (2014). Bronze Age economies of the Carpathian Basin: Trade, craft production, and agro-pastoral intensification. (Unpublished doctoral dissertation). University of Michigan, Ann Arbor.
- Nocete, F. (2006). The first specialised copper industry in the Iberian Peninsula: Cabezo Juré (2900-2200 BC). *Antiquity*, 80, 646-657.
- Nocete, F., Lizcano, R., Peramo, A., & Gómez, E. (2010). Emergence, collapse and continuity of the first political system in the Guadalquivir Basin from the fourth to the second millennium BC: The long-term sequence of Úbeda (Spain). *Journal of Anthropological Archaeology*, 29(2), 219-237.
- North, D. C. (1990). *Institutions, institutional change, and economic performance*. Cambridge: Cambridge University Press.
- Orschiedt, J. & Haidle, M. N. (2006). The LBK enclosure at Herxheim: Theatre of war or ritual centre?: References from osteoarchaeological investigations. *Journal of Conflict Archaeology*, 2(1), 153-168.
- O'Shea, J. M. (1984). *Mortuary variability: An archaeological investigation*. Orlando: Academic Press.
- O'Shea, J. M. (1996). *Villagers of the Maros: Portrait of an Early Bronze Age society*. New York: Plenum Press.
- O'Shea, J. M. (2011). A river runs through it: Landscape and the evolution of Bronze Age networks in the Carpathian Basin. *Journal of World Prehistory*, 24, 161-174.
- O'Shea, J. M. and Barker, A. W. (1996). Measuring social complexity and variation: A categorical imperative? In J. Arnold (Ed.), *Emergent Complexity: The Evolution of Intermediate Societies*. (pp. 13-24). Ann Arbor: International Monographs in Prehistory.
- O'Sullivan, M. (2005). *Duma na nGiall: The Mound of the Hostages, Tara*. Bray: Wordwell & UCD School of Archaeology.
- O'Sullivan, M., Scarre, C., & Doyle, M. (Eds.). (2013). *Tara: From the past to the future: Towards a new research agenda*. Bray: Wordwell & UCD School of Archaeology.
- Papalas, C.A. (2008). *Bronze Age metallurgy of the Eastern Carpathian Basin: A holistic exploration*. (Unpublished doctoral dissertation). Arizona State University, Tempe.
- Pare, C. F. (2000). Bronze and the Bronze Age. In C. Pare (Ed.), *Metals make the world go round: The supply and circulation of metals in Bronze Age Europe*. (pp. 1-37). Oxford: Oxbow Books.
- Parker-Pearson, M. (1993). The powerful dead: Archaeological relationships between the living and the dead. *Cambridge Archaeological Journal*, 3, 203-229.
- Parker-Pearson, M. (1999). *The archaeology of death and burial*. College Station, TX: Texas A & M University Press.

- Parker-Pearson, M. (2003). Materiality and ritual: The origins of stone tombs in southern Madagascar. In Z. Crossland, G. Sodikoff & W. Griffin (Eds.), *Lova/Inheritance: Past and Present in Madagascar*. (pp. 127-157). Ann Arbor: University of Michigan.
- Parkinson, W. A. (2002). Integration, interaction, and tribal “cycling”: The transition to the Copper Age on the Great Hungarian Plain. In W. Parkinson (Ed.), *The archaeology of tribal societies*. (pp. 391-438). Ann Arbor: International Monographs in Prehistory.
- Parkinson, W. A., & Gyucha, A. (2012). Long-term social dynamics and the emergence of hereditary inequality: A prehistoric example from the Carpathian Basin. In T.L. Kienlin & A. Zimmerman (Eds.), *Beyond elites: Alternatives to hierarchical systems in modelling social formations*. (pp. 243-250). Bonn: Rudolf Habelt.
- Petroutsas, E. I., Richards, M. P., & Manolis, S. K. (2007). Stable isotope analysis of human remains from the Early Helladic site of Perachora, Korinth, Greece. In C. Mee & J. Renard (Eds.), *Cooking up the past: Food and culinary practices in the Neolithic and Bronze Age Aegean*. (pp. 290-296). Oxford: Oxbow.
- Popa, C. I., Rîșcuța, N. C. & Iosif, F. V. (2009). Cercetări arheologice la Balșa și Mada (jud. Hunedoara) și câteva observații privind necropolele tumulare din Munții Apuseni. *Apulum*, 46, 257-286.
- Porčić, M. (2012). Social complexity and inequality in the Late Neolithic of the Central Balkans: reviewing the evidence. *Documenta Praehistorica*, 39, 167-183.
- Powell, M. (1992). In the best of health? Disease and trauma among the Mississippian elite. In A. Barker & T.R. Pauketat (Eds.), *Lords of the southeast: Social inequality and the native elites of southeastern North America*. (pp. 81-97). Washington DC: Archaeological Papers of the American Anthropological Association.
- Quinn, C. P. (2015). Returning and reuse: Diachronic perspectives on multi-component cemeteries and mortuary politics at Middle Neolithic and Early Bronze Age Tara, Ireland. *Journal of Anthropological Archaeology*, 37, 1-18.
- Quinn, C. P., & Kuijt, I. (2013). The tempo of life and death during the Early Bronze Age at the Mound of the Hostages, Tara. In M. O'Sullivan, C. Scarre & M. Doyle (Eds.), *Tara: From the past to the future: Towards a new research agenda*. (pp. 196-206). Dublin: Wordwell & UCD School of Archaeology.
- Raczky, P., & Anders, A. (2008). Late Neolithic spatial differentiation at Polgár-Csőszhalom, eastern Hungary. In D. W. Bailey, A. Whittle, & D. Hofmann (Eds.), *Living well together? Settlement and materiality in the Neolithic of South-East and Central Europe*. (pp. 35-53). Oxford: Oxbow.
- Rathbun, T. A., & Steckel, R. H. (2002). The health of slaves and free blacks in the East. In J. Rose & R. Steckel (Eds.), *The backbone of history: Health and nutrition in the Western Hemisphere*. (pp. 208-222). Cambridge: Cambridge University Press.
- Renfrew, C. (1973). Monuments, mobilization and social organization in Neolithic Wessex. In C. Renfrew (Ed.), *The explanation of culture change: Models in prehistory*. (pp. 539-558). Gloucester: Duckworth.
- Renfrew, C. (Ed.). 1983. *The megalithic monuments of western Europe*. London: Thames & Hudson.
- Robbins Schug, G., Gray, K., Mushrif-Tripathy, V. & Sankhyan, A. R. (2012). A peaceful realm? Trauma and social differentiation at Harappa. *International Journal of Paleopathology*, 2(2-3), 136-147.
- Robbins Schug, G., Blevins, K. E., Cox, B., Gray, K., and Mushrif-Tripathy, V. (2013). Infection, disease, and biosocial processes at the end of the Indus civilization. *PLoS ONE*, 8(12), 1-20.
- Romero-Vargas, S., Ruiz-Sandoval, J. L., Sotomayor-González, A., Revuelta-Gutiérrez, R., Celis-López, M. A., Gómez-Amador, J. L., García-González, U., López-Serna, R., García-Navarro, V., Mendez Rosio, D., Correa-Correa, V. & Gómez-Llata, S. (2010). A look at Mayan artificial cranial deformation practices: morphological and cultural aspects. *Neurosurgery Focus*, 29(6), 1-5.
- Ruby, B. J., Carr, C., & Charles, D. K. (2005). Community organizations in the Scioto, Mann, and Havana Hopewellian regions: A comparative perspective. In C. Carr & C. D. Troy (Eds.), *Gathering Hopewell*. (pp. 119-176). New York: Springer.
- Saxe, A. A. (1970). *Social dimensions of mortuary practices*. (Unpublished doctoral dissertation). University of Michigan, Ann Arbor.
- Schmidt, C. W., & Symes, S. A. (2008). *The analysis of burned human remains*. San Diego: Academic Press.
- Schurr, M. R., & Cook, D. C. (2014). The temporal and cultural contexts of the enigmatic cremations from the Yokem Site, Illinois, USA. In I. Kuijt, C. Quinn & G. Cooney (Eds.), *Transformation by fire: The archaeology of cremation in cultural context*. (pp. 67-92). Tucson: University of Arizona Press.
- Shanks, M., & Tilley, C. (1982). Ideology, symbolic power and ritual communication: a reinterpretation of Neolithic mortuary practices. In I. Hodder (Ed.), *Symbolic and structural archaeology*. (pp. 129-154). Cambridge: Cambridge University Press.
- Shennan, S. (1982). Ideology, change and the European Early Bronze Age. In I. Hodder (Ed.), *Symbolic and structural archaeology*. (pp. 155-161). Cambridge: Cambridge University Press.
- Sheridan, A., Jay, M., Montgomery, J., Pellegrini, M., & Cahill Wilson, J. (2013). Tara boy: local hero or international man of mystery? In M. O'Sullivan, C. Scarre & M. Doyle (Eds.), *Tara: From the past to the future: Towards a new research agenda*. (pp. 207-232). Bray: Wordwell & UCD School of Archaeology.
- Sherratt, A. G. (1993). What would a Bronze-Age world system look like? Relations between temperate Europe and the Mediterranean in Later Prehistory. *Journal of European Archaeology*, 1, 1-57.
- Shuler, K. A. (2011). Life and death on a Barbadian sugar plantation: historic and bioarchaeological views of infection and mortality at Newton Plantation. *International Journal of Osteoarchaeology*, 21(1), 66-81.

- Skeates, R. (1991). Caves, cults and children in Neolithic Abruzzo, Central Italy. In R. Gowland & C. Knüsel (Eds.), *Social archaeology of funerary remains*. (pp. 122-134). Oxford: Oxbow Books.
- Sosna, D., Galeta, P., Šmejda, L., Sladek, V., & Bruzek, J. (2013). Burials and graphs: Relational approach to mortuary analysis. *Social Science Computer Review*, 31(1), 56-70.
- Spence, M. W., & White, C. D. (2009). Mesoamerican bioarchaeology: Past and future. *Ancient Mesoamerica*, 20, 233-240.
- Tainter, J. A. (1980). Behavior and status in a Middle Woodland Mortuary population from the Illinois Valley. *American Antiquity*, 45(2), 308-313.
- Ucko, P. J. (1969). Ethnography and archaeological interpretation of funerary remains. *World Archaeology*, 1(2), 263-280.
- Usher, B. M., Weets, J. D., & Wanglund, C. (2002). Can we determine kinship systems? Testing models of genetic patterns for cemetery analysis. *American Journal of Physical Anthropology*, 117(S34), 159.
- Waddell, J. (1990). *The Bronze Age burials of Ireland*. Galway: Galway University Press.
- Waddell, J. (2010). *The prehistoric archaeology of Ireland*. Third ed. Dublin: Wordwell.
- Walker, P. L., Bathurst, R. R., Richman, R., Gjerdrum, T., & Andrushko, V. A. (2009). The causes of porotic hyperostosis and cribra orbitalia: A reappraisal of the iron-deficiency-anemia hypothesis. *American Journal of Physical Anthropology*, 139(2), 109-125.
- Waterman, A.J., Silva, A.M., & Tykot, R.H. (2014). Stable isotopic indicators of diet from two Late Prehistoric burial sites in Portugal: An investigation of dietary evidence of social differentiation. *Open Journal of Archaeometry*, 2(1), 22-27.
- Weiss, E. (2007). Muscle markers revisited: Activity pattern reconstruction with controls in a central California Amerind population. *American Journal of Physical Anthropology*, 133, 931-940.
- Whallon, R. (1989). Elements of cultural change in the Later Paleolithic. In P. Mellars & C. Stringer (Eds.), *The human revolution: Behavioural and biological perspectives on the origins of modern humans*. (pp. 433-454). Princeton: Princeton University Press.
- Whallon, R. (2006). Social networks and information: Non-“utilitarian” mobility among hunter-gatherers. *Journal of Anthropological Archaeology*, 25(2), 259-270.
- Whitley, J. (2002). Too many ancestors. *Antiquity*, 76, 119-126.
- Wiessner, P. (2002). The vines of complexity: Egalitarian structures and the institutionalization of inequality among the Enga. *Current Anthropology*, 43, 233-269.
- Williams, H. (2015). Towards an archaeology of cremation. In C. Schmidt & S. Symes (Eds.), *The Analysis of Burned Human Remains*. (pp. 259-294). San Diego: Academic Press.
- Wood, J. W., Milner, G. R., Harpending, H. C., & Weiss, K. M. (1992). The osteological paradox: Problems of inferring prehistoric health from skeletal samples. *Current Anthropology*, 33(4), 343-370.
- Woodburn, J. (1982). Social dimensions of death in four African hunting and gathering societies. In M. Bloch & J. Parry (Eds.), *Death and the regeneration of life*. (pp. 187-211). Cambridge: Cambridge University Press.
- Zafra de la Torre, N., Hornos Mata, F., & Castro López, M. (1999). A macro-village as the origin of the peasant way of life: Marroquíes Bajos (Jaén, Spain) C. 2500-2000 Cal. BC. *Trabajos de Prehistoria*, 56(1), 77-102.
- Zafra de la Torre, N., Castro López, M., & Hornos Mata, F. (2003). Succession and simultaneity in a big settlement: chronology of the macro-village of Marroquíes Bajos (Jaén, Spain) c. 2500-2000 cal BC. *Trabajos de Prehistoria*, 60(1), 79-90.