COMPLEXITY AND AUTONOMY IN BRONZE AGE EUROPE: ASSESSING CULTURAL DEVELOPMENTS IN EASTERN HUNGARY

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Anthropology)
in The University of Michigan
2010

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For my Mother and Father

ACKNOWLEDGEMENTS

My interest in comparative anthropology was ignited during my undergraduate degree while taking classes with Bruce Trigger at McGill University. Although I found the comparison of states fascinating, my interest centered on the long developmental sequences that led to their formation. When I arrived in Ann Arbor in 2001, I wanted to compare the prehistoric trajectories of complex societies, and explain why they diverged. It was fortuitous that Joyce Marcus suggested I spend a summer in Hungary on Bill Parkinson's NSF funded project in 2002. Meeting with Bill and Attila Gyucha, his Hungarian colleague, would set in motion close collaborative friendships that would allow the study of the eastern Hungarian Bronze Age contained within these pages. My debt to them and countless others is enormous.

Many people facilitated my entry into Hungary. Pál Raczky generously provided input on my project when I was first becoming acquainted with the Hungarian Bronze Age. Magdi Vicze was very kind in introducing me to Százhalombatta archaeology and answering my questions about the Great Hungarian Plain. In and around Budapest, I have been warmly greeted by the next generation of Bronze Age specialists: Dani Fukőh, Brigitta Berzsényi, Vajk Szeverényi, Attila Kreiter, Gabi Kúlcsár, Viktória Kiss, Klara Fischl, László Reményi, János Dani and many others.

At the Munkácsy Mihály Museum in Békéscsaba, Imre Szátmari was infinitely gracious in supporting my surface collection, providing resources and work space, and allowing his archaeologists to spend time out at my excavations. Pál Medgyesi, another archaeologist at the museum, answered many of my questions about the excavation and survey of Sarkad-Peckesi-domb. Marietta Csányi and Judit Tárnóki received me at the county museum in Szolnok and were very generous to lead me through the material culture and chronology of the Körös area. Sándor Hornok, mayor of the village of Tarhos, enthusiastically supported my excavations.

Alice Choyke and Laci Bartociewicz invariably provided amazing hospitality when I stayed in Budapest and encouraged my fascination with the Bronze Age. Ferenc Horváth, Éva and Ottó Fogas received me many times in Szeged when I was still finding my way around a Hungarian *spakli*. Special thanks go to Tim Earle for reading an early draft and providing very useful advice when I was formulating my NSF proposal. Tim also generously hosted me in the Benta Valley project in 2006 and helped improve my survey methods.

Throughout the duration of the project, Gergely Bóka was my collaborator and tireless supporter, without whose guidance I would have certainly strayed. The friendship and archaeological expertise of Dori Kékegyi and Gábor (Baxi) Bácsmegi were likewise responsible for any success I have had with archaeological deposits in the Hungarian countryside. Special thanks are due to Amy Nicodemus, Chris Papalas, and Márton Tibor for rigorous analyses of the archaeological material collected over the course of two years. Tim Parsons and Amy Nicodemus in addition spent several weeks with me in the field on survey and excavation. Several colleagues came out for a few days to lend a trowel and support at the excavation, including Éva Fogasné, Klára Medgyesi, Tamás Polanyi, Eric Rupley and Rod Salisbury. Darren Poltorak joined the team last, but stayed on for a heroic three month stretch with very long days. In this time, we completed a tremendous amount of work.

The underpinnings of my theoretical perspective result from many stimulating conversations with close friends, especially in Ann Arbor. Many of these were held in the spirited atmosphere of the Monday Night Reading Group at a local pub. Regular members include my good friends Howard Tsai, Stephen Dueppen, Allison Davis, Dan and Christina Pugh, and Kenny Sims. A Bronze Age Europe reading group convened after I returned from Hungary, bringing together Seth Button, Em Holt, Adela Sobotkova, Amy Nicodemus, Alice Wright, and Eric Rupley. The diversity of opinions and experiences was an exciting return to Bronze Age literature after almost two years in the field. Outside of reading groups, I have been fortunate to enjoy the company of Randy Hicks, Cameron Gokee, Hemanth Kadambi, Helen Dixon, Davorka (Seki) Radovic, and Tim Horsley. My brother Earl and sister Maureen have also been very supportive throughout my graduate career.

My year and a half stay in Hungary was made an absolute pleasure by the companionship and support of my closest friends Vajk Szeverényi, Dori Kékegyi, Gergő Bóka, Bill Parkinson, and Attila Gyucha. Vajk, Billy and Attila have read my work in various drafts and it is much improved because of it. Finally, I cannot extend warm enough gratitude for my friendships with Laura C. Brown, Eric Rupley, and Ashley (Mittens) Lemke. My life in Ann Arbor has been a joy because of them.

My field research was funded by the National Science Foundation, the Rackham International Research Award, the International Institute, and the James B. Griffin Research Award from the Department of Anthropology. Two years of writing in Ann Arbor were supported by the Department of Anthropology, a fellowship in the Mischa Titiev Anthropology Library, and a Rackham One-Term Write-Up Fellowship. Critical digital maps of eastern Hungary were obtained through the generous assistance of Karl Longstreth, the Map Librarian at the University of Michigan Map Library.

My sincere thanks go to my committee – Henry Wright, Bob Whallon, and Dan Brown – for getting through a sizeable manuscript in a very short time and providing me with excellent comments. Special thanks go to Dan Brown for joining as my cognate member late in the writing process. Finally, I extend my profound gratitude to my chair, John O'Shea, for giving me the intellectual freedom to study prehistory in a way I found engaging, but also for challenging me to make it relevant for other anthropologists.

This dissertation is dedicated to my mother and father. They gave me the sails and compass to explore the world, but also have provided an island and harbour of love and support.

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Abstract

This dissertation develops a general anthropological method for studying 'middle-range societies' (which includes 'tribes,' 'chiefdoms,' and 'ranked' societies) and applies it to the Middle Bronze Age archaeological sequence in the Körös basin of eastern Hungary (2150-1400 BC). The theoretical emphasis focuses on eight social dimensions that are both cross-culturally significant and archaeologically observable. These dimensions allow monitoring social change at both the local and regional levels. This facilitates integrating models of social change with archaeological evidence such as storage location, house size, scalar stress at large settlements, the intensity of craft production, and estimates of agricultural yields based on intensive gardening and plough agriculture. Site catchment and settlement pattern analysis is another component of the approach, allowing the possibility of inter-site inequalities or dependencies to be evaluated.

This anthropological method is used to assess the orthodox understanding of Bronze Age societies – the Ottomány (Otomani) and Gyulavarsánd cultures – as hierarchical polities with elites controlling the production and distribution of prestige goods and other crafts. In contrast, the evidence from the Körös basin in the published literature and from new systematic collection and excavation indicates a pattern of autonomous villages with no sub-segment controlling metallurgy or subsistence goods. This model may not hold in areas surrounding the basin, however, suggesting organizational forms existed as a heterogeneous mosaic across the Bronze Age landscape of the Carpathian Basin.

Chapter 1: Introduction

The growth of metallurgy in the European Bronze Age (ca. 2700-1200 BC) corresponded to increases in wealth and the furthering of social inequalities. For decades, scholars have argued that the mining, trading, and production of metals fundamentally changed social interactions (Childe 1930; Kristiansen 1987; Pare 2000; Renfrew 1973; Shennan 1986, 1993a, 1993b). The fortification of major sites attests to new threats and a greater mobilization of labour. Many archaeologists believe that political hierarchies emerged at this time.

While this remains a possibility, Bronze Age Europe did not experience primary state formation outside of Greece. Though wealth disparities in the Bronze Age are easily recognized, the extent to which hierarchies were coercive and regionally organized is less well established. Comparing the polities from these archaeological sequences to the competing pre-state political formations in Mesopotamia or the Valley of Oaxaca is difficult because of critical gaps in the evidence. Explaining differences between European trajectories and those documented elsewhere is therefore nearly impossible.

The Carpathian Basin is a vast and seemingly homogenous landscape with a long and well documented record of human occupation. Due to the importance of issues such as metallurgy and trade in explanations for changes in political complexity, the Bronze Age on the Great Hungarian Plain in particular is an ideal place to address these issues. This dissertation is an inquiry into the extent to which Bronze Age communities in eastern Hungary were politically autonomous, and the degree to which craft production and consumption was concentrated in the hands of the few. It is also an attempt to situate Bronze Age societies within a socio-political spectrum of variability. My interest lies not so much in finding the right term to describe Bronze Age societies, but in answering broad questions about the eastern Hungarian trajectory in particular, and situating it among the evolution of stateless societies in general. The topics may be old, but the specific questions I bring to the study, and the tools I use to answer them, draw on contemporary or persistent theoretical concerns.

THEORETICAL CONTEXT

Placing Bronze Age societies in a comparative light with other parts of the world requires an improvement in the vocabulary for describing extinct societies. Ethnographic fieldwork in the first half of the twentieth century provided an enormous corpus of data on stateless societies; this has served as an important entry for thinking about prehistory. Beginning in the 1960s, ethnologists using an evolutionary perspective attempted to organize the observed variation and explain changes from one social form to another. Typologies such as Service's (1962) band-tribe-chiefdom, or Fried's (1967) egalitarian-ranked-stratified famously took a world of variability and reduced it to clean forms, each with their own internal logic. As in the late nineteenth century, these sequences of change were also a 'sorting' of living societies rather than an empirical study of evolutionary sequences generated from the archaeological record. Nonetheless, they have served as useful starting points and hypotheses for archaeological investigation of the past.

Despite the heuristic value of these categories, the use of social typologies for archaeologists has obvious limitations. Comparisons between archaeological sequences can only be as detailed as the methods used to describe them, and as sophisticated as the comparative analyses brought to bear. Questions about the evolution of stateless societies in general remain broad because the complexity of the phenomenon under study precludes simple answers. Many archaeologists are interested in transformations of political organization and the foundations and development of inequality (Arnold 1995; Feinman and Neitzel 1984; Gregg 1991; McIntosh 1999; Price and Feinman 1995; Tooker and Fried 1983; Upham 1990). One brand of consensus to emerge from the 1980s was that rather than assuming that clustered attributes transitioned in lock-step, variability and change was probably best studied by de-coupling social, political, and demographic dimensions (O'Shea and Barker 1996; Plog and Upham 1983; Upham 1990). Despite these early calls, few such general methodologies have been forthcoming. Such an approach is nonetheless clearly required to answer some of the more complex evolutionary questions we ask of prehistory.

Most archaeologists recognize there are countless prehistoric trajectories of stateless societies exhibiting oscillation between different, but apparently stable, structural forms. These differences often form the basic fabric of 'archaeological cultures.' It is nonetheless unclear what the major socio-structural thresholds to be overcome are, and how these structural transformations may be related to internal or external political pressures.

Anthropologists have been studying the diversity of stateless societies for over a century. Over time they have pointed to different themes critical to understanding social change under a given set of conditions. Demographic issues may be obviously important in one case of social transformation, but exchange or warfare central to it in another. This makes the multi-faceted character of stateless societies almost a required starting point for investigating their trajectories and explaining similarities and differences. The corpus of evidence available for studying the evolution of stateless societies is vast and the theoretical tools required to answer our questions must be sophisticated.

The archaeological record is the best database for testing ideas about how and why social change in stateless societies occurred. Archaeological methods remain the primary tools for studying the past without written records. Most of the methods required for evaluating hypotheses about social regularities in prehistoric societies were only developed with the emergence of processualist archaeology. The comparative study of stateless trajectories in prehistory is therefore a young science[1].

A GENERAL APPROACH FOR A SPECIFIC TRAJECTORY

This dissertation in an attempt to provide a broad overview of several different aspects of societies living in the Körös river basin during the Middle Bronze Age, known locally as the Ottomány and Gyulavarsánd cultures (2150BC-1400 BC). In order to do so, I

[1] V. Gordon Childe's (1951) *Social evolution* is an important exception, although the lack of an independent absolute dating system in many ways precluded the reconstruction of indigenous change.

assemble a corpus of anthropological observations and archaeological tools for studying systemic change in middle-range societies.

This multi-dimensional approach takes broad social dimensions such as the primary unit of consumption, access to exotic items, the intensity of food production, the distribution of craft activities, and the inter-dependence of settlements at a regional scale to investigate the character of stateless societies over time. Describing different social or economic features of stateless societies using the archaeological record requires knowledge of the range of ways in which stateless societies organize according to any one social dimension, and also an adequate sense of the record's limitations. In the work that follows, I synthesize the literature for abstractions such as segmentation and intensification and distil certain principles that can be operationalized in archaeological middle-range theory. Although I construct archaeological indicators specific to the cultural history and environment of the Bronze Age in eastern Hungary, my synthesis allows many kinds and sources of evidence to be employed for similar studies in other areas.

These tools are a preliminary step toward providing an analytical framework for comparing the evolutionary trajectories of stateless societies. A broad analytical approach such as this is the logical next step to move beyond more general comparative terms such as 'tribe' and 'chiefdom.'

The novelty of this approach lies not in the development of new theory, but in the systematic application of a range of extent knowledge and methodology. The attempt at a thorough reconstruction of a single trajectory provides 1) an evaluation of existing social models for my particular case study (Bronze Age eastern Hungary); 2) evidence with which to evaluate common hypotheses concerning change in the European Bronze Age; and 3) evidence with which to evaluate hypotheses relevant to the evolution of middle-range societies more broadly. The methods used here also force the analyst to view the details of stateless societies at multiple scales. They necessarily focus the analysis on both the local and the regional organization of cultures and the variation inherent in such organization. The feedback between using different indicators and scales incidentally helps refine archaeological methods by pointing out blind spots and contradictions.

STRUCTURE OF THE THESIS

The dissertation is organized into eleven chapters. Chapter 2 provides a broad overview of the European Bronze Age and the scholars who have engaged it. The primary themes that permeate the literature and common social models used for reconstructing Bronze Age societies are introduced. I argue that while models such as the Celts or an idealized Indo-European society may be acceptable starting points, the theoretical basis for reconstruction and the archaeological evidence to support it are poorly developed.

In Chapter 3, I offer an anthropological alternative for studying variability in stateless societies. It avoids much of the baggage associated with homologies from the historical literature, and does not pre-formulate conclusions in the seductive way associated with the typological approach. First I introduce the major concepts used for exploring middle-range society in this dissertation, and offer eight inter-connected social dimensions (such as segmentation, household distinction, regional consolidation) critical for modeling change. Each one of them has historically been involved in different arguments surrounding the evolution of more complex social forms. The generality of these dimensions makes possible the comparison between the Körös sequence and middle-range sequences elsewhere.

Chapter 4 provides the geo-environmental background to the culture history of the eastern Carpathian area. This background is required for understanding the specific archaeological measures built for the social dimensions introduced in Chapter 3. The current landscape is largely artificial, resulting from the construction of a major levee system by engineers of the Habsburg Empire in the nineteenth century. Since the understanding of this landscape is currently undergoing a major revision, and the new syntheses are as yet unpublished, the geomorphology and hydrology is discussed in detail.

Chapter 5 develops the local archaeological context. The preceding Neolithic and Copper Age components of the prehistoric sequence are briefly described, followed by an overview of Bronze Age culture history and how the current chronology in the Körös region has taken form. The radiocarbon chronology is presented based on the published dates, and the culture history is re-framed according to it. At that point, I visit the classical Bronze Age by theme, including settlement patterns, mortuary treatment, and economy.

Chapter 6 takes the social dimensions introduced in Chapter 3, and using local culture history and environment, turns them into specific variables and measures appropriate for the lower Körös basin. These indicators measure social variation at different scales. Some quantify differences between sites at the regional level. Some assess how categories of sites (e.g. fortified versus non-fortified) are different from one another with respect to a certain class of evidence. Others gauge the relationship between sites, and whether a case for dependence and asymmetry between them can be made.

In Chapter 7, I apply the indicators to the extant data on Bronze Age communities. I use excavation data from sites of the Ottomány and Gyulavarsánd culture to assess the idea that fortified tells in the lower Körös basin were regional centers of craft production and consumption. Due to a paucity of some kinds of evidence, not all of the archaeological indicators I build in Chapter 6 can be used. Nonetheless, the weight of the evidence suggests autonomous village societies rather than hierarchical political entities. Since a leading motive of the investigation is to assess competing models of complexity in Bronze Age societies, I devise a research strategy to establish how this combination of complexity and autonomy worked.

Chapter 8 presents an overview of the fieldwork undertaken. In this chapter I describe the Hungarian site gazetteer used for site re-visits, the *Magyarország Régészeti Topográfiája* (MRT), and the process of site selection and collection. The primary results I include are the sizes of Middle Bronze Age sites in the two different phases. I also present the limited magnetometry data collected during survey, and the basic chronological and stratigraphic information for my excavation of an Ottomány phase site. These data form the core subsequent analyses confirming the preliminary analysis.

In Chapter 9, I take the data from Chapter 8 in the micro-region and package it as specific measures for most of the social dimensions outlined in Chapter 3. I consider the merits of the data for each measure independently of one another, and then combine them in a synthesis at the end of the chapter to provide a model of the Bronze Age Körös trajectory in the micro-region.

Chapter 10 presents data for the regional scales of analysis. In this chapter I leave the micro-region, and provide hypotheses explaining the observed spatial patterning of site location. Once all of the data for the final social dimension are reviewed, I revisit the conclusions from Chapter 9 and complete the model of Bronze Age middle-range societies in the area.

In the final chapter, I situate the Körös trajectory among neighbouring Hungarian groups, and two others in Bronze Age Europe, comparing some of the major differences and similarities. I then turn to some of the implications of my study for approaching variability in middle-range trajectories elsewhere, and consider major lessons learned from the emergence of more complex middle-range societies in other parts of the world.

To begin the study, I first turn to over a century of scholarship on Bronze Age Europe.

Chapter 2: Bronze Age Europe, the People without History

[W]hat would we learn of ancient Greece, for example, if we interpreted it only as a prehistoric Miss Liberty, holding aloft the torch of moral purpose in the barbarian night?
- E. Wolf (1982:5)

The Bronze Age is considered by many to be the time when Europe was born. It is the age of heroes from the Homeric epics, and during its finale, reads from the tablets of Mycenaean palaces. Despite our fragments of Linear B, however, we know Bronze Age Europe above all from the archaeology. The metallurgical traditions of gold and copper working that began in the preceding Copper Age accelerated in subsequent millennia into strong indicators of craft production, trade and wealth[2]. The individual burials of the Bell Beaker and Corded Ware cultures at the beginning of the Bronze Age contrast greatly with the communalism of human burial characteristic of the Neolithic. Religious iconography around Europe changed from an emphasis on women, land and fertility to masculine symbols of weaponry, metal, and warfare. Countless deposits of swords, axes and armour in the marshlands and rivers of Europe suggest war and warriors, but also a powerful relationship between humans, metals and the spirit world. It is these images that have traditionally attracted archaeologists to the study of Bronze Age Europe.

In this chapter, however, I will argue that much of the history attributed to Bronze Age peoples is not their own. In *Europe and the People without History*, Eric Wolf (1982) attempts to write the history of the peoples Europeans encountered during five centuries of capitalist expansion (AD 1400-1900). It is an admirable book that few anthropologists would have the courage to write. Some argue it falls short of its goal, however, because Wolf's Marxist narrative is the story of capitalism rather than the story of its participants (Asad 1987). Similarly, the story archaeologists tell of Bronze Age Europe often reveals more about their lens to study it than it does about the people

[2] 'Wealth' is a primitive term and used in this dissertation only to refer to objects that were likely of high value in prehistory. How objects were differently valued, and whether they were inalienable (*sensu* Weiner 1985) are important topics but are not directly explored here.

investigated. Unfortunately, in the absence of written documentation, historians are handicapped in writing an anthropological account of people's conditions and constructions. Archaeologists, on the other hand, have no such handicap.

Bronze Age Europe is a fascinating place to study the archaeology of middle-range societies, the kinds of societies Wolf often described with fragmentary written records. The European prehistoric record includes a well-known six thousand year sequence of farming societies without state interference. Chronology building has been the backbone of much of the archaeological work in Europe, and this chronology provides an opportunity for studying process in a way not possible for lesser known regions of the world. The diversity of Europe also affords us the opportunity to look at changes in complexity under different environmental and cultural conditions.

Still, summarizing the research history for Bronze Age Europe is a daunting task. First, there are multiple traditions in European scholarship often with profoundly different archaeological interests and approaches. The British, French and Scandinavian traditions have a history of methodological and theoretical innovation, and have had the most vocal dialogues with archaeologists in North America (Trigger 1989). For complex reasons, the Germanic tradition of studying the Bronze Age, on the other hand, has entirely stagnated since the Second World War; German scholars seemingly pursue typo-chronology as an art for art's sake (Härke 1991). Other traditions still, such as the Hungarian one, are so small that while fundamentally influenced by the Germanic school, a small number of local archaeologists have set the theoretical terms of investigation with little debate (Laszlovsky and Siklódi 1991). The second challenge is related, namely that national politics have frequently had a strong influence on the institutions investigating the past in a way unknown in North America. It can plausibly be argued that European archaeology is more socially engaged for this reason (Hodder 1991).

The third reason for the difficulty is that these different traditions, nationalist concerns, and other scholarly assumptions are often embedded in publications, but are unspoken and not intuitive to foreign archaeologists. I will call these debates and topics 'hidden passengers.' They include anxieties over modern national boundaries, specific ethnic migrations of political consequence, varying currencies of Marxism framing archaeological interpretations, or an 'archaeological culture's relationship with the

Aegean'[3]. These are the issues that archaeology professors may talk about in their lectures, and students argue over at the pubs, but at least these days, rarely make their way into print. In the following pages I address some of the more important of the hidden passengers before I address the more explicit models they figure into as reconstructions of Bronze Age societies.

This chapter is composed of three parts. In the first part, I introduce recurrent themes that have captivated the minds of Bronze Age scholars. Some of these big topics started out explicit but have now become hidden passengers. First, a history of spectacular finds is presented in chronological order. I then address the early Indo-Europeans, and their Iron Age descendants encountered by the Romans and subsequently analyzed by Marx, Engels and many others. The second part is organized by theme, and involves a review of a century's use of analogy, homology, and social types in archaeological presentations of Bronze Age cultural variability. I focus specifically on the Hungarian Bronze Age in Chapter 6, and so restrict my discussion in this chapter to the positions of the more influential and synthetic writers on Bronze Age archaeology for Europe, such as Vere Gordon Childe, Marija Gimbutas, Colin Renfew, Kristian Kristiansen, and Timothy Earle. In the third part, I summarize the long-standing idea that bronze as a commodity became central to social reproduction and the emergence of complexity.

PART I: WEALTH, INDO-EUROPEANS, AND THE CONQUEST OF GAUL

Investigations into the Bronze Age past were headed by several motivations, but typo-chronology and antiquarian interests rank high among them. Although the goal of obtaining beautiful objects is still a concern in many archaeological traditions of Europe, the interpretation of these objects has undergone a sea change since the beginning of the inquiry in the nineteenth century.

[3] See Szeverényi (*forthcoming*) for an excellent review of the Hungarian research tradition.

A history of spectacular finds

The innocuous archaeological phrase 'The Early Bronze Age' in reality indicates the opening of a new epoch . . . the period of High Barbarian Europe.

- S. Piggott, *Ancient Europe* (1965)

The past one hundred and fifty years of studying prehistoric societies in Europe have seen several pivotal moments. At the beginning of the nineteenth century, parsing the prehistory before Roman contact into a succession of phases still escaped the most capable minds of the day (Daniel 1975). Scholars made no temporal distinctions in the curious collection of monuments on the landscape. All archaeological sites were normally classified as Celtic because few historians believed that they carried much time depth.

The first archaeological definition of the Bronze Age was pioneered by the historian Vedel-Simonsen in 1813, but only later elaborated into an acceptable sequence by Christian J. Thomsen (1836). Thomsen's "Three Age System" included a sorting of Stone, Bronze and Iron for prehistoric Denmark. Prehistoric archaeology barely existed outside of a circle of Danish intellectuals by 1840. It was decades later that artefacts and monuments from Britain to Greece were correctly attributed to the Bronze Age (Daniel 1975:145-151). The triage of Swiss Lake Villages into the Three Age System by Troyon (1860) was still an early use by outsiders (Daniel 1975:90-92). Even in the second half of the nineteenth century, the definition of the Bronze Age was only chronological without specific cultural valuation. This all changed with the excavations of Heinrich Schliemann.

In the mid-nineteenth century, scholars were split over the reality in the Homeric epics (Daniel 1975: 136-145; Fitton 1995). This may have stemmed from the belief that prehistoric Europeans were incapable of producing sophisticated objects (Renfrew 1973:198). It would take more than close readings of Homer to solve the debate. But if Schliemann could be faulted for his faith in the Homeric texts, he made up for it in his attention to surface scatters of sherds and a liberal use of the spade. Hisarlik in Anatolia, a good candidate for the 'lost city of Troy', was the first to see major excavations. The 'Treasure of Priam', a deeply buried collection of copper bowls, gold, silver, electrum, and bronze weapons, beads, and ear-rings, was a taste of success. Here was a first material indication of the wealth of the Bronze Age – even if it would later be found to date a thousand years earlier than Schliemann believed.

Schliemann's subsequent campaign at the citadel of Mycenae began primarily in 1876. Unlike Troy, Mycenae had never been 'lost.' The Lion Gate had been drawn by travellers before, and many modern Greeks already believed the monuments to be physical remains of the Heroic Age. The prospect of discovering the final resting place of Agamemnon and his compatriots was therefore an obvious and luring beacon (Fitton 1995). It was inside the citadel walls that Schliemann's first great discovery was made – Grave Circle A. The Shaft Graves were impressive stone hives, with nineteen bodies and remarkable riches. Bronze weapons, golden jewellery, silver plates, diadems, and face masks accompanied the human remains. Schliemann believed he had found Agamemnon's family, and the discovery contributed to the growing international acceptance of an age of brilliance lost to the memory of Classical Greece.

Once Schliemann had left Troy, Wilhelm Dörpfeld continued excavations there and published an important chronology in *Troja und Ilion* (Dörpfeld, et al. 1902). In it, he incorporated the chronological links in material culture between the Egyptian sequence and Mycenae identified by Flinders Petrie during a visit there in 1891 (Daniel 1975: 144-5). This identification was the basis for the chronology of the European mainland for the next thirty years.

Cross-dating with the continent seemed justified because of certain strong similarities in material culture. Bronze Age peoples as far as the British Isles even seemed to have benefited from the spectacular trade and influence of the Mycenaeans. Bush Barrow, a cemetery near Stonehenge, was excavated in 1808 and remains one of the more famous representatives of the Wessex culture (Coles and Taylor 1971; Piggott 1938:62). By the early 1900s, the Wessex culture was not seen as a Mycenaean colony, but rather as evidence of an invading people from across the English Channel in France. In a single burial – an extended inhumation – excavators found copper daggers, a bronze axe, and gold clothing ornaments. One dagger had thousands of gold pins decorating the handle. Delicately ornamented cups in an Aubrey Hole also tied at least some of the cremation burials at Stonehenge to the Wessex culture (Piggott 1936:76). Mycenaean type axes and exotics such as faience from the Mediterranean supported the existence of a very long-distance trade network.

Within the same decade that Schliemann had begun excavations at Mycenae, two Belgian mining engineers initiated archaeological excavations of Bronze Age sites in Iberia, Spain. It was not long thereafter that the El Argar culture was defined as the manifestation of the Bronze Age in Iberia (Siret, et al. 1887). The timing of the excavation was a historical accident, but Schliemann's publication of his material between 1875 and 1880 gave the Sirets a corpus of comparative material (Chapman 1990). The Bronze Age in Iberia was distinguished from the preceding Copper Age by settlement forms, mortuary treatment, pottery, and metallurgical types. Unlike the collective burials seen at Copper Age sites, burials of the El Argar culture were individual or double and usually placed within cist or jars. Nine-hundred and fifty burials occurred at El Argar alone. Argaric metalwork, including axes, halberds, riveted daggers, earrings, and bracelets, occurred in arsenical copper, gold, silver, and later, tin-bronze (Siret, et al. 1887). Gold leaf applied by pressure to sword handles, imported ivory buttons, and ostrich egg shells from Africa were a testament to their rich trade networks. The Sirets made famous the fortified sites, houses, and bronze working of the Argaric. In the late nineteenth century, however, these sites were attributed to colonization by the Phoenicians or Greeks (Chapman 1990). Somewhat later, instead of being mere colonies Childe promoted the idea that they developed through the 'influence' of traders from the eastern Mediterranean, representatives of great state civilizations with superior metallurgy (Childe 1947:267).

Despite similarities in axe-type with the Mediterranean, the dating of the Wessex culture by Piggott (1938) was actually based on typo-chronological parallels with the Únětice (German 'Aunjetitz') culture and their assumed links with Late Bronze Age Greece (Renfrew 1968). The Únětice complex spans much of Central Europe, but has Bohemia, and the rich ores of the Erzgebirge, at its core (Gimbutas 1965; Shennan 1993a). As with the Wessex and Argaric cultures, the most impressive finds of the Únětice were the burial chambers. The 'royal tomb' at Leubingen, a famous burial in Saxony, was excavated in 1877 (Höfer 1906). An old man was placed in a plank-constructed oak mortuary house, surrounded by dozens of axes, daggers, halberds, gold and bronze ornaments. A young girl rested across his torso. Built around them were large boulders and a timber structure, all within an earthen mound over 8 meters high. Meanwhile, other graves of the Únětice culture simply lay in deep pits under small earthen mounds, individually or as a group, with a pot or similarly simple furnishings. Once the Three Age System had been accepted, the discovery of differential burial treatment of people in Central Europe, Wessex, and Armorica suggested productive economies and pervasive inequalities beyond anything seen from the preceding Stone Age.

A trade network linking the British Isles with the Alps, Central Europe, and the Mediterranean implied a vast network of commerce. Large prehistoric settlements on major rivers were increasingly identified in the late nineteenth century and scholars believed these Bronze Age sites played prominent roles in the movement of wealth. Many believed the fortified 'tells' of eastern Hungary were part of a tradition that came from the Near East (Németi and Molnár 2002:34). Excavation at the Hungarian tell of Tószeg-Laposhalom began in 1876. Systematic excavation by strata, and keeping the finds separate, however, was not practiced until Lajos Márton's first excavations there in 1908-1912. Childe's collaboration with Márton, Tompa and others in 1927 brought the Hungarian sites international recognition (Childe 1929; Tompa 1936).

Large stratified sites such as Tószeg provided a chronological touchstone for identifying 'synchronisms' – similar, presumably contemporary forms in material culture found in different 'cultures' – resulting from external trade (Childe 1929:viii). Artefact types from Tószeg allowed Childe (1929:259-267) and others to cross-date with the sequences at Pecica (Pécska) and Perjámos on the Maros (Roska 1912), Vattina in Serbia and the Mycenaean remains at Vardaróftsa in Macedonia (Heurtley 1927:48). Excavation of settlements rather than burials also provided increased knowledge about regional differences in the social and economic lives of Bronze Age peoples. Changes were observed in tool use and metal production over time. From the houses and animal bone from Tószeg B it became clear that domesticated horse had made its way into the Carpathian Basin by the Early Bronze Age, and that the Upper Tisza may have played a role in channelling horses and cheek-pieces to the north and west (Childe 1929:263-4).

The rapid spread of horses and riding accessories all over Europe in the Bronze Age was assumed to result from advantages in warfare and part of a growing militarization in Central Europe and Scandinavia. At the heart of this warfare lay metals – the tools of war and the objects of desire. The number of metal types grew sharply in the Bronze Age in comparison with the previous Copper Age (Harding 1984:141). Although axes were common in the Copper Age, the number of types and the decorative detail in the Bronze Age is striking. The halberd emerged in the Early Bronze Age (c. 2400 BC), and the popularity of the sword and spear took off in the Middle Bronze Age (c. 1700 BC). The use of body armour and shields was also present by this time (Harding 2007:79-80).

The study of metal types underpinned European chronology more than any other artefact material, even more so than pottery. Different areas had their own particular chronologies: Montelius (1885) had defined northern Europe; for Bavaria, Paul Reinecke defined the Bronze Age and early Iron Age (Müller-Karpe 1959), and Mozsolics and Hänsel defined the Carpathian Basin (Hänsel 1968; Mozsolics 1967, 1973, 1985; Mozsolics and Schalk 2000). A series of synchronisms linking these regions tied the continent together. An Apa-Gaura axe of Hungarian manufacture (*Schaftröhreaxt* Type A), for example, was found in multiple contexts across Europe, and this allowed scholars to tie Hungary's Bronze Age phase B III a to Reinecke's Bz B.

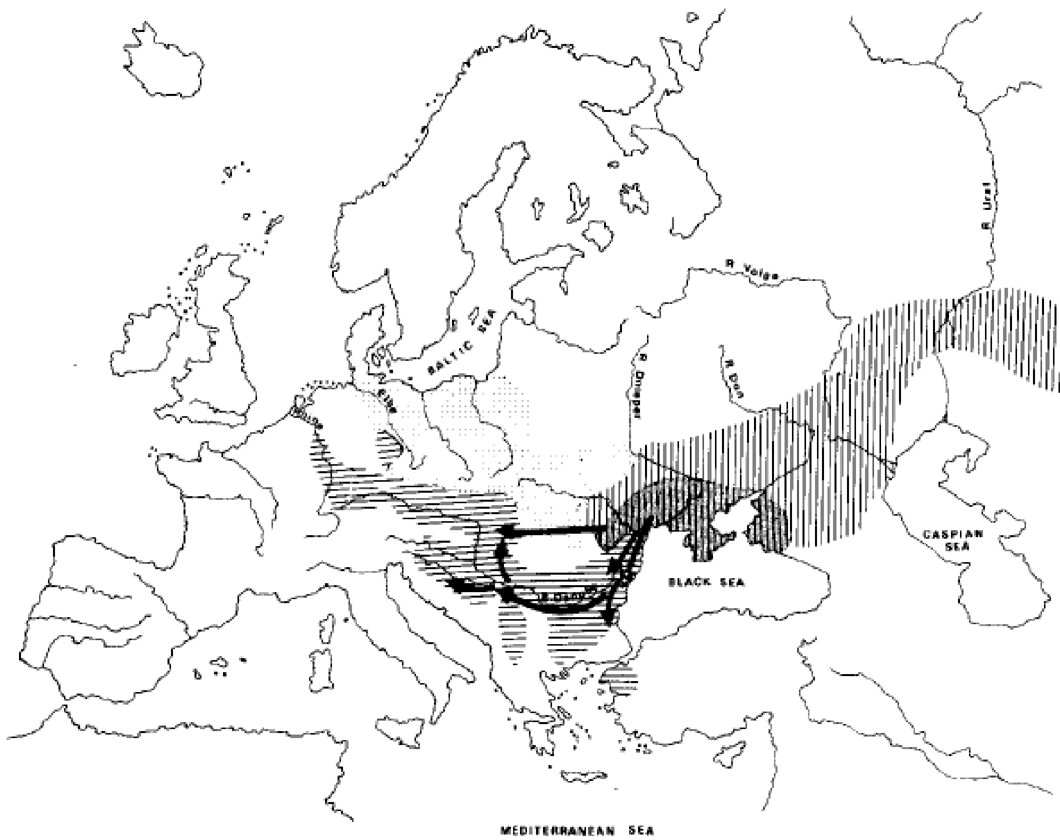
Beginning in the late 1950s, metallurgical specialists began to analyze the composition of individual pieces to ascertain, beyond typological associations, where exactly the ores for this proliferation of weapon types were coming from. German scholars collected specimens for the Stuttgart laboratory, and the findings became known as the SAM analyses (*Studien zu den Anfängen der Metallurgie*). Thousands of samples were taken and their compositions were sorted into metal groups, initially argued to represent similar techniques and ores (Junghans, et al. 1960, 1968). The method was criticized by outside archaeologists, but the data were re-analyzed (Butler and van der Waals 1964; Waterbolk and Butler 1965). Most agreed upon a progression from more or less pure copper, to one of arsenical bronze, to alloys of bronze with added tin. Lead was added for alloying in the LBA in the Carpathian Basin.

The view of European prehistory, and specifically the Bronze Age, changed dramatically from the introduction of the Three Age system to the publication of these compositional analyses in the 1960s. For prehistorians in the mid-nineteenth century, the Bronze Age was still only a hypothesis based on the work of a few Danes. A century later it had become the age when economic centers with traders and merchants such as Tószeg swelled along the rivers. Warriors and elites fuelled the demand for riches, weaponry, and master craftsmen.

By the mid-twentieth century, when scholars saw the wealth, ingenuity and commerce of the Bronze Age, they saw themselves. The archaeology, however, was not the only basis for perceiving a European ethnogenesis. The existence of a Proto-Indo European (PIE) language was accepted even by the turn of the twentieth century (Mallory 1989:9-23). A refinement and systematization of PIE has been the trend over the past century. Although PIE vocabulary is suggestive of their social and economic world, it has been mostly archaeologists describing these language speakers and grounding the word lists generated by linguists.

The Bronze Age and the dawn of the Indo-Europeans

The origin and influence of the Indo-Europeans is certainly one of the great 'hidden passengers' of Bronze Age research, although it was far more explicit in earlier general accounts. V. Gordon Childe, for example, was trained first as a Classical philologist, and second as an archaeologist (Trigger 1980). Throughout his career he evaluated the archaeological record in light of work in historical linguistics. In *Prehistoric Migrations in Europe* (Childe 1950), he seconded Hermes' (1937) argument that the Indo-European homeland was in Hither Asia. In interpreting the archaeology, he envisioned a small number of mounted elites galloping their horses and chariots into the heart of Europe during the Late Bronze Age. He credited the early Indo-Europeans with the cremation burials of the Urnfield culture, found at Troy, off the Danube, and on the northern plains of Europe.



23. The situation at *c*. 3400-2900 B.C. Horizontal striations: Balkano-Danubian culture (mixture of Wave I and substratum population; Dotted area: distribution of the Globular Amphora culture around 3000 B.C.: Dark shaded area and arrow with two dots: Wave No. 2, *c*. 3400-3200 B.C.; vertical striations: Jamna culture and its expansion (arrows) at *c*. 3000-2900 B.C.

Figure 2.1. Wave No.2 in the '*kurganization*' process (from Gimbutas 1977:331).

Important revisions were made to this theory by Lithuanian-born Marija Gimbutas (Gimbutas 1963, 1965, 1977, 1980). Her encyclopaedic knowledge of the archaeology and little known chronological sequences from the areas surrounding the Black and Caspian Seas created a coherent grand narrative that explained the appearance of one archaeological pattern and the disappearance of another. Although she also posited a south Russian homeland, instead of a few mounted elites she envisioned a series of out-migrations from the Urals of militaristic mixed pastoralists using horses and ox-carts. These strangers, culturally, physically, and linguistically distinct, buried their dead under barrows, or in Russian, *kurgan*s. They incorporated the existing Neolithic populations by imposing their language and cultural ideology. Gimbutas argued that their first expansion was in 4400-4300 BC, the second was in the mid 4th millennium, and the third circa 3000-2800 BC (Figure 2.3). As radiocarbon dates became available Gimbutas refined and changed the chronology. Under this hypothesis the first migratory wave was only disruptive. The second wave which occurred during the eastern European Copper Age, however, was central in changing the underlying ideological fabric of the inhabitants of Old Europe from a peaceful, mother-loving culture into a male-oriented warlike one.

For Gimbutas and her followers, this set of expansions explained the distribution of Indo-European languages, as words like 'ploughing' and 'yoke' were shared between Indo-European family branches, and arguably associated with these population advances. By the Bronze Age, she believed, the cultural and linguistic seeds of modern Europeans were planted: the Scandinavian-northwest became Germanic and the Monteoru in eastern Romania became Dacian. In the early twentieth century Lubor Niederle had placed the earliest settlements of the Slavs in the middle Dnieper basin, and Gimbutas (1965) agreed. The archaeology of the forest steppe and steppe belts of southeastern Poland, northeastern Slovakia, northern Moldavia, Podolia, and Bucovina were the heartland of proto-Slavic she termed the North Carpathian Culture. The low-lying tumuli of the area – of *kurgan* derivation – held inhumation burials with ceramics and metal ornaments imported from Slovakia or Hungary. For Gimbutas (1965:462-3), strong differences in burial furnishings, such as those from the tumuli at Balichi (Balice) on the upper Dniester, indicated similarities in inequalities between the North Carpathian and the Únětice area of the Western Carpathians. The Únětice was the 'parent culture' of the Tumulus and Urnfields. Gimbutas believed this archaeological complex gave birth to Proto-Celtic, Proto-Italic, and other sub-branches of the Indo-European language family[4].

[4] Gimbutas was not the last to address the Indo-European question, but subsequent syntheses of the linguistic and archaeological record have not privileged the Bronze Age to the extent that Childe and

North-western Europe and the Roman record

The pre-Roman inhabitants of continental Europe may be suggested by historical linguistics, but they are recorded above all by the archaeology of the Iron Age (750 - 20 BC). The major subdivisions of the Iron Age are the Hallstatt (C-D) and the La Tène[5]. It was in the Late La Tène that historical sources first mention the people and customs of the inner continent in any detail. These people are usually considered to be the direct descendants of Bronze Age cultures and are often used as a point of comparison for Bronze Age societies. Sources such as peasant ethnography were used to understand some kinds of material culture, but less often for general tenants of social structure. Because of the importance of Iron Age peoples in writings about deeper prehistory, a brief overview of these early historical records is necessary.

The Iron Age, the Roman accounts of Gaul, the Homeric epics, the Icelandic sagas, and other early texts are additional hidden passengers in Bronze Age studies. In the North American archaeological tradition, students were trained in the Native American customs and material culture as they pursued their archaeology. Thus, the study of prehistoric archaeology in the American Southwest (5000 BC – AD 1600) couldn't conceivably be properly understood without reading the classic Pueblo ethnography such as Eggan (1950) or Titiev (1944). The situation for training students in the prehistory of Europe was no different. Study your Tacitus, your Homer and your Herodotus: without them you forfeit a powerful window into the past.

The authors of the Roman period name and describe European peoples from Normandy to Thrace, but perhaps no area is better recorded and understood than northern Gaul. Julius Caesar's ten year incursion into modern day France, Belgium, the Netherlands, Luxembourg, and western Germany was documented first and foremost by the future Dictator (Caesar 1980). A series of military campaigns between the years 58

Gimbutas have. For example, Renfrew (1987) made a foray into the debate, arguing that the most parsimonious model situates the movement of Indo-European speakers along with the Old World farming domesticates in the Early Neolithic. The processes by which Indo-European languages made their way to the mosaic identified by historical linguistics was undoubtedly a very complex process, but the fascinating if endless disagreements fuelled by these positions need not concern us here. It is interesting to note in passing, however, that introductory textbooks in historical linguistics still cite Gimbutas as the authority on the archaeology of this issue (Campbell 1999).

[5] The subdivisions are 'archaeological cultures' rather than 'epochs.' They are therefore only a guideline, as regions vary. I use here the conventions for Northern Europe.

and 50 BC, often in alliance with warring indigenous groups, brought the people of the western continent to their knees and incorporated them into the Roman Empire. These were the subject of subsequent writing in the Roman period, notably in Tacitus' Germania, published in AD 98 (Tacitus 1999).

Figure 2.2. Map of the Celtic area referred to in the text.

Caesar made a social distinction between the Gauls and the Germans with the Rhine acting as an ethno-cultural barrier between them (VI: 11-23). This has been reproduced in both historical linguistics and archaeology as a starting point for investigating Late Iron Age variability (Figure 2.1), although even Tacitus drew attention to the notion that 'the Germans' were not a self-identifying group or a unified nation of people (2.3, Tacitus 1999:77-8). Caesar portrayed the Germans of the north as the more war-like of the two. They had little interest in agriculture, he said, and preferred animal husbandry and hunting; no strong social strata existed between them. By contrast, on the west side of the Rhine, not only did the majority of Gauls participate in agricultural works, they had ‘kings’ and paid ‘taxes’ to a ruling class. The Gauls had privileged classes – the Druids and the knights – in addition to commoners and slaves.

Within both broad cultural groupings there were segmentary tiers, in the literature conventionally termed ‘tribes’ and ‘subtribes’ or in Latin, the *civitates* and *pagi*. There were three important political institutions at both the level of *civitas* and *pagus* – the public assembly, the council of nobles, and the kingship (Figure 2.2)[6].

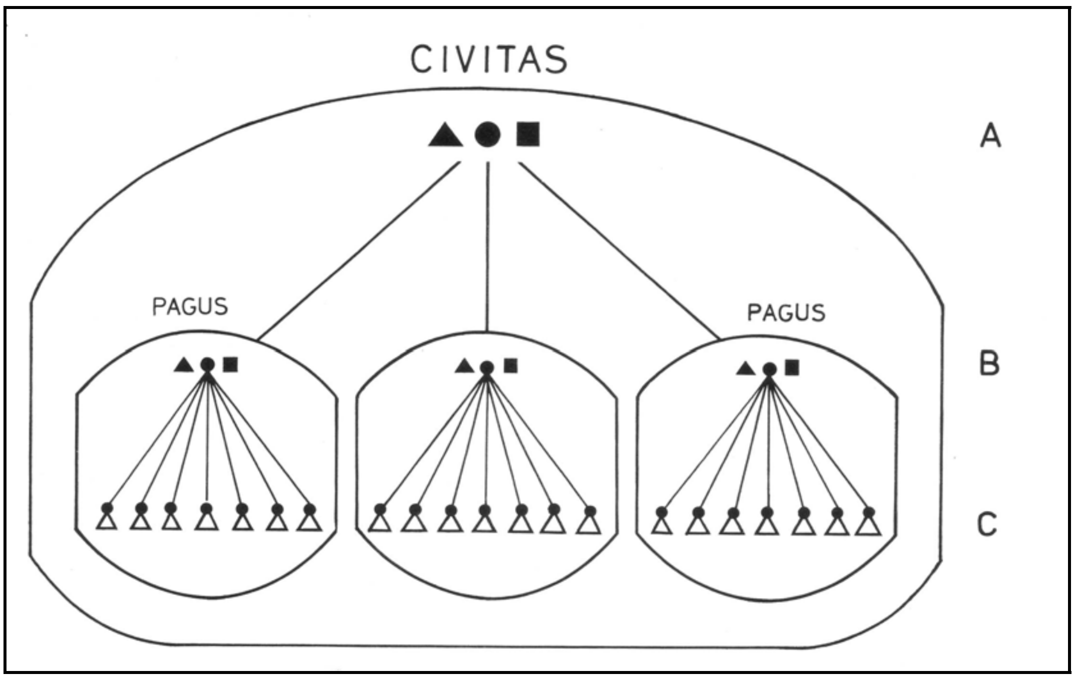


Figure 2.3. Simplification of Celtic political institutions. Letters represent segmentary tiers, and shapes represent public assemblies (triangles), tribal leaders (circles), and councils of nobles (squares)(reproduced from Roymans 1990:25).

The assembly made decisions concerning public justice, war and peace – and there, public opinion mattered. The council of nobles, by contrast, was a large aristocratic meeting of male warriors of mixed ages. A range of decisions was made in this more elite assembly. An individual’s power within the council of nobles was based on the size of their clientship. Thus, the larger the clientship the more weight an individual’s opinion

[6] Although mostly attested in Caesar’s narratives for the *civitates*, most historians assume that these institutions also existed at the level of the *pagus* (Roymans 1990:20).

held. The final institutional office, the ‘kingship,’ did not occur among the northern tribes, and was only sometimes found in southern areas of Gaul. Kings were war leaders and aristocrats, and could mobilize vast amounts of men for battle (Roymans 1990:34-8). Kings were considered to have the favour of the gods because they could make enormous offerings of gold and bronze to them. They held the loyalty of warriors for their distribution of wealth. But kings – what would be called ‘paramount chiefs’ in the North American scholarly tradition – came and went. In both northern and southern areas, the core unit – the *pagus* probably held the strongest degree of autonomy and shifted allegiances with some regularity. In the northern areas, the public assembly held more sway than the council of nobles, but the opposite held in the south.

Combining the archaeology with Caesar and Tacitus’ descriptions provides a fascinating range of social complexity in this small area (Crumley 1974; Roymans 1983, 1990). To archaeologists working in the typo-chronological framework, those inhabiting north Gaul fell into two different archaeological cultures, partially because the settlement patterns were so different (Hachmann 1976). Indeed, the major fortified Celtic settlements that Caesar encountered during his campaigns south of the Rhine he called *oppida*. Although formally similar to the large fortified refuges of the Late Hallstatt period, the *oppida* of the Late La Tène were often much larger (100 ha in some cases). Sites such as Villeneuve-Saint-Germain contained intensively occupied areas of segregated residential and industrial production space (Debord 1982). Large amounts of metallurgical slag and coin mould wasters suggest specialized production. High numbers of Mediterranean imports indicate trade in costly exotic items. Massive grain stores, such as those observed in the Altburg at Bundenbach allowed thousands of people to assemble within these fortified walls and withstand a prolonged siege (Schindler 1977). *Oppida* were also cult centers where both individuals and communities would make offerings of metals to the gods for victory in battle or success in other endeavours. Yet *oppida* were not found in the northernmost areas of Gaul. The Germans of the north had variably sized settlements that seem to have moved fairly often. For the most part, archaeological scatters are small (under 5 ha) and dispersed sites of only a few homesteads (see also 16.1, Tacitus 1999:83).

Likewise, the mortuary record indicates strong vertical distinctions among the Gauls, with lavish burials of individuals with horses and carts but in the north, no such distinctions are present; the Germans come out as egalitarian in a conventional archaeological analysis (Roymans 1990:257). Presumably, vertical social distinctions existed based on leadership positions in the *civitas* and *pagus*, but they are simply not represented in the archaeological record. Although Tacitus specifies that tribute was collected from slaves in the north, he specifies no office or distinction above freedmen (25.1, Tacitus 1999:87).[7]

There are two reasons frequently cited for the difference in the scale of complexity between the northern and southern areas of Gaul: agricultural productivity and proximity to the trade networks of the Mediterranean (Roymans 1990: 263-66). The Pleistocene loess of the higher, southern areas is agriculturally productive. By comparison, the Holocene deposits of the low lying area of the Rhine delta and the northern coast – composed of marine sediments and partly covered by peat and sand dunes – are marginal. The difference in agricultural productivity was noted even by Caesar during his campaigns (Caesar 1980:45). The tribes of more southerly areas – for example, the Remi and the Suessiones – were found on tributaries to the Seine, hilly areas of Pleistocene loess. Generating surpluses to fill the granaries of the *oppida* was not the challenge in the south it would have been for those in the north.

Moreover, the southern tribes of Gaul held trading relationships with Italian *mercatores* several centuries before the Roman military incursions (Nash 1984). So writes Diodorus (1946):

> They [the Gauls] are exceedingly fond of wine and sate themselves with the unmixed wine imported by merchants; . . . . And therefore many Italian merchants with their usual love of lucre look on the Gallic love of wine as their treasure trove. They transport the wine by boat on the navigable rivers and by wagon through the plains and receive in return for it an incredibly large price; for one jar of wine they receive in return a slave, a servant in exchange for the drink (5.26.3).

The southern Gauls had the environmental foundation for surplus food production to support craft specialists and lavish feasts. Like their neighbours to the north, they also had a cultural predisposition for war. But the demand for metals and slaves in the

[7] The mention of kings for the Germani (7.1, Tacitus 1999:80) is singular and enigmatic.

Mediterranean world and their fertile fields allowed a scale of production in this area of the Celtic world that was difficult or not possible elsewhere. Cultural differences in the north added to the obstructions: in northern Germany, wine was forbidden – it was considered to make men soft and effeminate[8]. Nor did they care for imported breeds of horses (Caesar 1980: VI, 2). In its simplest form, east of the Rhine, this highly autonomous, decentralized, and household-based culture is what Marx and Engels referred to as the 'Germanic mode of production'.

Marx, Engels and the Germanic Mode of Production

I introduce Marx here not to provide theory, but as a point of reference for various archaeological traditions that use a Marxist perspective to frame changes in prehistory. Marx is thus the third and final hidden passenger in this section. Although he is more important in some traditions than in others (for example, most discussions of Bronze Age Spain are set in Marxist frameworks), the most relevant for my purposes is the 'mode of production' literature beginning in the 1960s and 1970s that discuss stateless societies (more on this in Part II).

Marx defined the Germanic mode of production in the late 1850s during preparation of *Critique of Political Economy* (1859) and *Capital Vol. 1* (1867). The notes were published post-humously in part in 1903, and then completely in 1953 under the title *Pre-capitalist Economic Formations* (Marx 1857-8 [1964]). In this work, Marx contrasts in more detail his understanding of pre-capitalist economic forms and how they differ from feudal orders. Not intended for publication, sources are rarely explicit, and his examples are confined to early Greece, Rome, and certain Germanic groups[9].

The evolution he envisioned is as follows. In the earliest forms of agricultural use, communities hold land in common. Members who belong to the community are entitled to use land, but it is as "possession" and not "property". Though craft specialization and surpluses may occur for exchange, production and exchange is for 'individual-use', and not use-value. The earliest forms of aggregation are the precursors of cities. Based

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[8] Although Germanic and Celtic are distinct linguistic sub-groups of Indo-European, it is unclear to what extent linguistic lines corresponded to differences in Roman accounts or the archaeological record.

[9] Engels (1884) would publish a more elaborate discussion in *The Origin of the Family, Private Property and the State*, drawing as much on Morgan's (1877) *Ancient Society* as on Marx.

initially on only one kin group, as the settlement grows, a military organization develops in order to defend it. Additional kin groups join it, through voluntary movement or through slave capture by local inhabitants. The original settlers do not share land with newcomers though, for they lack citizenship. The early Roman state is used as one example of this (Marx 1964:71-74). These kin groups – now proprietors and non-proprietors – are the primordial germs of classes, and for communities running out of land, wars of conquest and heightened slavery increase the rate of development.

The Germans, however, never developed a city or any greater political unity than the gens (and consequently, the public assembly). Their individual households remained the independent centers of production:

> In classical antiquity the city with its attached territory formed the economic whole, in the Germanic world, the individual home, which itself appears merely as a point in the land belonging to it; there is no concentration of a multiplicity of proprietors, but the family as an independent unit (Marx 1964:79).

Why the Germanic mode of production could persist alongside more complex modes of production was beyond the scope of these early analyses. Nonetheless, the fusion of Caesar's description, moderated by Tacitus, and interpreted by Marx became a frame for thoughts about Bronze Age societies, despite the thousands of years between them.

Summary of Part I

In one hundred and fifty years the understanding of the Bronze Age went from a mere hypothesis to the period in which Europe was born. A century of discovery beginning with Schliemann demonstrated that the Bronze Age contained an unprecedented wealth, and marked the birth of social inequalities in Europe. Many believed these could be traced to the proto-Indo-Europeans and their andro-centric, war-loving spirit. Rome's devastating incursion into the Celtic world allowed archaeologists a glimpse – in writing – of what life was like before the empire. As with the ethnographic record for twentieth century archaeologists in the North America, the Celtic World has been a common point of departure for an understanding of Europe's prehistory. This is obvious in scholarly work as early as Marx and Engels, who, in re-creating the pre-capitalist past, put the

Germanic societies reported by Tacitus and Caesar alongside the Iroquois and the mythical precursors of Rome and Greece.

These topics are the passengers that accompany description or analysis of the Bronze Age whether they are physically present in writing or not: the birth of social inequality (or in Marx's view, social class), the introduction of a language family, and the written accounts of the classical world and epics. There are other hidden passengers still, but these three occur across multiple traditions in Europe, and are overlooked only at one's peril. More idiosyncratic passengers, such as current national boundaries and the influence on writing and scholarly interaction, are also important, and will come up again in Chapter 5 when I introduce the archaeology of eastern Hungary. In the next section, I describe how these specific sources for framing the past have been used in assuming the social mechanics of Bronze Age societies.

PART II: ANALOGY, HOMOLOGY AND MODELS FOR THE BRONZE AGE

Whether from Iron Age Germans, Roman myths or ethnography, social models for prehistoric societies allow us to generate hypotheses about the past that can be tested using archaeological data. Ideally, discrepancies in the data force us to remodel, producing still more hypotheses. Late Iron Age societies known from the historical record are a homological source for understanding Bronze Age societies, as Iron Age groups belong to the same historical tradition as the latter. Reasoning by homology is therefore a 'folk-culture approach' or 'direct historical analogy' (Acher 1961). The problem with homology is that it assumes causality: it excludes cultural change and interaction in new situations over time. Ethnographic analogy, the comparison between an archaeological signature and historically unrelated living peoples documented in the ethnographic record, have also contributed to understandings of European prehistory, often un-critically (Spriggs 2008). The negative contribution of analogy to archaeology is the inductive way in which it is used. In a similar fashion to reasoning by homology, conclusions are made by purported similarity without any actual hypothesis testing (Binford 1967; Wobst 1978; Wylie 1982).

The lack of field testing the archaeological consequences of such cultural models in Bronze Age archaeology is therefore not unlike epistemological problems generated by a facile use of ethnographic analogy or historical similarity elsewhere. In Europe, many of the 'traits' found in the archaeological record are assumed to be associated with other 'traits' from particular analogies or homologies, a process that results in self-fulfilling interpretations. In this section I examine the literary and ethnographic sources used in 'identifying' extinct Bronze Age social variability in the archaeological record over the past century. I pay particular attention to facets of these models amenable to archaeological investigation.

Homology

Nineteenth and early twentieth century archaeologists were not terribly interested in developing social models for Bronze Age societies - identifying Europe's sequence of culture change was their priority. As early as 1836, Thompson used the culture concept to describe the diffusion of Bronze Age technologies from one people to another. By the 1880s Montelius had the Scandinavian Bronze Age divided into six periods based on a sorting of metal artefacts (Montelius 1885). The strong diffusionist tone of Montelius' work, with the Near East as the source of innovation, was the primary interpretive structure for many decades to come. Childe carried on in this tradition.

Childe privileged the archaeological record for social reconstruction, but also employed both homology and social evolutionary categories, although homology was probably the more important. He also had a long-standing focus on economic trends and their transformative influence on Europe. Bronze metallurgy was one such trend (Childe 1930). Based on Homeric texts, Childe was convinced that metal-casting required full-time specialization. The importance of this homology cannot be overstated, as he considered these – initially itinerant – specialists to operate independently of tribal loyalties, capable of keeping trade channels open for the delivery of tin and copper when tribal wars occurred (Childe 1940:163).

Although Childe (1946a) used Engels and Marx's land-owning categories to describe prehistoric Scotland, there was little cross-cultural comparison in his analysis.

Instead, the importance of technology and economy was the emphasis. Nonetheless, Engels' influence is also apparent in the exploitative relationships he posited for Bronze Age societies[10]. The 'Wessex chieftains', for example, were assumed to be elites generating wealth from the farming and gathering activities of their subjects, who then traded it for luxury items from abroad (Childe 1940:135). But as with most of Childe's assertions about middle-range complexity, such statements remained one-liners and only a preface or a conclusion to typo-chronology, what he considered to be the serious business of archaeology.

Childe wrote explicitly about social anthropology in his later years but it was not as a source of inspiration for his interpretations. In 'Archaeology and anthropology,' he argued that it is ethnography that needs archaeology, and not the other way around (Childe 1946b). He also rejected the uncritical use of ethnographic analogy; for example, when Austrian archaeologists attributed particular marriage rules to people of the Swiss Neolithic, simply because the technologies and marriage rules were correlated in Melanesia (Childe 1946b:250).

Much more so than for Childe, homology was the primary means of social reconstruction under Gimbutas' synthetic work (Gimbutas 1965). As noted above, the reason for the stronger homology was her equation of language, society, and material culture. An adherent to the work of Dumézil (1958), she also believed that strong similarities held between the mythological and ideological foundations of Indo-Europeans, providing a core cultural inter-changeability. The social structure of any historically known Indo-European group could therefore serve as a model for the proto-Indo-Europeans. The richly adorned "royal" Únětice tomb from Leubingen, for example, was a tribal chieftain (Gimbutas 1965:264-7). The second burial tier below him comprised the members of the nobility: "Men of this class could have formed a council, the Indo-European tauta, similar to that of the Mycenaean Greeks, the Hittites, the Indo-Iranians, and other Indo-European groups" (Gimbutas 1965:267).

The use of homology has remained strong in many archaeological traditions of Europe, but none have made it as far internationally as Gimbutas. The next of the

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[10] According to a letter to Robert Braidwood in 1945, Childe preferred Engels' *Origins of the Family* (1884) to Morgan's discussion of Iron Age Europe, because 'Engels really knew something of German history and archaeology' (Trigger 1980:95).

European research traditions I discuss here was narrowly pursued, but as with the writings of Childe and Gimbutas, reached a large international audience.

Analogy and neo-evolutionary social type

In the 1970s, parallel to the New Archaeology of the Americas, a younger generation of mostly British archaeologists moved away from the use of homology. Colin Renfrew led the charge and two themes especially permeated his early work: a response to Childe's diffusion, and the development of more specific models for prehistoric Europe derived from the ethnographic and neo-evolutionary literature. The former focused on toppling the Montelian assumption of *ex oriente lux*; the development of Stonehenge was independent of the early Mediterranean states, or in other words, there could be a Wessex without Mycenae (Renfrew 1968). This he accomplished both through a systematic refutation of the material culture 'proofs' establishing Mycenaean origins of continental Europe's complexity and the presentation of calibrated radiocarbon dates (Renfrew 1972, 1973). Acceptance of the new chronology was like Caesar's army crossing the Rubicon – a fundamental step both irreversible and of strong consequences. By this point, so much of European prehistoric archaeology relied on cross-dating with the states of the Mediterranean. Allowing local chronologies to float on radiocarbon dates was a radical break with how archaeology had been done. This both pushed back the origins of the sequences and demanded all new explanations for their origins and development[11].

Although the revised chronology was clearly a watershed in viewing European prehistory, the project of archaeological theory was also redefined. The plate sequence in Renfrew's *Before Civilization* (1973) inter-digitated the early Bronze Age wealth of the Stonehenge and Wessex culture with 18th century drawings of a Louisiana chief's house and the elite burial platforms of Tahiti. Although Childe and others had used illustrations from other cultures for comparison, they were usually for specific technological issues rather than scales of complexity or operational cultural models.

[11] The first two lines of Renfrew's (1973:15) introduction in *Before Civilization* were not an exaggeration: "The study of prehistory today is in a state of crisis. Archaeologists all over the world have realized that much of prehistory, as written in the existing textbooks, is inadequate: some of it quite simply wrong."

The chiefly models for Europe were formalized in Renfrew's (1974) 'Beyond a subsistence economy.' In this paper, he drew attention to the middle-range between egalitarian tribes and early civilizations, a category considered merely 'transitional' by many Europeanists. Citing the work of Steward, Service, Sahlins, Fried and others, he argued that the middle-range of social variability contained its own forms of social logic, despite the problems that using typologies to formulate them provided. He contrasted individualizing versus group-oriented chiefdoms as useful constructs for thinking about social variability in the Bronze Age. Renfrew saw this as a productive exercise as it drew attention to the social and spatial differences between them that were not apparent, for example, in Service's (1962) band-tribe-chiefdom typology.

A Society for American Archaeology (SAA) symposium organized in 1980 promoting European processualism – published as *Ranking, Resource and Exchange* (Renfrew and Shennan 1982) – contains a telling sample of papers grappling with ways of framing the development of European complexity. Perhaps more than any other, the authors of this volume tried to intersect Fried's (1967) category of rank with the archaeological record, though several pointed out that four thousand years of archaeology defy all-embracing categories such as 'rank' or 'chiefdom' (e.g. Chapman 1982). Traditional homological approaches persisted however, with descriptions by Tacitus of the Germanic groups, or the help of the sagas for the Viking period to grasp Bronze Age variability (e.g. Randsborg 1982).

Yet as an outside observer, Robert Whallon commented on the limited spectrum of social variability used as analogies for Copper and Bronze Age Europe. Types such as the 'big-man,' for example, had been "blown into quasi-universal characteristics when, in fact, they are simply one of a number of alternative ways of organising economic flow and of maintaining different levels of social and economic control within such societies" (Whallon 1982:156). Even more pervasive and worrisome than this was "an apparent tendency to reify the levels of organisational complexity identified by Service, Sahlins, and Fried, and to treat them as some sort of universal ethnographic description which provides definitive 'model types' or universal analogues for all societies, past and present."[12]

The Neo-Evolutionary school of cultural ecology was only one theoretical framework for describing variability in stateless societies and not the more crucial one for scholars of Bronze Age Europe. More importantly in the 1960s and 1970s, two varieties of Marxism can be distinguished: structural Marxism and political economy (Ortner 1984)[13]. Political economy focused primarily on inter-regional dependencies and large scale historical processes (Wallerstein 1976; Wolf 1982). Structural Marxism was more traditionally ethnographic and focused on middle-range complexity in the ethnographic record (Bloch 1975; Godelier 1977; Seddon 1978). Its theoretical approach contained a materialism that sought to uncover invisible processes within pre-capitalist societies. Rather than taking the native conceived social models obtained through ethnographic work at face value, it took them as ideological blinders for self-reproducing systems of pervasive inequalities.

Marx's ghost and Bronze Age societies

The analytical categories employed by the structural Marxists were not commensurate with the American Neo-evolutionary school cited by the SAA conference participants. Instead, structural Marxists revived the term 'mode of production' to describe pre-capitalist systems of property holding and asymmetrical relations of production. Synthetic Marxist publications with archaeologists during the 1970s, such as an influential paper by Friedman and Rowlands(1976), collected ethnographic specimens and assembled them in a line of increasing inequality. They emphasized economic control and ideology in the structure of production as a key to understanding changes from one state to another (see also Frankenstein and Rowlands 1978). Exploitation was the key undercurrent driving social change. Although this exploitation could be organized several different ways, for structural Marxists, the role of culture was to mystify its participants (Ortner 1984:385).

[12] The force of Whallon's 'Comments' at the meeting seems to have incited a number of paper revisions before volume publication, as references to 'big-men' are almost absent in the final versions.
[13] I simplify here in order to highlight major themes in the Anglo-American literature. Different varieties of Marxist theory are also found in other archaeological traditions, and are just as influential.

The emphasis on the asymmetry of social conditions in the Bronze Age slowly crept into general narratives. For example, in the early 1980s, both ethnographic analogy and social typology were employed by Kristian Kristiansen, one of the Grand Synthesizers for northern Europe. Kristiansen (1982) argued that in Early Neolithic Scandinavia 'territorial chiefdoms' engaged in a trade network that imported the foreign causeway camps of Northwest Europe, but they had collapsed by the Late Neolithic. By the Early Bronze Age, the 'theocratic chiefdom' emerged as bronze enabled the monopolization and production of prestige items. The assumption of real economic exploitation underlying the system is faint, if present at all, in his characterization.

However, stronger language of political economy is found in his later work. In his contribution to Earle's edited volume on chiefdoms, Kristiansen states that tribute was a characteristic of Bronze Age societies (Kristiansen 1991). He positions the transformation to stratified society – territorial political structures with tributary obligations – as the fundamental structural change underlying the evolution of states (1991:18). In this paper, Kristiansen covers 2500 years in southern Scandinavia, and identifies two different forms of middle-range society in the Bronze and Iron Age sequence: the decentralized stratified society and centralized archaic state (a stratified society with an elaborate bureaucracy). Many of the 'structures' that are claimed to be in place for the decentralized stratified society of the Bronze Age, such as tribute and taxation, land ownership and a landless peasant class, however, are asserted rather than demonstrated with archaeological evidence.

A lack of archaeological evidence also characterized Anthony Gilman's (1981) Marxist account of emergent stratification for Bronze Age Europe (Gilman 1976; Gilman, et al. 1985). Analogies used by Gilman for the Bronze Age include the elites of Childe's 'Urban Revolution' in the Near East and Earle's (1977) presentation of the chiefdoms in Hawaii, assuming elites commanded the economy and siphoned off its surplus. He relied on the burial evidence, such as rich sub-adult graves at Branč in Slovakia, as an indicator of stratification and hereditary inequality. As Shennan pointed out in response, however, the evidence of social differentiation in burials might indicate a degree of ranking, but is insufficient to conclude the presence of economically stratified class societies (S.J. Shennan 1981:14).

Gilman (1995) later revisited the topic, and emphasized the autonomous and decentralized nature of Bronze Age societies, reviving specifically Marx's 'Germanic mode of production' (and not the structural Marxist varieties). He uses the Icelandic sagas of the 11^{th} to 14^{th} centuries and the Moroccan Rif (Munson 1989) as illustrative models, but also emphasized another element that Marx did not: competition. Although wealth inequalities exist in these systems, his focus centers less on the decentralization of the political units, and more on the strength of segmentary factions as the cheques on the system preventing the political consolidation of power.

Earle and the chiefdoms of Europe

Although Timothy Earle may not be a well known contributor to Bronze Age debates outside of the Anglophone and Scandinavian traditions, his decision to write about the Bronze Age brought European archaeology into North American conversations about chiefdoms. Earle (1977) and Peebles and Kus (1977) had made important modifications to Service's (1971) notion of the chiefdom and both papers were widely cited by the members of the 1980 SAA symposium. A major book with Allen Johnson collected a series of ethnographic cases organized on different scales, establishing him as a leader in modern evolutionary studies of stateless societies (Johnson and Earle 1987). In the same year in an Annual Review article, he cited Renfrew's (1974) work on the transition from "group-oriented" to "individualizing" chiefdoms in Wessex, the grave goods in Denmark (Kristiansen 1982, 1987; Levy 1979; Randsborg 1974), and the evidence for ranking in Slovakia (S. J. Shennan 1982) as evidence for chiefdoms in Europe.

But Earle's first real contribution to conversations about Bronze Age variability came from an SAR seminar in 1988. The resulting collection brought together a number of distinguished researchers focused on middle-range complexity (Earle 1989, 1991). Although the seminar was explicitly centered on the 'chiefdom' concept, Richard Bradley (Bradley 1991) revisited Wessex without the ethnographic analogy or assumption of cross-culturally valid social categories (or processes). Under the strong influence of the structural Marxists, Earle (1991) took quite a different approach in a comparison between Hawaii and the Wessex sequence. He argued that the property rights of an elite emerged over time as labour was continuously invested into land improvement and monuments. As in Hawaii, Earle saw the main change in the Bronze Age as the increasing interlocution of chiefs between the cosmic realm and their landscape, and therefore the inter-dependence of economy and ideology.

Earle began collaborating with Kristiansen in the 1990s in Thy, Denmark, and the first synthetic publication of the work was presented alongside that of Hawaii and the Andes (Earle 1997). But Earle also accessed the Bronze Age through homology with Iron Age societies described by literate societies of the time (Hedeager 1992), e.g. the epic of Beowulf and the Icelandic sagas (see also Earle 2002). In the most detailed publication from the Thy project, Earle et al. (1998) are careful in drawing specific analogies, as the Danish evidence for tribute mobilization is clearly less strong than it is in the Andean case or in Hawaii. The evidence is still grouped into the chiefly 'prestige-goods' category, however, one built on the tributary economies of the Andes and African ethnography of complex chiefdoms in Friedman and Rowlands (1977). Most recently, like Gilman (1995), Earle (2002:296) characterizes the network of competing chieftains in northern Europe as participating in the 'Germanic mode of production', in his reading of Engels, where independent farmsteads are precariously controlled by a warrior elite (Engels 1884:192-216)[14]. The implication is that the archaeology corresponds to three types of social strata; chiefs, warriors, and commoners. The Thy project flirts with the possibility that commoners paid rent to the upper class (Earle, et al. 1998:306), but the control of wealth by the upper tiers in the economy is the primary take home message of this case study. Earle's re-publication of the Danish material along with the Hawaiian and Andean case studies as *Bronze Age Economics* (2002), however, is clearly suggestive for the political economies of greater Europe. Earle remains perhaps the most explicit about the mechanism involved in his models, although much of their colour comes from specific ethnographic descriptions such as the Hawaiian case.

[14] In this publication, Engels channels Morgan, Marx, and interprets Tacitus and other writers of the Classical world. To me, Engels is describing warriors of different Germanic groups raiding one another more than he is describing one stratum of a Germanic group controlling the actions of another stratum in the same group.

Unlinking social attributes

Analogy with people of the ethnographic record, and homology with Iron Age or Indo-Europeans have been the primary pathways for reconstructing Bronze Age societies. There are, however, alternative approaches to Bronze Age variability that accept a large range of social forms and trajectories following Whallon's (1982) recommendations. Bob Chapman's (1990) evaluation of five explanations for the emergence of complexity in south-eastern Spain, for example, did not use social types to describe the variability in the archaeological record. Nor did he assume that particular social relationships (such as tribute) must co-occur with vertical distinctions found in the burial record. Rather, he approached system scale, technological change, complexity (social differentiation), interaction, and integration as variables to be considered independently in piecing together the Spanish sequence before he evaluated specific models underlying causes of changes in complexity.

O'Shea and Barker (1996) not only unlink of social variables, but also express a concern for how variables are used. In a review of attempts to parse out the variables lumped in social typologies, the authors criticise Feinman and Neitzel's (1984) characterization of social dimensions using dichotomous variables. They draw a comparison between three American and two European mortuary traditions to prove their point that while studies breaking down typologies are on the right track, dichotomous thinking also obscures a range of salient social differences. They describe five examples across four mortuary variables (heredity, elaboration, space, and region) on an ordinal scale between 1 and 4. The results illustrate that mortuary variable scores of complexity do not change in lock-step. This approach is consistent with O'Shea's (1996) more extensive treatment of the mortuary record in southeastern Hungary, using archaeological representations of social persona along with independent measures of inequality to gauge complexity.

Summary of Part II

The specific sources of social models of Bronze Age variability could be multiplied, but the same formats would re-surface. Many of these are ultimately attributable to one of the ‘hidden passengers’ identified in the preceding sections. Here I have tried to draw out a sample of the diversity of these cases by organizing them as homologies or analogies. Childe’s work was evolutionary, with Marx’s influence mostly limited to his focus on technology and economy. Occasionally, his assumption of exploitation showed through. His work was not strongly comparative with living societies however, and he was critical of attempts to use ethnography for characterizing prehistory. Like most others of his time, he relied on the Roman characterization of Celtic society and broad cultural and linguistic commonalities of Indo-Europeans to interpret the archaeology. The Indo-European cultural norms attributed to Bronze Age societies through homology were more numerous under Gimbutas’ readings.

Under the influence of American Neo-evolutionary typologies, Renfrew used cross-cultural analogies to develop new models for prehistoric Britain. Various strands of Marxism were more influential on the continent however, and a new influx of economics pushed tributary mechanisms to the front. Earle’s entrance into debates about the complexity of Bronze Age societies brought fresh comparisons to the ethnographic record, emphasizing the control and extractive capacities of chiefs over the potential decentralization of the system. Finally, there are fewer attempts at isolating socio-economic variables in prehistory, developing a method to study them with archaeological remains, and then piecing them together without assuming they look like fully assembled ethnographic or proto-historical social examples we may have handy. This last method is the approach taken in this dissertation.

PART III: THE SOCIAL CONTEXT OF BRONZE

So far I have briefly reviewed both the history and broader intellectual context of Bronze Age research, and surveyed the models used for interpreting archaeological remains. In many ways, though descriptive, these models also contain an explanation of social change throughout the Bronze Age. Nonetheless, as Chapman (1990) has shown, it is useful analytically to parse out explanations of change from the description of change in the sequence. In the next section, I draw attention to two of the major current explanations of social change for the Bronze Age: the production and circulation of metal.

The birth of commodities

In most current understandings of Bronze Age societies, bronze emerged as a key commodity for economic and social reproduction. The basic idea of bronze as central to social life, however, is of considerably antiquity. Childe (1930) believed that bronze was a pre-requisite for complex societies in the Near East. Bronze's role in Europe, however, was mainly to supply weapons for use in tribal warfare caused by increasing population pressure and competition for arable land. The emphasis on metals as storable wealth was also not lost on past generations:

> Worn or broken implements had no longer to be thrown away: in copper they could be recast in the same or different forms, limited in range only by technical bounds which the craftsman was constantly seeking to extend. Metal was thus not merely a precious possession: it was capital (Hawkes 1940:286).

There are currently two prominent iterations of this idea. The first iteration was essentially introduced in Part II, built on the structural Marxist concern for asymmetric relations of production and political economy. New exchange systems developed and bronze production concentrated in the hands of emerging elites at local centers. Exchange of fine goods occurred between these elites at a regional level, rarely making its way to commoners in the system. The version of the hypothesis in this particular form may be observed in Kristiansen (1982, 1987, 1991), Sherratt (1993), and Earle (2002). Its source is traceable to the logic in Frankenstein and Rowlands's (1978) argument for Iron Age societies.

The second iteration was proposed by Stephen J. Shennan (1993a, 1993b, 1995, 1999). In his view, access to bronze was strongly conditioned by location in a regional system composed of production cores and peripheries. Shennan sees the Alpine zones of central Europe and the Carpathian mountains as the core metal producing area of the continental system, and the emergence of a northern and western periphery. The exploitation of the Mitterberg ores alone would have put tremendous amounts of ores into circulation:

> In the core areas the key to the change was that copper and bronze underwent a process of commoditisation – they became important as unit quantities of metal rather than as restricted prestige items for social transactions, and may indeed have functioned in some respects as a proto-currency – as a means of exchange and store of value. The standardised weights of the ingots found in hoards in areas adjacent to the metal sources point in this direction (Menke 1982), a concern for standardisation which in some cases led to the addition of make-weights to underweight ingots and removal of the ends of over-weight ones (S.J. Shennan 1993b:62).

In this core, copper and bronze were convertible into goods and services, tools and weapons. Around 2000 BC in the peripheries - Britain, Denmark, Poland and central Germany – however, people still treated metals as prestige items. Shennan suggests that locally in a place like Central Germany, incoming metal might have been initially controlled by individuals such as the richly adorned Leubingen and Helmsdorf burials, between 1900-1800 BC (S.J. Shennan 1986). Rather than controlling production however, he argues that metals found in these 'princely burials' were traded in finished forms, perhaps in exchange for salt[15]. It may have been a real monopoly only because the ore sources of central Germany were not exploited at this time, but the trend was short lived. Control of incoming quantities of metal after 1800 BC could not be maintained, as any local hierarchy at the consumption end of the chain was not integrated with the miners at the ore sources.

Shennan agrees that over the course of the Bronze Age, copper and bronze were important trade items in social and economic processes. He agrees with Kristiansen, Earle and Sherratt, that small-scale chiefdoms characterized Earlier Bronze Age in Europe among increasing competition and warfare. In contrast to Kristiansen, Earle, and Sherratt, however, he argues the importance of metals did not derive from creating new potentials for control. Instead, consumption of metals was a general stimulus in a network of economic activity (S.J. Shennan 1993a:152-3; 1993b). The production and circulation of metals was not the economics of prestige goods competition but the productive and

[15] Although he argues that Copper Age exploitation of ores such as the Mondsee culture in Austria (3500-3000 BC) did take place, their deposition as 'prestige' items in graves and quickly exhausted sources led to the fall of these cultures (S.J. Shennan 1993b:60-61).

demographic contributions of non-elites and interacting regions over time (S.J. Shennan 1993a, 1993b, 1995, 1999).

The birth of metal as a commodity, if only in restricted areas in the beginning, is potentially only one of several commodities to appear in the Bronze Age. Increased use of Spondylus, Dentalium, and secondary animal products such as cheese and hides are more specialities that could be added to the list (Sherratt 1981). Amber is another commodity believed to make its debut in continental trade networks at this time (S.J. Shennan 1982b; Sherratt 1993). As with bronze, however, considering a material a commodity requires close attention to the cultural context in which it is produced and used[16]. Since amber from a single source is found all over Europe in finished forms and was likely held by single families for generations, describing it as a commodity is misleading. In terms of the context of production however, amber had little prestige value at its source in western Jutland, where it is rarely found worked. In the Early Bronze Age, many households prepared it, presumably for trade, and it could easily be considered a commodity in this context (Earle et al. 1998).

Most authors have recognized the Bronze Age as a context which saw economic specialization as a kind of complexity. Yet how commodity production occurred, the degree and fashion in which it was specialized, and the local and regional socio-economic contexts in which it developed, remain under-theorized and under-described. The commoditization of bronze is only one such economic process that requires further consideration. Other processes such as agricultural intensification, increasing population density or the emergence of regional hierarchies are equally assumed rather than demonstrated.

CONCLUSION

Bronze Age Europeans are people without history, despite the pervasive belief that they are the founding culture of Europe. This chapter sought to shine light on the ‘hidden

[16] Earle (2002:316; 2004), for example, argues that bronze may have been a commodity, but the swords produced for chiefly consumption were inalienable (Weiner 1992). He and most others would agree that by the Late Bronze Age, bronze used for common objects such as sickles marks the disappearance of bronze from the realm of socially controllable by the elite.

passengers' in Bronze Age studies that form part of the published literature. Although this attempt is probably most helpful for those unfamiliar with the larger history and grand narratives of Bronze Age Europe, I hope that identifying them as models of Bronze Age societies that require archaeological confirmation is also useful for those familiar with the tradition.

In my view, Bronze Age peoples are very much still 'Others'. I argue that using Iron Age homology for them is anachronistic. Deploying the ideological reconstructions of proto-Indo Europeans for them is mere speculation. Assuming they fit the mould of a 'big-man' or a 'chiefdom' category for other parts of the world requires faith, not archaeological techniques. Many have questioned whether we can ever know the 'Other.' To such a position, Ortner (1984) tells us, we can only respond: Try.

Reconstructing the evolution of an extinct social system is a worthwhile task. Rather than wearing the comfortable 'old shoes' of homology or allowing the tyranny of the ethnographic record to decide the fate of prehistoric societies (Wobst 1978), however, I advocate more careful attention to the archaeological record. Better documentation of the past is required before better explanations of both stasis and change in prehistoric societies can proceed.

There is a rich canvass of social variability in European prehistory available for study. More accurate descriptions of different social trajectories taken in the Bronze Age even allow us, indirectly, to evaluate explanations for the development of state societies. Fundamentally, explanations for the emergence of states in the Aegean or elsewhere are only as plausible as their explanation of null cases in the rest of Europe. In order to approach this topic, however, archaeological sequences such as those from Bronze Age Hungary must be broken into units comparable to those isolated for the best studied archaeological sequences of the world such as the southern Aegean, Mesopotamia, and Mesoamerica.

In the next chapters, I break down the many political and economic components of stateless societies into separate parameters broadly amenable to archaeological inquiry. I review them as topics pertaining to living societies in Chapter 3, and seek ways of detecting them in the archaeological record in Chapter 6. In this way the possibility exists to reconstruct a Bronze Age society that bears little resemblance to those often described in the general literature for Europe, nor seems typical of either ‘tribes’ or ‘chiefdoms’ in the ethnographic record.

Chapter 3: Background to a Study of Middle-Range Society

Some time ago, from an evolutionary perspective based on ethnology, I found the following stages of social-political development to be well suited to the available data: bands, tribes, chiefdoms, and primitive states (Service, 1962). While this classification may still have its uses in characterizing contemporary (or historically known) primitive societies it does not seem so useful for prehistoric archaeology.

- Elman R. Service (1975:303)

In the previous chapter, I provided a historical overview of the research interests in European Bronze Age societies over the past century. I argued that homology with Iron Age Indo-European societies and a limited range of analogies were the primary frames for interpreting the archaeological record. The recent literature describing political and economic features of Bronze Age societies is primarily derived from structural Marxist characterizations of stateless peoples, and its merger with the scholarship on 'chiefdoms' written by North Americans.

In this chapter I first offer a brief overview of the intellectual trajectory North American archaeological schools have followed in their study of middle range societies, having broadly discussed the European trajectory in the previous chapter. Second, I specify exactly what I mean by the term 'middle-range'. Third, I outline two general axes of social differentiation – vertical and horizontal – for framing social categories derived from archaeological data. Fourth, I present a model and method for identifying evolutionary change in middle-range societies. This includes the eight dimensions of social and economic variability that I use for studying the archaeology of the Bronze Age. I argue that reconstructing prehistoric social variation using a framework of social dimensions characterized independently is a superior approach than the uses of homology and analogy described in Chapter 2.

INTELLECTUAL FRAMEWORK

The North America intellectual trajectory

Although some cross-fertilization occurred, the trajectory of North American archaeological research over the past fifty years was quite different from Europe's. The primary reason is that archaeologists in North America usually worked in an anthropological framework, as one sub-field of a tradition defined by Boas (1904) in the beginning of the twentieth century. The specific comparative angle had its genesis in the 1950s and 1960s, however, during a revival of social evolution by ethnologists (Steward 1955; White 1949, 1959). Although British social anthropologists had been interested in social classification all along, there was little in the way of evolutionary trajectory and no systematic or processual accounting for change (e.g. Fortes and Evans-Pritchard 1940). In contrast, American anthropologists isolated societies with similar economic or political features and tried to locate them as a series of stages in human social trajectories.

Generally speaking, there were two broad approaches. One variant involved the coding and quantification of large numbers of cross-cultural data for hypothesis testing (Murdock 1949, 1957; Naroll 1956). The other involved a more restricted sample of ethnographic cases from which generalizations were made (Fried 1967; Sahlins 1963; Sahlins 1968; Sahlins and Service 1960; Service 1962). Several features of this research distinguished it from the nineteenth century evolutionists. First was the vast amount of data they now had to work with and its placement into coded databases such as the Human Relations Area Files. Second was the tacit recognition by almost everyone that Steward's multi-lineal evolution enjoyed better empirical support than any of the more rigid sequences of the nineteenth century (Morgan 1877; Tylor 1871, 1881).

Lewis Binford and others working in a neo-evolutionary framework assumed that cultural diversity to a strong degree would vary along environmental and subsistence parameters (Trigger 1989:392-394). If one part of the system such as the subsistence pattern could be determined archaeologically, the rest of the system could be predicted in general terms. Many other archaeologists responded positively to the evolutionary frameworks re-developed by ethnologists, probably because they were in a privileged position to evaluate their accuracy and identify cross-cultural regularities in human social trajectories. Evolutionary types such as the ‘chiefdom’ were refined and made testable for the archaeological record (Earle 1977; C. S. Peebles and S. Kus 1977; Redman 1978).

Social typologies and an interest in evolution did not last very long among the socio-cultural anthropologists in part due to the wake created by symbolic and structural anthropology. The difficulty of studying peoples outside of states also became acute – the integration of stateless societies into the modern world system meant that many indigenous political and economic features (such as warfare) were modified or abandoned. More importantly, however, time was needed to study evolution. And for archaeologists who studied stateless societies through the archaeological record, their subjects remained stateless. Consequently, the use of broad categories such as ‘ranked’ or ‘tribal’ for stages or types of societies has persisted in many circles of North American archaeologists.

Using universal social categories to investigate social variability among ancient peoples, however, was and remains criticised (Claessen and Velde 1985; Drennan and Uribe 1987; Hastorf 1990; McGuire 1983; McIntosh 1999; O'Shea and Barker 1996; Plog and Upham 1983; Tainter 1977; Tooker and Fried 1983; Upham 1990; Yoffee 1993). The advantages and problems with social typologies for archaeology were cogently presented in a series of papers delivered at an American Ethnological Society conference in 1979. Plog and Upham (1983:199-200) summarize the four major concerns. First, using a few key attributes to classify political organizations for a region curtails the range of explanatory statements about the case and the arguments become hopelessly circular. For example, if the size of the largest site is used to identify the presence of a state, it becomes impossible to investigate the relationship between site size and state organization because the former was used to define the latter. Second, if there are regularities in the outcomes of evolutionary sequences, the precise variability of these societies must be described in order to determine why this is so. Third, if archaeologists are to take seriously the challenge to identify patterns of social variability in the archaeological record not seen ethnographically, strategies must be employed to allow detection of patterns of variation not seen in the present. Fourth, ideal types foster too quick a summary judgement of particular cases, ignoring variation over time and space.

There are many reviews of this evolutionary literature and its uptake by archaeologists so I won't duplicate them here (Arnold 1993, 1996; Diehl 2000; Drennan 2000; Feinman and Neitzel 1984; Haas 2000; Paynter 1989). In my view, the most inadequate feature of the typological approach was the underlying neo-evolutionary assumption of co-variation in social features rather than its demonstration with archaeological data. Although social features such as subsistence production, environment and demography are related, when archaeological measures are under-developed, explanations of change from one type to another fail to account for the interesting and often local variations in how these relationships are expressed and differ between cultural trajectories.

Terms developed based on social regularities observed in a restricted sample of middle-range societies have an intellectual genealogy of usage in North America different from Europe, and their current use by North American archaeologists is often very narrow and specific (e.g. 'chiefdom' in the American Southeast, 'ranked' on the Northwest Coast, 'tribal' on the Great Plains). I therefore heed Service's warning at the beginning of the chapter. Rather than assume that the general social models of complexity most often used – tribe, ranked society, big-man society, simple chiefdom and complex chiefdom – are appropriate for characterizing the variability in the European archaeological record, I instead make it an empirical question. The social or economic regularities in the ethnographic record underlying such categories may not be the only ones or the most appropriate for Bronze Age Europe. The question is not even where to 'draw the line' between types, because social variability does not vary along a single dimension, but many. Next I provide a framework for how to compare stateless societies along multiple dimensions.

The Middle-Range

Having just identified one set of social categories as inadequate, I now create an alternative tripartite typology. This is not paradoxical, because typlogies are not required for studying social variation along dimensions. I include it only because it specifies what I mean by the 'middle-range.' I use Ray Kelly's (Kelly 2000) distinction between unsegmented and segmented societies to define the lower end of middle-range complexity. This is useful analytically because segmentation is a broad feature of social structure that orders the individual's world but does not necessarily rely on kinship. Segments are units that are equivalent in structure and function. Segmental organization is the combination of these like units into progressively more inclusive groups (Kelly 2000:45). The presence of a segmentary organization has consequences for how people interact in matters as basic as warfare, residence and marriage rules. It also has a bearing on community resilience. Those societies left unsegmented, such as the Mbuti or the !Kung have limited options for group organization and violence, and do not employ an ideology of 'us versus them'. Note, however, that Kelly's definition of segmentation departs from others, who couple it with a lineage or egalitarian ethic (e.g. Gellner 1969:54-55; Sahlins 1961).

States and empires are the most complex segmented societies[17]. I will use Wright and Johnson's definition of the state as a kind of segmented society with a specialized administration of political control:

> Any society with three or more levels of decision-making hierarchy must necessarily involve such specialization because the lowest or first-order decision-making will be directly involved in productive and transfer activities and second-order decision-making will be coordinating these and correcting their material errors. However, third-order decision-making will be concerned with coordinating and correcting these corrections (Wright and Johnson 1975:267).

I therefore use the term 'middle-range societies' to describe forms of organization that are segmentary but stateless. In a general sense, it encompasses both the terms 'tribe' and 'chiefdom' in the classical sense outlined by Service (1962). As Rousseau (2006:21) observes, the very blandness of the term avoids reductionist assumptions. Yet it is meaningful in that historically, the variability in both unsegmented hunter-gatherer societies and states has been constrained due to demographic and technological factors. Those societies in between – segmented, stateless societies – are fascinating precisely because they are not as formally constrained by demography and technology, and

[17] 'The state' lumps Shaka's Zulu nation and twenty-first century France under the same category. There are massive degrees of internal differentiation separating these two examples, but given our interest in middle-range societies this need not concern us here.

therefore exhibit a dizzying array of socio-political forms. Two axes are particularly useful for the formal socio-structural comparison.

Vertical and Horizontal social distinctions

Vertical and horizontal distinctions are differences captured in linguistic and symbolic categories of the people we study, even if archaeologists have difficulties capturing them or understanding exactly what they mean. Vertical distinctions are distinctions involving dominance , while horizontal distinctions imply difference but no inherent ranking. These distinctions might be ambiguous, not obvious to even ethnographers, or inconsistent. For archaeologists, it is even more difficult to identify these patterns. But as mortuary studies have shown, there often are opportunities to discover them (Binford 1971; Saxe 1970; Tainter 1977). I will continue to refer back to these two structural parameters throughout the dissertation.

For either structural parameter elaborated here, distinctions can be nominal or graduated. For a vertical distinction such as accomplishment in war, inequality might be measured by the number of enemy kills. Horizontal distinctions include categories such as clan membership and sodality. These axes are analytically useful only at a coarse level because they are static and ignore the fact that horizontal units such as households or moieties can be organized vertically in relation to one another in any given moment. Indeed, distinctions such as neighbourhoods or clans that begin as horizontal, may over time become asymmetrical in exchange and evolve into a prolonged or permanent hierarchical relationship. A taxonomic device such as this therefore does nothing to elucidate the process or the creation of differences and hierarchy. Nonetheless, it is a convenient starting place to evaluate differences observable in the archaeological record at various scales in time and space.

Egalitarianism

Egalitarianism is a social ethos in which the absence of vertical social distinctions is asserted and enforced (Woodburn 1982:431). This of course does not preclude inequalities. Age is a graduated parameter and gender is nominal; although there is no inherent ranking to either of them, it was observed long ago that in most societies they constitute the first forms of inequality (Engels 1884). It has become clear in the past forty years or so, however, that egalitarian society at its strongest is not a base on which culture is built, but rather a line of equal access to resources that is rigorously patrolled (Cashdan 1980; Flanagan and Rayner 1988; Lee 1979; Woodburn 1982). The pervasiveness of demand sharing and the rejection of the idea of reciprocity make 'immediate-return' hunter-gatherers quite unlike other egalitarian societies (Woodburn 1998). In egalitarian systems with 'delayed-return' economics, societies with food storage treated as personal property, social distinctions and reciprocity are permissible, as long as they are in principle available to all within the age-sex grade (Woodburn 1998).

Vertical social distinctions

Vertical social distinctions are indigenous ranked categories, distinguishable from one another, ideally exclusive, and exhaustive in that everybody belongs to one (Rousseau 2001:117)[18]. Vertical social distinctions are marked in semiotic spaces such as speech or architecture that are acknowledged as marking the ranking between users of a shared symbolic system. Systems of vertical social distinctions such as those of highland New Guinea lack certain levelling mechanisms and might be called a state of "competitive equality" (Woodburn 1982:446) or "transegalitarian society" (Hayden 1995, citing Clark and Blake 1989). Societies characterized by competitive equality are still acephalous in the traditional anthropological sense (without a headman), but might more accurately be called "multicephalous" because there are so many people involved in the decision making process (Rousseau 2006:110-111). Prominent heads of households, those participating in the social 'competition,' form this multicephality. Social positions attainable based on food production yields and distribution from labour inputs are attributed positive values. People situated in less valued positions, because they work less or work only for others, acquire labels such as "little-men" and "rubbish-men" (Strathern 1971:188). These individuals have opted out of the competitive game, unwilling or

[18] Rousseau used the term 'stratification' for a system of vertical distinctions. I prefer 'vertical social distinction' to 'stratification' because of the latter's intellectual baggage and widespread association with class society and states.

unable to engage in the labour it takes to mobilize people and food for prestigious affairs. They are treated with contempt and live at a lower level of subsistence than others. This crystallization of social distinctions and categories with differential treatment is one foundation upon which institutional hierarchy is built.

Vertical social distinctions can be hereditary or not, and they may or may not be coupled with acute economic advantages. Rank among the Powhatan had clear economic advantages (Rountree 1989). The elite controlled trade and collected tribute. There was no strong hereditary component to the lineage, or cosmological basis for the stratum, but ruling elites were usually born to elites. The rulers and their families were distinguished from commoners by the richness of their dress, their council of decision-makers, their refinement and participation at ceremonies, the ranks of servants, and the labour they left to others. Priests were also of very high standing, as were warriors. Although they would serve in the *weroance*'s (ruler's) council, they were not part of the ruling families. Powhatan and the ruling elite could live lavishly because of the tribute they collected from the trading, hunting, and agricultural efforts of their subjects. According to one Jamestown observer, tribute items included skins, beads, copper, pearls, deer, turkeys, wild beasts, and corn (Rountree 1989:109). In no way could it be called a redistributive arrangement (sensu Service 1971), and coercion may have been implied if not actually used. Although the tribute collection may not have been the "eight parts in ten" that another observer reported, there is no doubt that economically, it was good to be the king.

Adding horizontal social distinctions

Inequalities in wealth, education, or influence in regional politics are obviously important for structuring interactions between people. However, of equal importance is horizontal differentiation into nominal parameters such as clan, sodality, or specialized occupation. Kinship is often built into these horizontal distinctions, but lineage and clan based distinctions entail more complex social organization than simply complex marriage rules (for example, among certain Australian unsegmented hunter-gatherer groups). People can belong to many such segmental groupings simultaneously. A woman might be a member of a sororal society, a potter, and a representative of particular lineage.

For horizontal distinctions, the Powhatan are not the best for illustration, because the English who recorded many of the details in the 17th century were not attentive to kinship structure (Rountree 1989:93). The Tewa of the American Southwest, on the other hand, are a better example because they are well known for horizontal distinctions that divide them into ritual groups (Ortiz 1969). The Tewa structured many of their activities in terms of Winter and Summer People. These moieties were present in their myth, ritual, and livelihood. The Summer Moiety was associated with agriculture while the Winter moiety was associated with hunting.

Strong vertical social distinctions nonetheless also characterized the Tewa. The *Made People* were at the top, the *Towa é* in the middle, and the *Dry Food People*, the commoners, at the bottom (Ortiz 1969). Fowles (2004) employs Weber's term "hierocracy" to describe these societies which combine religiously – based prestige inequalities on the one hand with overall economic equalities on the other, although in the village of T'aitöna he studied (ancestral to the related Tiwa), the 'higher ranking' of the moieties did have more grandiose architecture and mealing bin stores (Fowles 2005:43).

As the number of socially recognized categories people can belong to increases, so do the types of interactions possible (Blau 1970). An increase in complexity can describe the addition of parameters in which vertical distinctions are made, the relative difference between these distinctions, or the addition of horizontal distinctions or breadth. The more nominal parameters there are within a society and the more equally distributed the population among them, the greater the heterogeneity. For this reason, an increase in complexity does not necessarily mean an increase in inequality.

A model and method for studying evolutionary change in middle-range societies

I defined the 'middle-range' above as a diverse spectrum of political and economic possibilities between unsegmented societies and states. There is no reason to believe that for trajectories ending in primary state formation, however, this spectrum can be leapt over (*contra* Yoffee 1993). My reading of the ethnographic record and different archaeological sequences suggests just the opposite. Once in this middle-range spectrum, few historical trajectories ever cycle back to unsegmented societies; nor, however, do they undergo pristine state formation. This does not imply a stasis, but rather oscillation between various social forms measurable by degrees of hierarchy, group size, and economic specialization.

The ethnographic record is one source of suggestions for which economic and political combinations are possible or not possible, common and rare. The underlying productive capacity of the environment is one contributor to this variability. The cultural willingness to harness that capacity is another. Demographic scale and regional inter-dependence are likewise critical parameters for meeting certain kinds of organizational requirements such as standing armies and craft specialists who do not produce their own food. A spectrum of horizontal and vertical complexity oriented on economic conditions is illustrated in Figure 3.1.

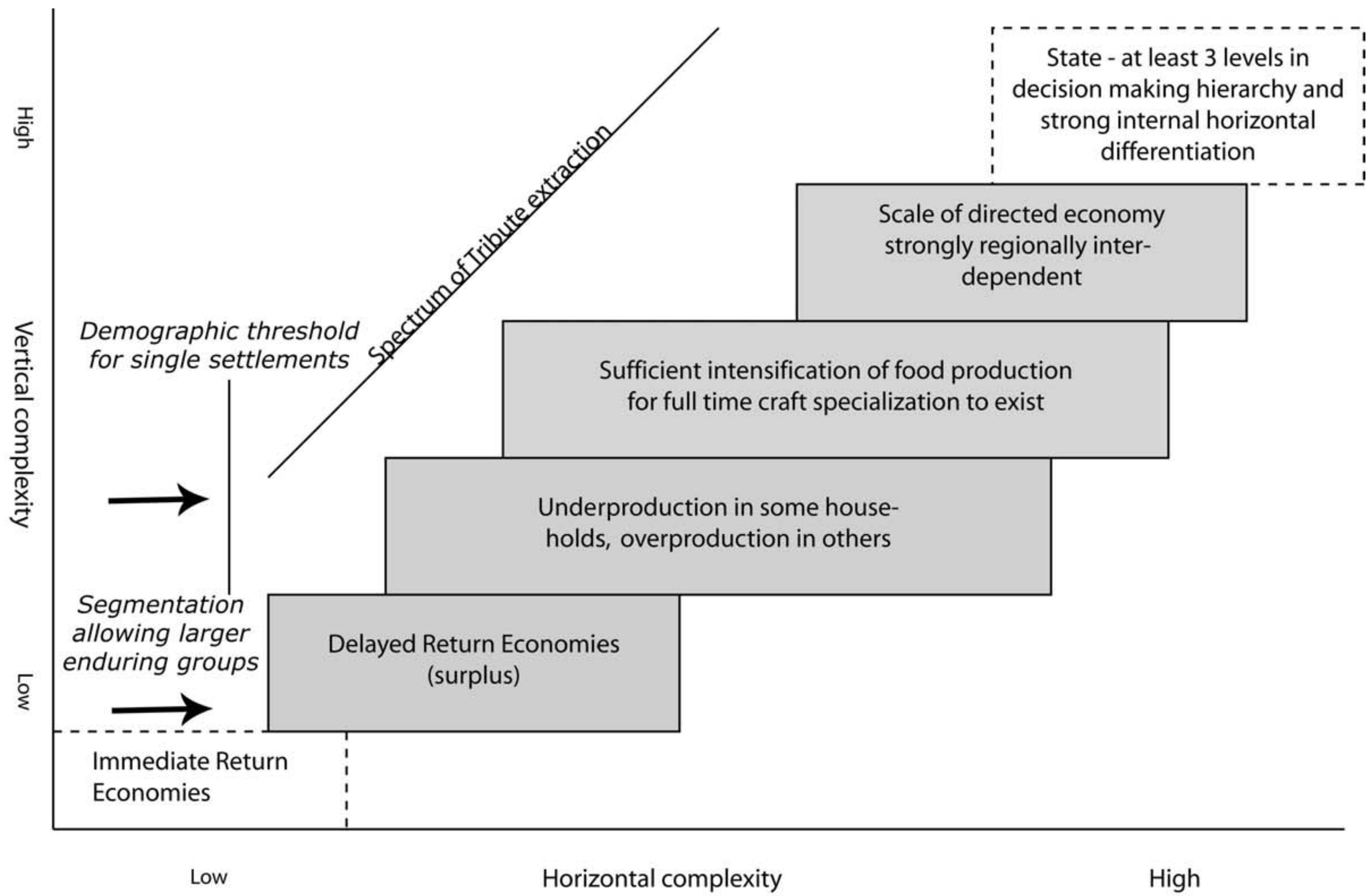

Figure 3.1. Hypothesized system states for middle-range societies.

The sequence of economic conditions (in grey) is a low-level hypothesis. This figure uses many of the inductive lessons from ethnography to generate what is actually a unilineal sequence, the 'holy grail' of evolutionary social science. Neither tempo nor cycling is built into this abstraction. Although there is only one direction societies can travel 'to become a state,' there are many paths or trajectories, and potentially many cycles and tempos (Spencer 1990). That is, some societies may achieve the same level of intensification of production and craft specialization with complex horizontal social forms and relatively less vertical complexity or inequality. They would therefore be in the same 'grey box', but further along the x axis than the y. In other words, despite the diversity of middle-range societies, certain kinds of socio-economic forms must be built on pre-existing conditions. If such a real sequence of conditions exists, we can refer to its components as the 'building blocks' of complexity.

A figure such as this is only useful at the most general level of abstraction, and placing ethnographic cases into it accomplishes very little. This is so for at least three reasons. First, detailed archaeological sequences are required as evidence to support such hypotheses. Testing hypotheses about the order and make-up of these building blocks cannot proceed with ethnographic case studies. Second, there is no causality or explanation built into the hypothesis that one 'building block' must precede another. Explanations for change within one building block or between system states in different locations in the sequence require different sets of explanations, because the emergent properties of a system change as societies become larger and more complex. Therefore, there is an underlying set of hypotheses that, together, explain the order. Third, causality must be investigated empirically using measures, not abstractions. The economic boxes and leadership descriptors are broad concepts or system states, not measures.

In this dissertation, I use the terms *social dimension*, *variable*, and *indicator* to discuss social variability at different analytical scales. A *social dimension* is an abstract, potentially measurable aspect of a social form[19]. It is above all an analytical distinction allowing comparison between different societies. The judicial system, the practice of clientship, and access to non-local resources are all examples of social dimensions.

[19] The 'social form' is also an abstraction, one that masks some internal conflicts, cycles and temporal oscillations. I do not pretend that there are specific social boundaries to this social form, even if any given analysis must.

Variables are specific components of a social dimension. For 'judicial system,' the arbiter of social justice (e.g. social office holder, age grade, or general assembly) is a single variable. The social consequence of being accused of adultery is another. Social dimensions can therefore be analyzed in multiple ways by focusing on different variables. Finally, *indicators* are measures that stand as field proxies for a variable. If the interest in the variable regards the concentration of authority, an indicator could be the proportion of adults in a community (or set of communities) that is responsible for making a given decision, such as the punishment for adultery. The information could be gleaned from ethnographies, but would obviously require other information, such as community demographics.

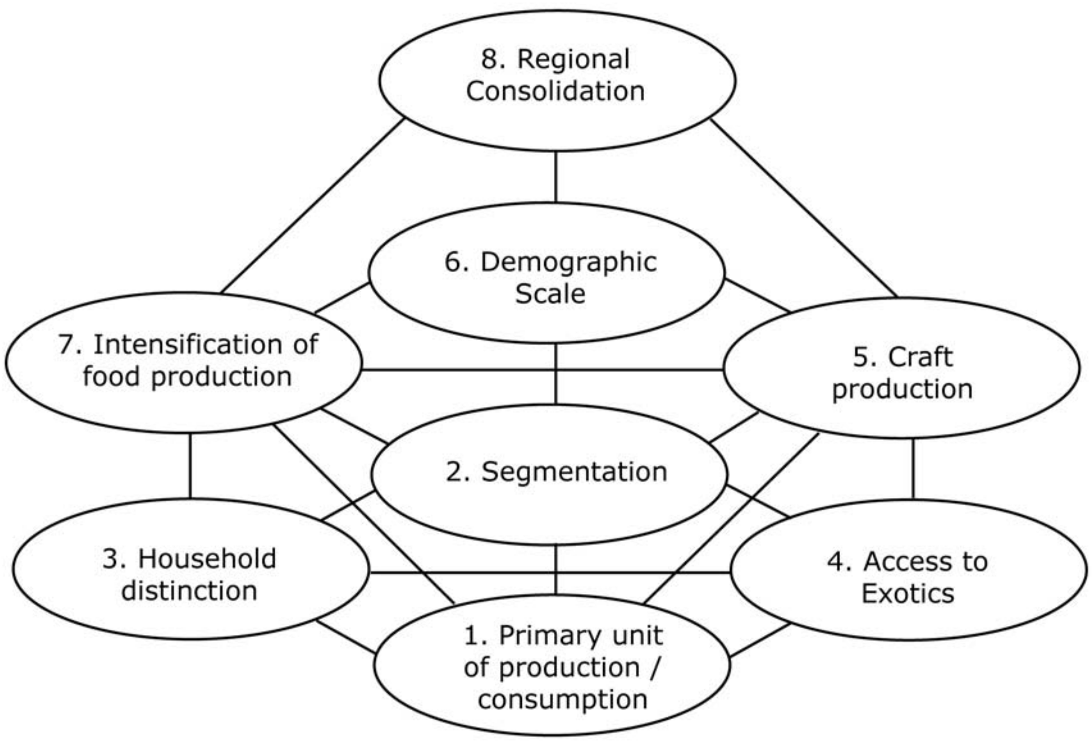

Figure 3.2. Social dimensions used to explore middle-range societies in the dissertation.

For my study of Bronze Age societies, I focus on social dimensions for that repeatedly get invoked in 'first causes' arguments for the emergence of more complex social forms (Figure 3.2): (1) the primary unit of food production / consumption; (2) segmentation; (3) household distinction; (4) access to exotics; (5) craft production; (6)

demographic scale; (7) intensification of food production; and (8) regional consolidation. These social dimensions are all interconnected but can be used independently to describe an eight dimensional space. Figure 3.2 is also a 'road map' I use in this dissertation to travel across middle-range variability during my analysis. The numbering sequence in this figure represents the order in which my discussion travels, a logic that makes sense partly in terms of scale, but also in the final presentation of my results. The lines and locations of these dimensions relative to one another in Figure 3.2 are meant to convey the idea that changes of magnitude in one dimension are often dependent on similar changes in another dimension. This is not a causal or explanatory diagram; it is a descriptive one. Nonetheless, the content of this description changes over time, therefore the variables these dimensions contain can be mobilized to test the salience of particular explanations. Which variables are independent, and which dependent, depends on the hypothesis being evaluated.

These dimensions have repeatedly emerged as important for understanding stasis or change in middle-range societies (Earle 1989; McGuire 1983; Hastorf 1990; Upham 1990). They interact to produce conditions of population pressure, resource scarcity, competition between households, and the monopolization of craft production and exchange. As I will argue below, variables of segmentation and regional consolidation are important to consider not so much because they are a *cause* of change, but an *accommodator* or *precondition* for change. Similarly, certain demographic thresholds exist as bottlenecks that preclude social stasis. Although these are not the dimensions all anthropologists would choose in a study of social variability, they are particularly well suited to archaeological investigation and change over time. Other dimensions, such as neuro-psychology or factionalism, are of course relevant for understanding the breadth and variability of the middle-range. If they do not leave material remains, however, their specific role in the evolution of prehistoric systems is unverifiable. Other important social dimensions – such as mortuary treatment and vertical or horizontal distinctions in ceramics - are well suited to archaeological investigation, but are currently not well understood in my study region.

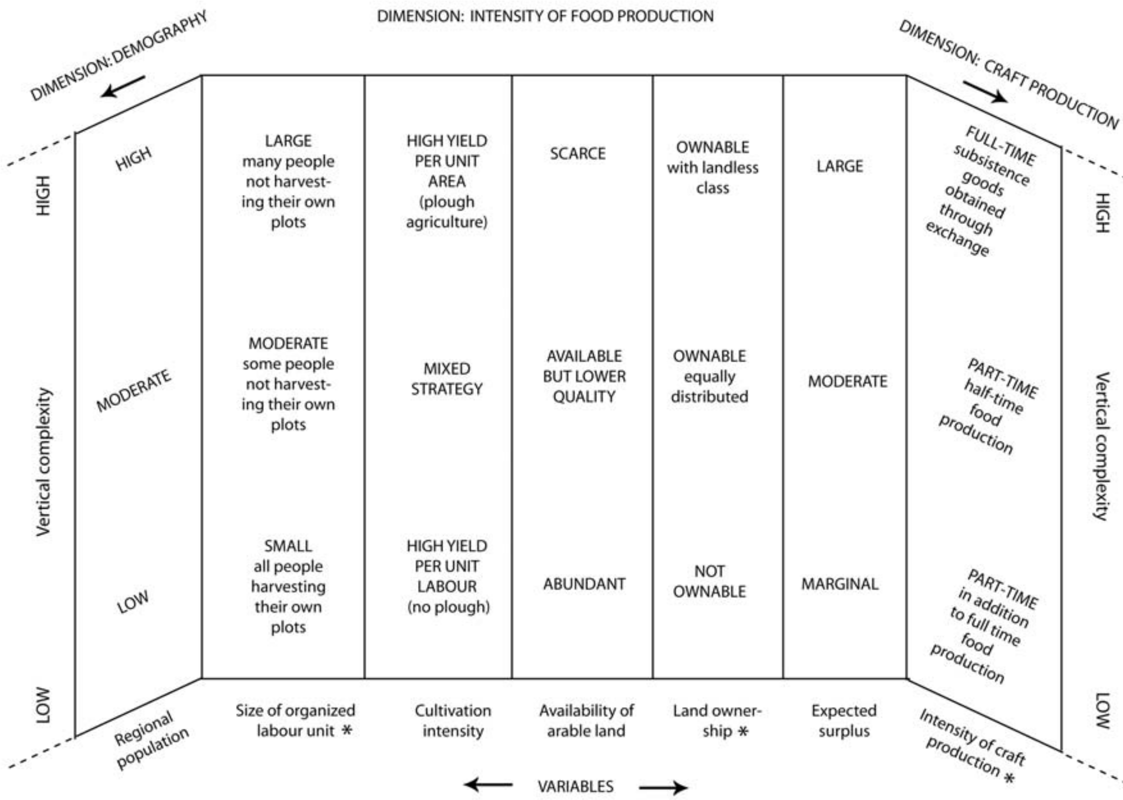

Figure 3.3. The relationship between social dimension and variable for changes in subsistence production in Europe. Variables with an asterisk (*) are particularly difficult to measure archaeologically.

The analytical distinction between social dimension and variable is illustrated in Figure 3.3 for evaluating a hypothesis I discuss below. The principle dimension is ‘intensity of food production,’ for which there are several related variables. The variables chosen are particularly critical for agriculturalists, but the way I have described the axes is specific to my discussion of subsistence production in Europe. That is, the figure is not designed to represent the essential variables for intensified food production in all societies[20]. Here I have listed ‘size of organized labour unit,’ ‘cultivation intensity’, ‘availability of arable land,’ ‘land ownership’, and ‘expected surplus’ of the primary crop. Explaining change in these variables, however, might require related dimensions, such as demography and craft production; I have included only a single variable for each

[20] Subsistence production intensification must be thought about more broadly than this if it is to encapsulate hunter-gatherers, pastoralists and agriculturalists.

of them in this figure. Specific ethnographic indicators for these variables are not listed in the interests of clarity, but a common measure of regional population, for example, is density (persons per km^2). Although it is difficult to measure land ownership or labour pool size, measuring related variables allows for a more plausible reconstruction of those unobservable. For instance, a landless class is unlikely if there is no land shortage, a variable measurable through the consideration of land availability, population and cultivation intensity.

I draw attention to how people generally use these measures before I turn to the archaeology. In the Human Relations Area Files project, hundreds of societies in the ethnographic present are described (purportedly) using the same indicators (Murdock 1949, 1967). Many have used this database to observe attribute clusters or 'adhesions', to use Tylor's term. As I noted in a previous section, other social scientists prefer more careful case selection for comparative study. Regardless of the approach, explaining the origin of the social patterning observed historically is a long-standing interest in anthropology. Accounting for cross-cultural regularities attracts the minds of anthropological archaeologists in particular. There is room for improvement, however, and I believe progress can best be made carefully distinguishing between what we learn from the ethnographic present, and what know of the archaeological record. I explore this in more detail using Figure 3.3 and an example relevant for the prehistory of Europe.

Goody (1976) used the HRAF database as one line of evidence to identify inheritance rules as a major cultural difference between Eurasian and African societies, a distinction that he argues had strong implications for differential capital accumulation. Societies in which both men and women inherit parental property also tended to be ones in which female reproduction was tightly controlled. Interestingly, these social attributes were also correlated with plough agriculture. In Figure 3.3, that is, Eurasian societies clustered at the top and African societies on the bottom. To explain the source of the inheritance rules and other adhesions, he relied on Childe's (1954) reading of the archaeological record. In Childe's mind, the plough was a solution to 'population pressure.' A much greater surplus was capable under plough agriculture and allowed a non-producing class to emerge. The plough, therefore, was not only a technology that spurred changes in kinship and wealth inheritance to preserve the household; it also created a platform for the urban revolution. This driving emphasis is illustrated in Figure 3.4.

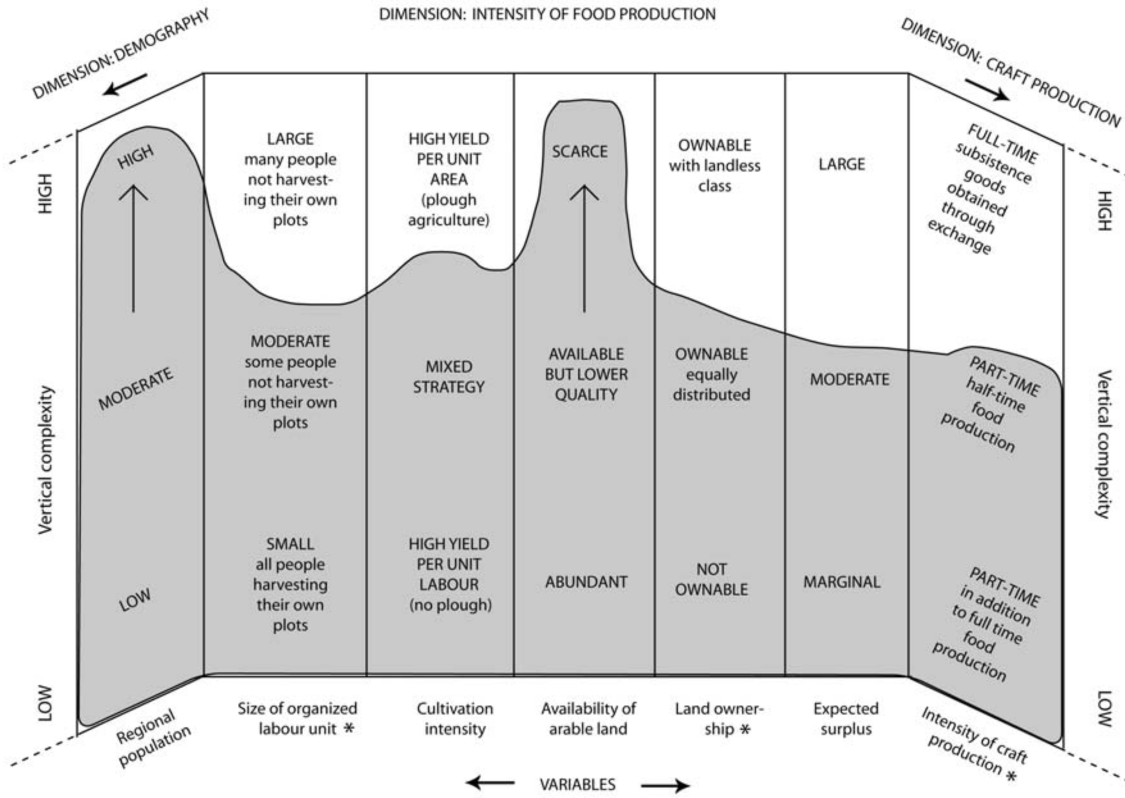

Figure 3.4. Stylized representation of the critical drivers of social change in Goody's explanation.

Goody's review of the historical support for this thesis stopped there, but the topic was later picked up by archaeologists. Sherratt's (1981) introduction of the 'secondary products revolution' brought the importance of plough agriculture back to the table. Sherratt, citing Goody (1976), posited the identification of the plough in the archaeological record as indirect evidence for patrilineal, male-dominated, hierarchical societies with landed and landless classes. Halstead (1995b) also revisited Goody's evolutionary hypothesis. Rather than treating attributes observed in the ethnographic record as a timeless adhesion, however, he broke it down into components that could be investigated archaeologically, such as those in Figures 3.3. Halstead used ethnographic observations from early 20th century Macedonia to argue that real world constraints on plough use, labour and land, mean that even if plough technology is available, it does not mean that it will be adopted by everyone. Moreover, in comparison to garden cultivation, plough agriculture is actually 'wasteful' in requiring more land to produce the same amount of wheat[21]. In his evaluation of the Greek Bronze Age, although he found evidence for ploughing at the capital, there was none for peasants in the countryside.

The implications of this vignette for archaeologists are four-fold. First, evolutionary hypotheses such as Goody's are actually testable in the archaeological record. Standards of what constitutes 'evidence,' however, have changed since Childe's time. Second, social attribute clusters observed in the ethnographic record do not hold for all time, and explaining them requires investigating their origins and development. The 'building blocks' of complexity proposed in Figure 3.1, constructed to some degree using ethnographic examples, will consequently change as we learn more about prehistory. Third, there are more variables involved than Goody, Childe, and Sherratt considered. Testing evolutionary hypotheses therefore requires substantially more work than one might think.

Next I introduce details of the social dimensions I use for describing middle-range societies in eastern Hungary. For each social dimension I include three parts. First, I provide a summary of the disciplines and investigators that have made significant empirical or theoretical contributions to current understandings. I weight my cited literature to the more recent past, excluding nineteenth century scholars (although most of these topics can be traced to original insights or initial formulations by thinkers such as Morgan, Spencer, Tylor, Marx, or Maine). Second, I present my thesis for the dimension, required background supporting the legitimacy of the archaeological measures presented in Chapter 6. Finally, I include a short summary of the relevance the dimension has for the operation and evolution of middle-range societies. I will come back to many of these references in the final chapter of the dissertation.

[21] It can only be considered to have a higher yield per unit area, as seen in Figure 3.3, if lower quality or riskier agricultural plots are used for cereal production. This is not an argument that Halstead made, but is likely for Eastern Hungary.

DIMENSION 1: PRIMARY UNIT OF FOOD PRODUCTION / CONSUMPTION

Research history. The primary unit of production and consumption is a group with particular rights and responsibilities commonly referred to as 'the household'. The definition of such a group has been of interest to social scientists since the nineteenth century, and ethnographers identified many of its critical features in the first half of the 20th century. New cross-cultural syntheses emerged in the early 1970s bearing on evolution and analytical scale. Sahlins (1972:41-99) argued that the common household goal of under-production perpetuated an atomized basal unit of mechanical solidarity and a species of anarchy. Flannery (1972) identified the significance of house form for production and sharing, and distinguished it from other analytical levels in *The Early Mesoamerican Village* (Flannery 1976).

Beginning in the 1980s, a mature cultural ecological school published a series of perspectives on households and corporate groups (Netting 1990; Netting, et al. 1984; Stone 1991; Wilk and Netting 1984). Parallel to this trend emerged a 'household archaeology' (Blanton 1994; Coupland and Banning 1996; Hayden and Cannon 1982; Kramer 1982a; Wilk and Rathje 1982). Archaeologists developed the social importance of storage at the same time (Ames 1996; D'Altroy and Earle 1982; D'Altroy and Earle 1985; Earle 1991; Halstead and O'Shea 1982; Kelly 1991; Margomenou 2008).

Thesis. I make basic distinctions that emerge from the anthropological literature and some more specific points relevant for archaeological reconstructions. It is widely accepted that the household is the most prominent unit of production, consumption, transmission and reproduction in sedentary societies (Wilk and Netting 1982; Netting 1993; Sahlins 1972). It is useful analytically to distinguish the household – a temporary association of people – from the corporate group, a single trans-generational property holding entity, even if their boundaries are sometimes co-terminus (Goodenough 1951:30-31). When corporate groups consist of multiple households, use rights are held by individual households, but are allocated by the corporate group.

Household boundaries vary cross-culturally according to the organization and number of people within it, and so there is no one-to-one correspondence between physical structures such as houses and the household (Hayden and Cannon 1982;

Lawrence and Low 1990). House size, however, often co-varies with wealth and large labour pools (Netting 1982; Coupland and Banning 1996). It also often co-varies with political functions (e.g. Leach 1954; Trigger 1990a). Archaeologists also often note that both food preparation and storage locations are influenced by the productive and consumptive unit boundary (e.g. Ames 1996; Ortman 1998).

The social importance of these distinctions is best understood through examples of household and corporate configurations and their relationship to house size, storage and food preparation area. The Huron and early historic Northwest Coast groups both had large houses with multiple nuclear families, and therefore multiple hearths (Boas and Codere 1966; Coupland 1996; Drucker 1951; Matson 1996; Trigger 1976, 1990a, 1990b). For ethno-historically attested Iroquois, each hearth was used by one to two families of around five individuals (Warrick 1996:12). The corporate group boundary in the northwest coast is the same as the household boundary, confined to a single, generally patrilocal, house structure[22]. The corporate group had rights to fishing and hunting grounds, and houses persisted over generations. Although the Huron had clans, they did not have a corporate group identifying with a territorial resource. The Huron were maize horticulturalists, and settlements did not last for more than a few decades before they moved on to new fields. Individual houses generally consisted of a matriline: a mother and her grown daughters and their families, or several sisters. Like the Northwest Coast groups, most food preparation for consumption took place by the nuclear families at their own hearths. They pooled corn by household in shared storage bins, however, so the Huron household can also be described as a corporate group. On the Northwest Coast, corporate house food storage was intra-mural in perishable containers. It is uncertain the extent to which resources were kept individually at a family's hearth as opposed to in common and controlled by the head of house. It is possible that whatever resources were cached in close proximity to the hearths of nuclear families was private property rather than communal, even if sharing with housemates was expected under certain conditions.

A household may equally consist of people in several small houses. In this case, if a household of several nuclear families is working together, surplus may be stored

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[22] In reality the situation was quite complex, with people of different rank and even lineage constantly coming and going. See the Nootka, for example (in Drucker 1951:278-286).

communally or individually by house. Storage in a common space ensures that everyone sees who accesses it. The groundnut stores of the Dagomba compounds in Ghana, for example, were used equally by the women of the compound who contributed (Prussin 1969:36). By contrast, a lineage elder had the strongest say when the yams were prepared, which until then remained inside the compound in a large room.

When people atomize across small houses, the households often cluster in space for convenience or solidarity. Common activities such as manuring gardens, threshing wheat, or tending children are made easier by this spatial alignment. The location of the boundary for the corporate group might be this residential cluster, particularly conspicuous in examples such as the Tiv residential compounds (Bohannan and Bohannan 1968). In other cases, the corporate group straddles a larger area such as village or multiple villages, with domestic labour groups falling to households within it (Keesing 1975; Wilk and Netting 1984). Land use rights may be allocated by representatives of the corporate group, however, even when the greater area is under the responsibility of a ruler (e.g. the Lozi, Gluckman 1943).

Relevance. The importance of household production for self-determination in middle-range societies is widely acknowledged. At least for food production, even in the most complex stateless societies, the means of production continues to lie in the hands of the producers (Taylor 1975:38). The transition to internal storage control – as opposed to community control – is an important social evolutionary milestone, because incentives for production grow because the free-rider problem is reduced (Flannery 1972). When households compete in food production, however, far under-producing free-riders can re-emerge, but only at the expense of indebting themselves (Sahlins 1972: 101-148).

Indeed, many argue that it is the emergence of large households and the command of labour that allows certain families or corporate groups to dominate others. For example, complex tasks such as reef-netting by the Straits Salish of the Northwest Coast may have required the collaboration between nuclear families (perhaps 24 adults simultaneously netting and processing fish), and thus encouraged the formation of such co-residential groups (Coupland 1996; Matson 1996). Leaders of already large houses would also have been able to attract the labour of families in need and benefit from slaves captured in war (Donald 1983). Combined with large storage capacities provided by such productive units, well-off families can indebt others in need and build the reputation and social competition advantage of the household "aggrandizer" (Ames 1996; Arnold 1993, 1996; Hayden 1994).

The idea that corporate groups always control some critical resource is relevant for identifying them in the archaeological record (Hayden and Cannon 1982). The importance of corporate descent groups lies in the weight of the rights and privileges associated with them. For men in Huron society, marrying into a woman's longhouse meant sharing food grown by women's labour (though if he was considered lazy, the husband was sent back to his mother and sisters). By contrast, marrying into a Nootka or Kwakitul house meant gaining the right of access to the harvests from hunting and fishing grounds, a highly variable resource in space but predictable by location (Donald and Mitchell 1975). The long term consequences of what that resource is and its variability in the environment may play an important role in the long-term development of inequalities.

DIMENSION 2: SEGMENTATION

Research history. Segmentation is a form of horizontal distinction that orders groups of associating people. Although I am using Kelly's (2000) definition of segmentary as a broad classification that describes even states, its intellectual roots describe only stateless societies, and is used in different analytical frameworks for a variety of purposes. The political importance of the segmentary system was first systematically elaborated by Evans-Pritchard (1940) in *The Nuer*, and re-invigorated in the 1960s by Sahlins (1961). Segmentation within villages was particularly well studied ethnographically among middle-range societies in the American Southwest (e.g. Titiev 1944; Eggan 1950; Ortiz 1969). However, some anthropologists also stress the importance of segmentation not based on kinship (e.g. Dresch 1986; cf. Munson 1989). With the exception of the American Southwest, segmentation as an overarching principle for middle-range societies studied by archaeologists dates mostly to the past two decades (Brumfiel and Fox 1994;

Fletcher 1977; Fowles 2002; Holl and Levy 1993; Parkinson 1999a, 2002a; Rogers 1995)[23].

At least for the village level, the bulk of relevant publications for the interaction between segmentation and the material world may lie in the identification and discussion of community layouts and vernacular architecture in stateless societies. The 'cultural geographers' might have been the first to systematically focus on the social correlates of community plans (Fraser 1968; Prussin 1969; Rapoport 1969, 1982). Architectural studies followed in this tradition, focusing on how different cultural logics affected the built environment (Hillier and Hanson 1984). Ethnoarchaeology has also been important for understanding how cultural conceptions of space articulate with the built environment (David and Kramer 2001:255-302; Holl and Levy 1993; Kent 1987, 1990b).

The uniting of segments for routine events such as marriages, seasonal feasts, or raids on other settlements, helps to reproduce them in both cultural memory and significance. Two foci in particular - 'integrative structures' (e.g. Adler and Wilshusen 1990) and feasting (e.g. Dietler and Hayden 2001) – have been topics of particular interest by archaeologists because of their visibility in the material record.

Thesis. Under 'Dimension 1: Primary Unit,' above, I identified the household and the corporate group as important units of production, consumption, and resource access. These units are potentially segments of a more complex structure. The thesis I make here is that segmentary structures can occur across settlements and within settlements (Hogbin and Wedgwood 1953, 1954; Keesing 1975:39-43) and that where multiple segments are present in one community, segmentary lines are often reproduced in the built environment (e.g. (e.g. Eggan 1950; Lévi-Strauss 1973:219-223; Titiev 1944) and supported by group activities such as rituals and feasting (Adler and Wilshusen 1990; Dietler and Hayden 2001; Johnson 1982: 405-6). Specific demographic aspects of segmentation are introduced under Dimension 6.

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[23] I leave out horizontal distinctions in ceramics because the resolution at which I can access them is too poor to merit evaluating the vast literature associated with this important set of material culture.

Relevance. Segmentation is one of the primary, shared characteristics accounting for the different appearances of tribal societies in time and space (Parkinson 1999, 2002a). Long ago, Gearing (1958) emphasized that changes in *structural pose* meant that a social structure could change from one form to another – such as an egalitarian group to a hierarchical war party – for only a limited amount of time and then return to a former state. The same people therefore occupy a different use of space and different social roles during alternative times of the year. Sahlins (1961) also emphasized how segmentation could be harnessed as a means for rapid territorial expansion. Segmentation could account for the displacement of the Dinka by the Nuer, a group with a greater number of segmentary tiers to draw on for confrontations (Kelly 1985).

Segmentation is not only about the power of united groups. Aggrandizers are often considered to exploit the opportunities afforded by the coming together of segments by the indebting of rival households (Hayden 1995), or in maintaining a state of perpetual warfare (Carneiro 1998). Despite the 'functional equivalence' of segments, however, rituals and feasts between them can serve the interests of factions rather than simply performing integrative functions (Fowles 2005). Even when the emphasis is on affirmation of group equality, there may be the opportunity for individual gain. In New Guinea ritual feasts, ritual experts gained from the events but did not have the social networks to invest their earnings (Wiessner 2001). In contrast, the Big-Men that organized the sacred feasts were given the opportunity to alter norms and values, such as the incorporation of new cults.

DIMENSION 3: HOUSEHOLD DISTINCTIONS

Research history. Description of household dwellings and their cultural significance was part of the ethnographic tradition of the first half of the twentieth century. Ground plans, photographs, totem poles or carved monoliths in front of distinguished houses are found in many classics (e.g.(Boas and Codere 1966; Firth 1936; Leach 1954; Mills 1937). In the 1960s, a small group of cultural geographers stand out as the most empirical in accounting for regularities in vernacular architecture (Fraser 1968; Rapaport 1969; Prussin 1969). Beginning in the late 1970s, archaeologists developed an empirical dataset for testing common assumptions about architecture, style, and society (Blanton 1994; Coudart 1992; Feinman and Neitzel 1984; Kent 1990a; Kramer 1982b). A new direction in theoretical architecture using a grammar analogy was published in the 1980s (Hillier and Hanson 1984), and used by ethnoarchaeologists soon thereafter (Banning 1996; Smith and David 1995).

Thesis. The structural and decorative composition of houses varies cross-culturally, but a much more limited range – a grammar – will characterize a particular culture[24]. Systematic deviations from the norm, in layout or internal features, indicate different patterns of usage consistent with different roles of the inhabitants or their structural relation to others (Hillier and Hanson 1984).

These features can include location, orientation, size, and access to interior rooms. A similar logic of difference applies to the exterior of structures, which marks them as associated with magic or the sacred (Rapoport 1968, 1982: Feinman and Netizel 1984). In many cultures of states, religious buildings tend to be distinguished places of worship. In stateless societies, the same markers of the sacred or the supernatural often adorn the residences of powerful individuals who have a rare and privileged relationship with the spirit world. These distinctions have symbolic meaning for those who share this built environment.

This difference is manifested by those who *achieve* a measure of greatness and sometimes adorn their living space with a record of the event (Hayden 2001:54-6; Hutton 1922b). Such achievement and generosity is often submerged into the realm of the sacred, however, because in most societies, success is considered to be dependent upon the cooperation of the spirit world.

Relevance. Household distinctions incurred by affiliation with the supernatural are interesting in middle-range societies because they allow a potentially powerful form of inequality to emerge and to become part of the habitual. Ritual and religious specialists in otherwise non-hierarchical middle-range societies often have the basis for moral authority and can use their influence to mobilize people across kinship lines (Aldenderfer 1993;

[24] Multiple 'grammars' characterize more complex societies.

Evans-Pritchard 1940). This is important because elites in very hierarchical but stateless societies are considered social ‘Others’, qualitatively different than ‘Us’, not only closer to the supernatural realm of the ancestors, but part of it (Helms 1998).

DIMENSION 4: ACCESS TO EXOTICS

Research history. The first significant demonstration of the complexity and sophistication of exchange networks circulating non-local items within and between stateless societies was published by Bronislaw Malinowski in *Argonauts of the Western Pacific* (Malinowski 1922). Exchange itself has been a central topic within anthropology ever since, although major contributions have changed the tone and direction of the investigation (Appadurai 1986; Mauss 1925; Munn 1986; Polanyi 1957). The question of why exotics matter is essentially a question of ‘value.’ No less than exchange, value itself is a fundament problem for anthropologists (Graeber 2001; Weiner 1985).

Although archaeologists have rarely been involved at the avant-guard of these conversations, they have been studying the exchange and hoarding of valuables as long as they have been studying prehistory. This is because archaeologists have always been in a unique position for recognizing value in the prehistoric record, as objects of desire can travel thousands of kilometres across multiple cultural systems (see for example, the European amber route in Navarro 1925). Despite a longstanding interest in the problem of exchange, it was beginning in the 1970s that archaeologists developed their ideas into explicit, general models about how exotic goods in general might articulate with other features of stateless societies (D'Altroy and Earle 1985; Earle 1982, 1987, 1997; Flannery 1968a; Frankenstein and Rowlands 1978; Goldstein 2000; Helms 1988, 1993; Junker 1990; Renfrew 1975; Rowlands 1987).

Thesis. Here again, I emphasize only a few points relevant to the archaeology of middle-range societies. First, exotic items are sometimes used as a currency or token of value that can be exchanged (Dalton 1977; O'Shea 1981). These can be circulated and standardized as long as they remain scarce. Such tokens can be used for marriage payments, war reparations or exchanged for food. Second, in extreme ethnographic examples, the practice of gifting exotica to supporters temporarily solidifies positions of prestige under some cultural conditions (Boas and Codere 1966; Ekholm 1972; Sahlins 1963; Strathern 1971). The societies of highland New Guinea or the North American Northwest Coast are particularly famous for this, although certainly part of the scale of these systems derives from exchange with Europeans (Sahlins 2000; Spriggs 2008). Third, local value may be placed not only on the holding and distribution of such items, but perhaps also the acquisition (Helms 1988, 1993). Finally, and related to the second and third points, is the degree to which exotics circulate in a network of exchange due to down the line trade, direct procurement, or other (Renfrew 1975). The extent to which non-local resources are obtainable by people by exchange is related to the scale of inter-regional exchange. This has important, if complex, consequences for the development of asymmetries in exchange due to the peculiarities of geography and resources distribution.

Relevance. The movement of exotics or rare goods figure strongly in currently influential models of more hierarchical stateless societies. Goods from distant lands took on dramatic effect in the "prestige goods economy" model, where precious goods were exchanged and controlled by elites in Iron Age Germany (Frankenstein and Rowlands 1978). In this model, the regional contacts of the elite allowed them to limit and monopolize the circulation of wealth objects in the system. The distribution of these items and the commoners' inability to obtain them otherwise, embed inequalities in social relationships. Similar use of exotic goods characterizes the chiefly political economy of 'wealth finance' described by Earle (1997, 2002) for the archaeology of Thy, Denmark. Although it is perhaps most commonly found to describe European societies, a version of this system was at one point also argued to hold for Moundville, Alabama (Welch 1991).

DIMENSION 5: CRAFT PRODUCTION

Research history. As with exchange, studies of craft production also fall within a massive body of literature. Yet, as David and Kramer (2001:304) point out, most studies lack the detailed intersection of material culture study with the social context required by archaeologists. Social scientists are interested broadly in the economic organization of production, and the manipulation of the people within it. On the other hand, art historians, metallurgists and ceramicists not working in the social sciences tend to focus only on the techniques and procedures involved.

For stateless societies, ethnoarchaeologists have probably done the most detailed work of relevance, but they have above all studied potting (Longacre 1991; Stark 2003), iron-working (Childs 2000; Childs and Killick 1993; David, et al. 1989; de Barros 2000), and to a limited extent, lithic procurement (Sharma 2007; Terradas 2005). Although they do not provide many of the details, ethnographic and ethnohistoric studies are also important (Bisson 2000; de Barros 1986, 1988; de Maret 1980; Neaher 1979; Rowlands 1971; White 1969). Study of the political context of craft production gained momentum beginning in a widely cited volume on crafts, exchange and complex societies (Brumfiel and Earle 1987; Friedman and Rowlands 1976; Peregrine 1991). However, by far the most influential analytical framework for the anthropology of craft production was provided by Cathy Costin (1986; 1991). Recent inter-disciplinary contributions continue to use (or struggle against) her terms (Flad and Hruby 2007).

Thesis. The four points for middle-range societies I emphasize here are structured using Costin's parameters. First, the *context of production* ranges from fully independent craft production to production fully attached to an elite (Brumfiel and Earle 1987; Earle 2002; Sinopoli 1988); the relative *regional concentration of production* facilities can range from total regional concentration of craft production to regional ubiquity (Harding 1967; Rowlands 1971:214-15). The *scale of production* ranges from a single individual to factory production, although factory production is an element of a wage economy, and not found in middle-range societies. Finally, the *intensity* of crafting ranges from part-time in addition to subsistence production to full time, with all subsistence obtained through exchange.

An example can highlight what these features describe in ethnographically recorded societies. The Sio potters in the Vitiaz Straights exchange network east of the island of Papua New Guinea, are an example of relative concentration (Harding 1967; Sahlins 1972). Due to the heterogeneous distribution of starting materials (clay), they are the only pot producers in an extensive network of exchange between several islands and ethnic groups. Nonetheless, the Sio only work part-time as potters. They are primarily agricultural producers, and are not dependent on other groups for food staples. Production occurs at the household level only, fully independent of any political economy.

Relevance. Craft production has been an important component in models of political economy for middle-range societies since the 1970s (Frankenstein and Rowlands 1978; Friedman and Rowlands 1976). Arnold (1995:89) suggests that craft production can also be at the center of ‘marginalization,’ the process by which elites develop control over labour and its products (Gilman 1981; Gosden 1989; Hayden 1995). The finished copper objects were a form of tribute in one area of the Kingdom of Kongo, an important example used in Frankenstein and Rowlands’ model. D’Altroy and Earle (1985) described it as one form of tribute in chiefdoms: ‘wealth finance.’ Earle suggested that the production of precious objects such as bronze and gold might be more tightly controlled by an elite, making others in the system dependents (Earle 1997; Brumfiel and Earle 1987).

DIMENSION 6: DEMOGRAPHIC SCALE

Research history. Although resource stress is often cited as providing the upper limit on population aggregation, some scholars have also focused on the stress produced by human interaction alone: I focus only on this latter form here and the former under Dimension 7, ‘Intensification of food production.’ The correlation between high population and other measures of complexity has been observed statistically for over fifty years (Carneiro 1967; Ember 1963; Naroll 1956). Some cultural ecologists in the 1960s and 1970s used rich ethnographic sources in New Guinea to weigh in on how this relationship worked (Brown and Podolefsky 1976; Forge 1972; Rappaport 1968). Gregory Johnson (1982), an archaeologist, combined information theory and a set of ethnographic data to provide calculations bearing on why societies of certain organizational types do not breach particular population levels (but see Bandy 2004; Brumann 2000). Here I use some of the conclusions that bear on populations assembled within a single locus.

Thesis. The reason for demographic stress is the accumulation of potential face-to-face interactions (Rappoport 1968; Johnson 1982). Consider the relationship between people and pigs (Rappaport 1968:116):

> If twenty men, for example, each own one pig and have one garden, there are 400 possibilities for pigs to cause disputes between men by damaging gardens. If the number of men is raised to forty, each of which still has one pig and one garden, the number of possibilities for disputes has increased to 1,600, other things being equal. Likewise, doubling the numbers of unmarried males and unmarried females also, perhaps, more than doubles the possibilities of women stealing and other dispute-producing incidents. Sources of irritation thus increase at a greater rate than population size. If population increase were taken to be linear, the increase in some causes of dispute, if not actual dispute, might be taken to be roughly geometric. It might even be possible to find some way to express mathematically an "irritation coefficient" of population size.

The message here was that a village of forty men and forty pigs provides 1600 good reasons to live away from other people. Demographic stress is prevented by segmentation, which reduces potential interactions (Johnson 1982). Scalar stress can be thought of as 'high' at a 125 person gathering with the heads of extended families bearing the brunt of interaction. A review of data on population and segmentation in New Guinea villages led Johnson to argue that local groups averaging about 250 people were common if they were represented by four clans; the number of clans represented in a local group generally scaled with population. Although we do not know the precise reasons for it, however, multiple case studies suggest that beyond about 500 people at a single locus, only a permanent hierarchical decision-making body permits successful integration (Brumann 2000; Feinman and Neitzel 1984:67; Forge 1972; Johnson 1982; Keene 1991; Naroll 1956; Upham 1990:12).

Relevance. 'Population growth', in combination with other parameters, has been a prime mover of changes in social complexity for a long time, but often based on the requirement of increasing food production (Binford 1968; Sanders and Price 1968). A perspective based more or less on scalar stress was offered by Wright and Johnson (1975) to suggest that populations exceeded the information processing capacities of pre-state Uruk, resulting in structural changes and the evolution into a more complex administration. Johnson (1978:100) developed the logic further. Given a set of conditions, his model implied that a 'selective pressure' may usher in ascribed status and inheritance rules (ranking) at the same time as it does for vertically specialized decision-making. For Carneiro (1981), it was population growth and warfare driving the competition for scarce land. Survival fell only to the best organized and most populous military. The combination between population aggregation and the harnessing of inequalities in the exchange of rare goods was the critical formulation in Feinman's (1991) account for state formation in Oaxaca.

DIMENSION 7: INTENSIFICATION OF FOOD PRODUCTION

Research history. Intensification of agricultural production describes the addition of inputs – capital, labour or skills – into a parcel of land up with incrementally smaller gains[25] (Brookfield 1972:31). In many cases additional inputs substitute for land in a given area. In other cases, bringing low quality land under cultivation that requires additional labour or capital, or produces lower or less reliable yields constitutes intensification. Boserup (1965) argued that the growth of population fuelled this process. Others have focused on social, political and environmental reasons (Bender 1978, 1985; Brookfield 1972; Brumfiel and Earle 1987; D'Altroy and Earle 1985; Earle 1977, 1991; Friedman and Rowlands 1976:207-17; Geertz 1963; Gilman 1981; Gilman 1991; Halstead and O'Shea 1982; Hayden 1995; Sahlins 1972). Given that intensification in general is understood most easily through a particular case and local measures, I focus here on the relevant literature for prehistoric Europe (Bogaard 2004, 2005; Bogaard, et al. 2007; Bogaard, et al. 2000; Charles, et al. 2002; Halstead 1987, 1995a; Halstead and Jones 1989; Jones 1983, 2005; Jones, et al. 2000; Jones, et al. 1999).

Thesis. The possibilities for intensification to state B depend on the starting cultural conditions and technological availability of state A (Boserup 1965; Brookfield 1972). The starting conditions of food production in the European Neolithic probably resemble certain forms of garden agriculture observed ethnographically (Bogaard 2004). The introduction of traction animals raises the output per unit labour-hour of this system but has different labour scheduling and incurs costs in efficiency of seed and land use

[25] Incrementally smaller gain is otherwise known as the "economic margin."

(Halstead 1995). The transition to this intensified production is significant, however, because labour scheduling under plough agriculture relieves a section of the population from having to engage in agricultural work.

Relevance. Intensification is widely believed to be a critical component of changes in increasing social complexity. The process is tightly integrated with other changes in complexity because the change in labour and land availability drastically affects the solutions people can employ under conditions of conflict. Because degrees in intensification depend on the economic margin – a moving frame – an impetus for technological development and strong land degradation can result when demand is high enough. Boserup (1965) considered social change to be a reaction to the diminishing returns of population increase. Most anthropologists, however, have stressed the social motivations for intensification and the feedback influence it can have on the wider system.

Many also stress that once storage is possible, the intensification of production can be increasingly usurped by elites for their purposes (Brumfiel and Earle 1987; D'Altroy and Earle, 1985; Earle 1977, 1991; Gilman 1981, 1991; Friedman and Rowlands 1978:207-17; Johnson and Earle 1987; Geertz 1963; Halstead and O'Shea 1982; Hayden 1995; Childe 1951: 97, 107). When one segment of a population is indebted to another – for example, a village smallholder to a local leader's family – the indebted are often driven to produce more without ever restoring the balance (Bender 1978, 1985; Spielmann 2002). Greater surpluses free up more people to engage in specific kinds of specialized production and also decreases the variance of productive output further, enabling a degree of stability by having common storage coffers, but with unequal benefits (Halstead and O'Shea 1982).

DIMENSION 8: REGIONAL CONSOLIDATION

Research history. I define regional consolidation as the integration of multiple settlements under enduring hierarchical leadership. The settlements do not need to be permanent, but must be modular and not sub-components of seasonal group fission; the definition therefore excludes confederacies and can be extended to nomadic groups. Such polities were identified as ‘Group A’ by African ethnographers in the 1930s (Fortes and Evans-Pritchard 1940:10-11). This regional form of integration was identified in South and Central American as ‘politically organized chiefdoms’ (Oberg 1955:484-85). Oberg’s definition was subsequently used by Carneiro (1970, 1981). These early classificatory exercises provided a platform for the conceptualization of regional political consolidation for archaeologists, notably Peebles and Kus (1977), Steponaitis (1978, 1981) and Wright (1977, 1986, 1994). Tribute, or ‘mobilization’ of resources and labour in support of a political hierarchy, has also been a central concern in the study of regional consolidation (Barker 1999; Earle 1977; C. S. Peebles and S. Kus 1977; Steponaitis 1981; Welch 1991; Wright 2000)

Thesis. One indication of regional consolidation is the aggregation, rather than dispersal, of populations (Forge 1972; Jones 2004; Rowlands 1972; Taylor 1975:72; Tuzin 2001). This describes people living in closer quarters for whatever reason, either with settlements nearer to one another, or simply more population in larger settlements. A low level ‘settlement hierarchy,’ however, does not require that a social hierarchy existed between settlements. If most settlements are small but there is a single large outlier, there are potentially several explanations, including a superior catchment, an greater interest in security in some part of the region, a point of seasonal aggregation, or horizontal movement over time. When regional political consolidation does occur, however, tribute collection – on a spectrum of intensity – is a common feature of middle-range societies (e.g. Steponaitis 1978; Taylor 1975; Wright 2000). When enough people aggregate at a regional center, food tribute will be *required* to sustain the population (Brumfiel 1976; Steponaitis 1981). Moreover, the spatial layout of a regionally consolidated polity will evolve in response to tributary requirements and external political constraints (Hally 1999; Steponaitis 1978, 1981).

Relevance. Many consider the emergence of tributary hierarchy as a supra-village consolidation to be the most significant leap in a socio-political evolution of inequalities (Carneiro 1981; Kristiansen 1991; Oberg 1955; Service 1975). This is with good reasons, because once it becomes accepted in a cultural setting, it can become self-sustaining. Despite the 'cycling' between one and two tiers in a hierarchy documented for many areas (Anderson 1994; Wright 1994), strong regional political hierarchies can prevent local splinter factions. Elites of the Kayan of central Borneo, for example, intermarried across communities, making it impossible for commoners to leave for another area (Rousseau 2006:174-5). Therefore, crossing into the realm of supra-village hierarchy, tributary relationships, and inter-village elite marriages makes it difficult to return to autonomous village life even if commoners have decided that they would like to opt out. Moreover, once two levels of regional hierarchy are present, the system is only an additional level short of the hierarchy that generates a state (Flannery 1999b; Wright 1986).

CONCLUSION

In this chapter I offer eight different social dimensions that can be used to build a model of middle-range societies and track changes in their organization over time. These social dimensions serve to bind and constrain change in middle-range societies as much as they provide opportunities for internal evolution or metamorphosis through contact with external social networks. While it is my hope that this summary is useful for others investigating variability and change in middle-range trajectories, I have limited my discussion to features and models most relevant for my particular study.

The purpose of providing ethnographic examples here is not to find the 'right' analogy for ancient people in the Bronze Age, but to illustrate a range of food production, exchange, and demographic issues and isolate the mechanisms through which these social dimensions operate. A single marker of hierarchy in our data should not lead us too quickly to assume it controlled all facets of life. The data may suggest opposing trends as well, including equalities or freedoms we shouldn't overlook. Mixed indicators are perfectly within the range of the culturally normal. Once this is understood, we should not assume that archaeological variables pointing in different socio-economic directions indicate a methodological failure. On the contrary, they might represent a real cultural pattern.

Nonetheless, I don't advocate the focus on idiosyncratic historical features or cultural contradictions at the expense of larger issues. The social dimensions offered here, if used together, provide a strong framework for comparison with societies and trajectories in other times and places. The framework allows us to evaluate the strength of the low-level evolutionary hypothesis provided in the beginning of this chapter and further refine it. With time, such hypotheses become empirically supported in archaeological sequences rather than ethnographic observations. The most common tempos and cycles of change can be mapped out. Social features that emerge gradually in small increments can be contrasted with changes that are fundamentally transformational.

This greater evolutionary understanding can only take place specifying the dimensions involved in social process and using tighter archaeological measures for monitoring change within them. For this reason, I have provided several theses in this chapter that will underlie the archaeological indicators developed in this dissertation. Although social dimensions are broadly comparable between time and place, indicators are specific to historical circumstance and environments. Therefore, in the next two chapters I build the environmental and cultural background for the Bronze Age sequence under investigation.

Chapter 4: The Geo-environmental Setting

Situating Bronze Age societies within the broad socio-dimensional space presented in the previous chapter still requires an adequate cultural ecological understanding for proposing specific indicators of social variables. Although intensification of food production is a social dimension comparable between societies, the particular empirical parameters – population, type of crop, and productivity – are grounded in different environmental settings.

Socio-economic characteristics of Bronze Age societies in the Carpathian Basin were conditioned by the broader geomorphology, climate, and vegetation of their environment. Mountains and major desolate features on the landscape separated people and promoted the divergence of cultural traditions. Particular resource concentrations such as ore quarries, fertile agricultural land, or rich hunting grounds may have been contested territories. Points on the landscape between eco-zones may have been areas of feasting and exchange. River systems at different times and places were probably both geographic barriers and the channels of contact and trade. In the following pages, I highlight the major aspects of the landscape at the macro- and micro-level required for understanding how people in the Bronze Age made a living.

This chapter is composed of two parts. In the first part, I outline the terrain and hydrology of the Carpathian Basin. After some introductory remarks on the antiquity and formation of major features of the Basin, I describe the Pleistocene evolution of the Great Hungarian Plain, and the visibility of its remains on the current terrain of the Körös area. Substantial construction projects straightened the major rivers of the Plain in the 18^{th} and 19^{th} centuries. The prehistoric landscape must therefore be entirely reconstructed. I provide a somewhat detailed discussion of the geomorphology, soils and river network of the Holocene Körös Basin to build a plausible model of the prehistoric landscape. In the second part of this chapter, I identify the critical mineral resources available to Bronze Age peoples, and to the extent possible, describe the living landscape that connected the villages of the Körös region to their neighbours. The basic features of the Körös environment must be understood for the analyses in later chapters to be intelligible.

PART I: TERRAIN AND HYDROLOGY

The Carpathian Basin contains a flat plain surrounded by a ring of mountains with three major openings promoting contact with the continent: one to the northwest through Austria, one pass to the northeast leading to Upper Poland and the Ukraine, and one or two principle routes to the Balkans in the south of the Basin. These apertures have been important sources of contact with different cultural traditions and technologies. Many basic similarities in productive economy and technology otherwise characterize people living in the Carpathian Basin during prehistory at any given time. For this reason it is sometimes thought of as a 'laboratory' by archaeologists studying cultural or structural changes in prehistory. Few geographic obstacles inhibit interaction in a vast basin, yet different patterns of interaction are clearly present at different points in time.

The Carpathian Basin

The Carpathian Basin can be divided into three broad areas – the arc of mountains which forms the basin's rim, the forested Transdanubian mountains and basal environments of the mountain belts, and the Great Hungarian Plain (Nagy Alföld). The Alpine, Carpathian and Dinaric mountain ranges were formed as early as the Oligocene, and were more or less completely formed by the Pliocene (Fig 4.1).

The basin as a morphological feature came into being during the late Tertiary (Pécsi 1970). Lake Pannon was a long lived lake dating from the Middle Miocene (12.0 mya) to the Early Pliocene (4.5 mya) (Bérczi and Phillips 1985; Magyar, et al. 1999). It achieved its maximum extent by 9.5 mya and then began to retreat, forming the Little Plain (Kis Alföld) basin and the northeastern part of the Great Plain by 9.0 mya. The recent landscape began to form with the deposition of alluvium during the lake's final retreat in the Early Pliocene.

The Nyírség alluvial fan dates to the Pleistocene and was deposited by the drainage systems of the Tisza-Szamos-Kraszna and the Bodrog (Pécsi 1970:15). Its highest rise is 186 m above sea level and it surface is covered with re-deposited water lain Pleistocene loess (Figure 4.2). This forms the major northeastern route into and out of the Basin. The Little and Great Plains subsided during the Pliocene and Pleistocene, while marginal areas of the basin rim still underwent uplift. The Danube and Tisza rivers incised Pannonian alluvium into a complex drainage pattern, reacting to uplift, subsidence, and periodic climate change (Gábris and Nádor 2007). The Danube route today travels across the Little Plain in the northwest and leaves the Basin through the Iron Gates in the Southern Carpathians. Both entry points were important for cultural contact in the Bronze Age.

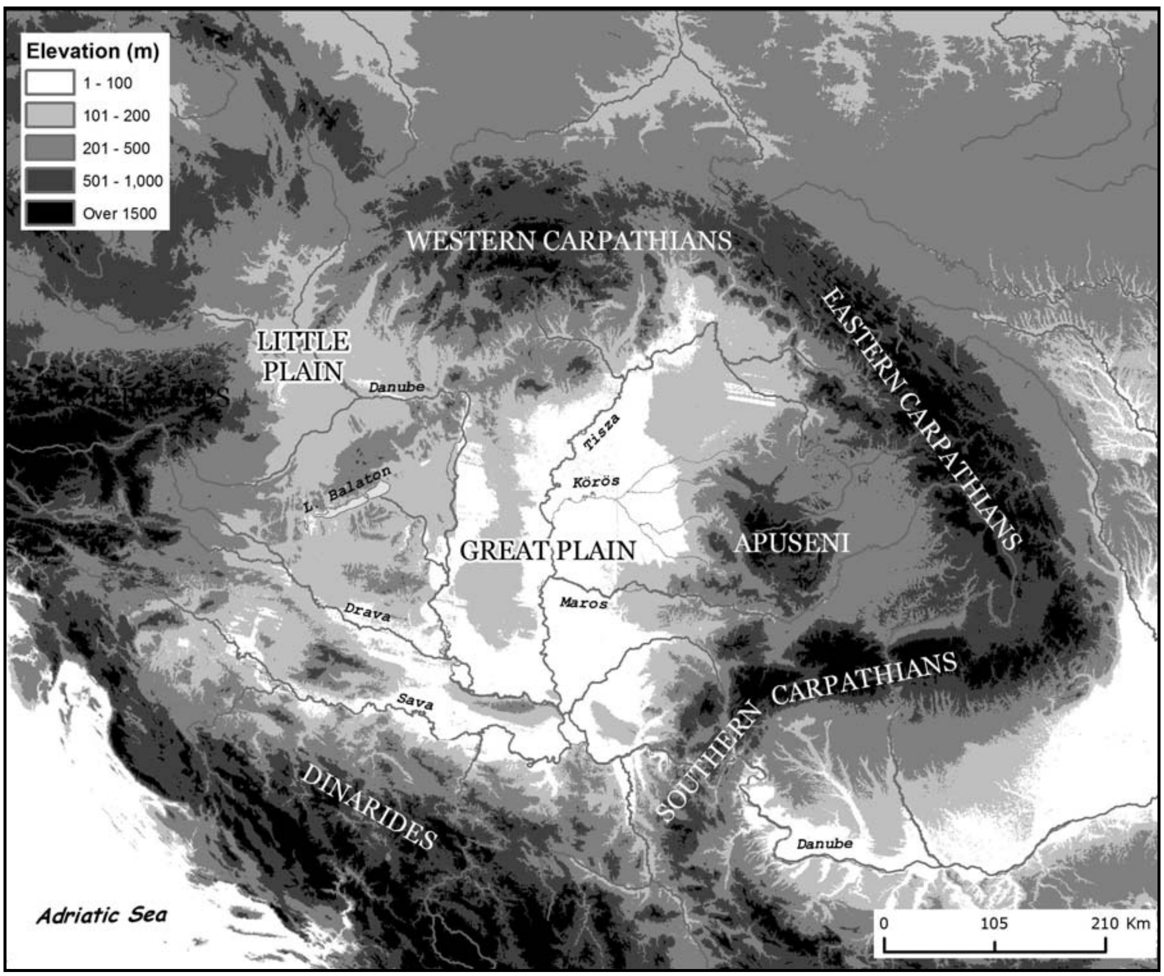

Figure 4.1. The major components of the Carpathian Basin.

Late Pleistocene evolution of the Great Hungarian Plain

The Great Hungarian Plain is an important culture area that at many points throughout prehistory exhibits an strong degree of cultural similarity, probably maintained through contact and exchange. The Great Plain occupies an area of about 100 000 km^2 and is among the largest alluvial plains in Europe, though only 50 000 km^2 belongs to Hungary (Gábris and Nádor 2007:2761; Pécsi and Sárfalvi 1964:87). It is a true plain and more uniform than other regions of the Carpathian Basin, but is not everywhere structurally and morphologically distinct from its surroundings (Figure 4.2). A great fan of alluvium and aeolian deposit – the Danube-Tisza Interfluve – divides the Danube and the Tisza, surmounting the floodplain of both rivers by 50 m. The floodplains of the Danube and Drava form the western and southwestern limits of the Great Plain. With the exception of the lower third (south of Szolnok), the Tisza floodplain is less well defined than the Danube.

Deep-coring by the Hungarian National Geological Institute (*Magyar Állami Földtani Intézet*) in the 1970s indicates that during the second half of the Pleistocene, the Tisza migrated back and forth along a NE-SW axis (Borsy 1989; Franyó 1977, 1981; Gábris and Nádor 2007; Mike 1991; Nádor, et al. 2007; Rónai 1982, 1985). Before river regulation, the central and upper Tisza underwent frequent avulsion, the abandonment of an old river channel and the creation of a new one. This left a series of oxbows in its floodplain (Pécsi 1970:19). After the floods, the deeper parts of the floodplain remained waterlogged, maintaining marshes and swamp-forests, poplar groves, and peat bogs. These areas became important locations for settlement during prehistory in many areas of the Plain. Such conditions, typical of the landscape surrounding the Tisza, occur in some areas of the lower Körös basin such as the Dévaványa Plain, but the meandering Holocene channels and alluvial fans are the most common landform.

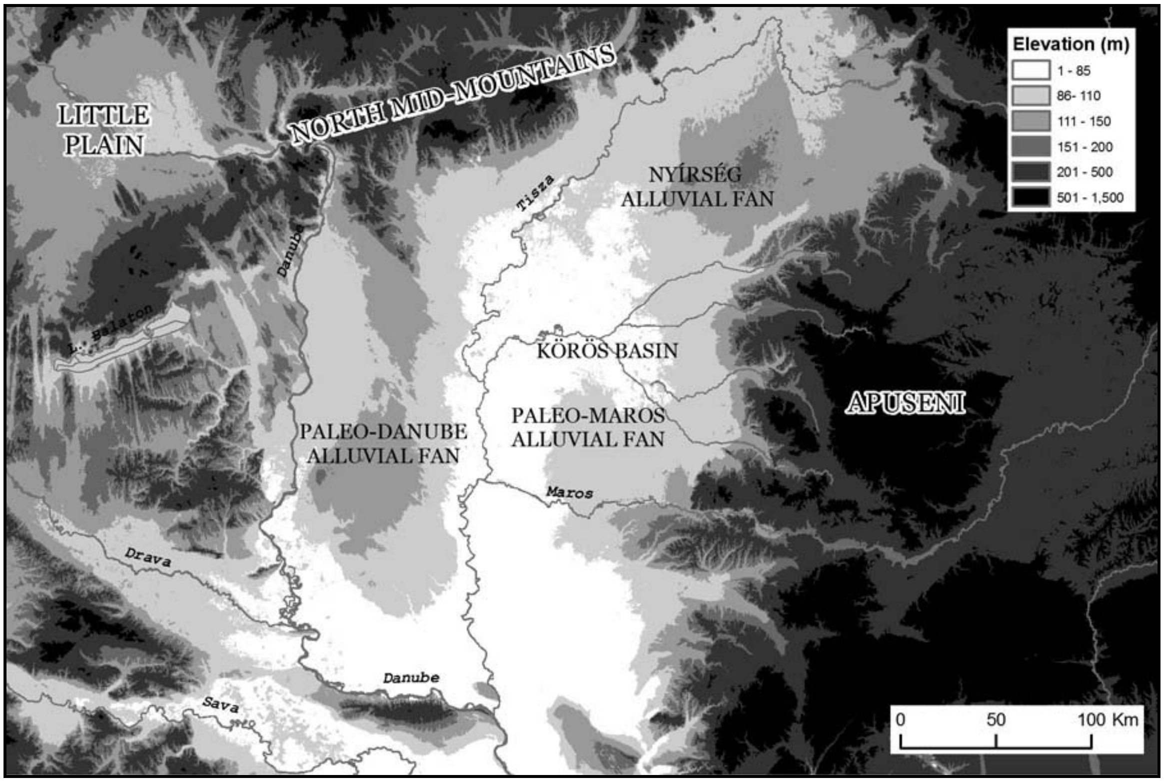

Figure 4.2. The Great Hungarian Plain and its major components. Elevation breaks are exaggerated at low altitudes to highlight subtle features of the plain.

In the Körös basin, the Fekete and Fehér Körös were braided at the end of the Pleistocene, possibly related to accelerated uplift in the southern Apuseni mountains (Nádor, et al.:2007:11). In fact, there is increasing evidence that many of the known channel changes at this time were influenced by active tectonic features rather than high energy (Nádor, et al. 2007; Schumm, et al. 2000; Timár 2003). The Maros moved south at the end of the Pleistocene, depositing a great deal of alluvium along the way (Mike 1991:660; Somogyi 1969:309). Much of this alluvial fan hardly rises above the actual floodplains of the river. The Maros alluvial fan includes channel scars probably dating to the Pleistocene, but topographic highs also represent aeolian features. The deep cores also suggest that the Tisza had left the Körös Basin by the early Holocene and the major arms of the Körös had more or less taken their current place on the landscape {Mike, 1991 #3220:662; Nádor, 2007 #3352).

General hydrology and soils of Körös basin

Understanding the hydrology and soils of the study area is critical for modeling agricultural production and intensification later in this dissertation. Hydrology is likely the more important of the two, and in later chapters I will be using a reconstruction of Holocene river network derived primarily from topographic maps overlaid with wetland areas of the Middle Ages. I therefore review the grounds for doing so in some depth. The characteristics and distribution of major soil classes are important background for my approach to modeling agricultural production in later chapters.

The Körös alluvial fan is actually a system of coalesced alluvial fans, mostly sand covered with river-laid silt. Little of this fill dates to the Holocene (Nádor, et al. 2003). The basin is almost entirely flat, with terrain relief of 100 to 85 m between the Romanian border and the confluence with the Tisza some 70-110 km downstream. The basin's average height is 84-85 m above sea level, and represents one of the lowest parts of the Pannonian Basin {Nádor, 2003 #3358:2958}. Floodplain gradients range from about 0.3 to 0.5 m/km, strongly impacting stream hydrology and sediment transport capacity.

The most significant tributaries in the basin today are the Körös (Fehér, Fekete, and Sebes-Körös) and Berettyó, all originating in the western slopes of the Apuseni mountains of Transylvania (Fig 4.3). The Fehér- and Fekete-Körös rivers drain into the Kettős-Körös and the Kettős- and Sebes-Körös merge to form the Hármas-Körös. This river, the 'Triple Körös' drains into the Tisza once in the middle of the Plain. The Körös basin boundary in the north follows the extents of two great wetlands, the Nagy-Sárrét and Kis-Sárrét. In the south, the boundary is the northern extent of the Maros fan, rising several meters higher in elevation. The whole drainage area of the Körös-Berettyó region covers more than 27 000 km^2 and roughly half of it, 12 931 km^2 falls into present day Hungary (Dóka 1997:13-14).

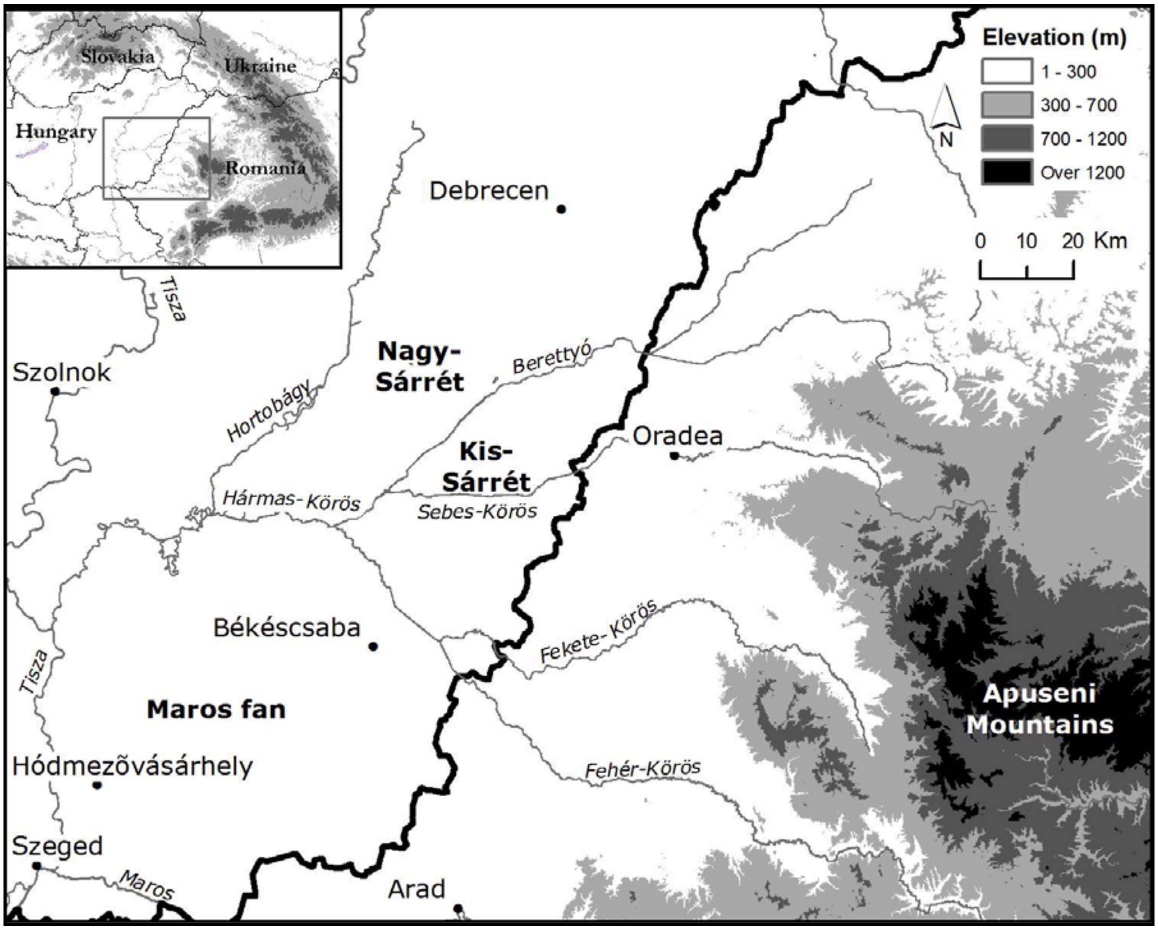

Figure 4.3. Modern hydrology in the lower Körös basin with national boundaries and major cities.

For building indicators of regional productivity, in Chapter 6 I will be dividing land into 'farmable' and 'unfarmable' classes. The soils of the lower Körös basin fall into the chernozem (well-drained prairie soils with thick A horizons), solonetz (salt-affected soils) and hydromorphic (poorly drained with prominent redox features in the subsoil) soil groups (Frolking forthcoming). Soils in the broad flats and depressions of the basin are generally hydromorphic meadow clays' (*réti talajok)* (Figure 4.4). Meadow clay can be described as "black, fine, dense, generally featureless and homogenous clay" (Frolking, *forthcoming*). It forms under wet conditions, from seasonal flooding, a high water table, standing water, or permanent marshes (Botyánski *pers.comm.*). The meadow soils in the Vésztő area have silty-clay loess parent material, with highly expansive clays, making them impermeable when wet, and shrunken and cracked when dry.

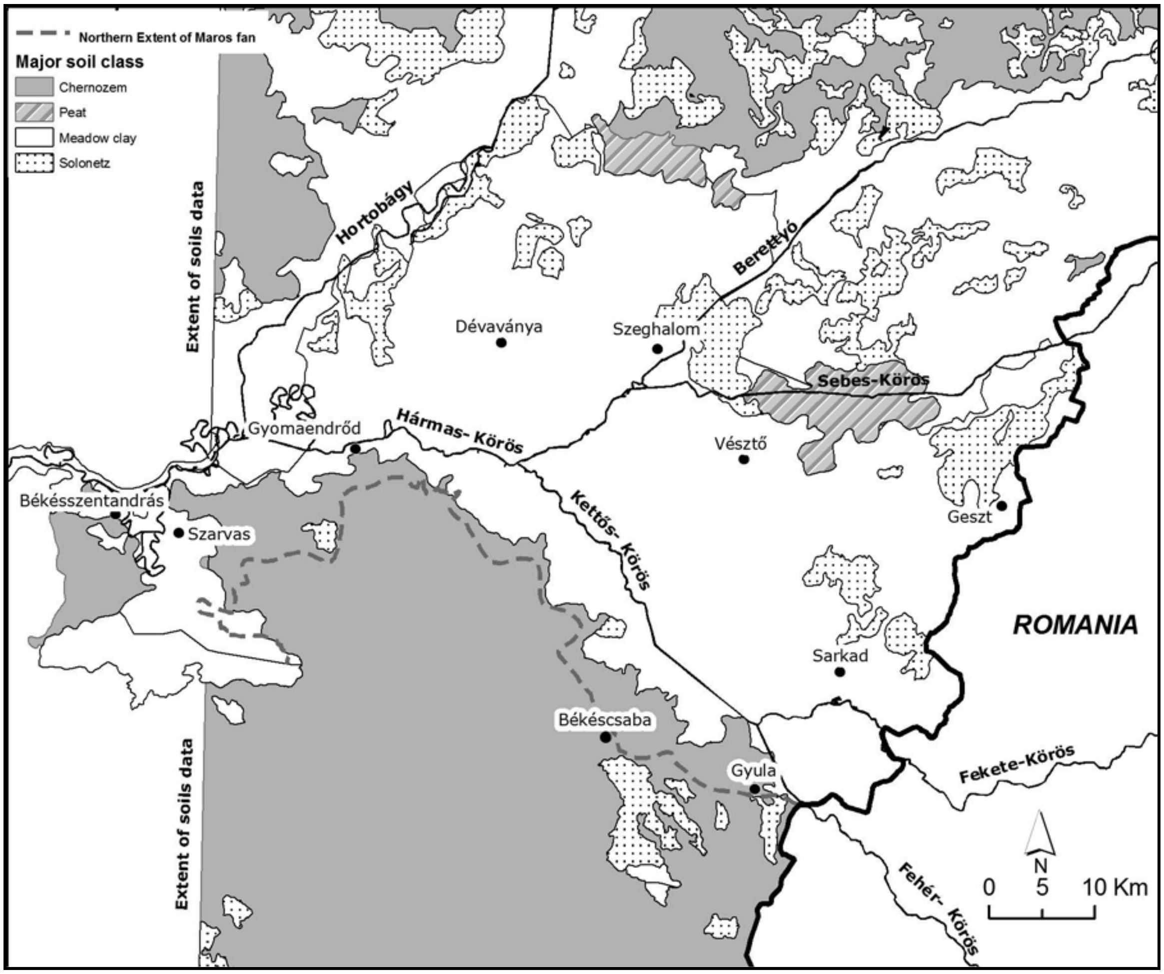

Figure 4.4. Major soil classes in the lower Körös basin at the 1:100 000 scale.

Solonetzes are the second most common soil type in the basin. They contain a high salt content and form when salty groundwater is stagnant and evaporates up through the soil during the hot months. These soils occur at elevations between chernozem and meadow clay; they are good for pasture but are for the most part unfarmable. Peat is acidic and a waterlogged soil typical of marshlands where the groundwater is at the surface for most of the year. Like solonetz, it is un-cultivatable under most circumstances. Chernozems are the least common soils in the Körös basin, although they are found on most parts of the Maros fan. These 'black soils' contain a high percentage of humus and are superior for farming.

Figure 4.4 shows soil types from 1:100 000 maps, grouped by major class (chernozem, meadow clay, solonetz, and peat). Though the particular class of soil could have changed over the past 4000 years (e.g. ‘terrace chernozem’ to ‘meadow chernozem’), if the basic hydrology of the region has been stable during the Holocene it is unlikely that the root class ‘chernozem’ would have changed (e.g. to ‘meadow clay) (Botyánski, *pers. comm.*). This gives a general sense of land-use potential across the Körös basin and can inform settlement patterns at the regional level.

The precision of these maps precludes using them for micro-environments and settlement catchments, however, where subtle topographic changes (under 0.5 m) have major consequences for soil formation. Typically, two or three of these categories can be found within a single hectare around a Bronze Age village in the Körös basin when explored on a 1:10 000 scale map. The geomorphology of particular channels and a reconstruction of the channel network during the Holocene explains why this is so.

Geomorphology and the Körös basin Holocene hydrological network

Our most detailed picture of small-scale Holocene soil and hydrological evolution comes from the Sebes Körös area (Frolking, *forthcoming*). Field investigations near the town of Vésztő focused on identifying paleochannel remnants with peat deposits, characterizing local stratigraphic and pedologic relationships, and establishing pre-canalization channel morphology and floodplain stratigraphy. A number of core sites were sampled with an Oakfield hand probe over a two year period. The meadow clays in the Vésztő area appear to be derived locally from the transport of sediment to topographic lows, a result of aggrading topographic highs rather than the melanization of a chernozem-like A horizon. The source of meadow clays could also be transport by overbank stream flow, as deposits from field testing both away from large channels, and adjacent to the Sebes Körös, appear very similar. The channel width of the Sebes Körös at Vésztő-Mágor was 25 m, small considering its basin drainage area (4300 km^2). The high channel sinuosity coupled with the extremely low floodplain gradient would have resulted in low velocity and minimal overbank discharge. Hydraulic estimates suggest that under virtually all conditions, evaporation would have been more significant than channel drainage for removing water from the basin. The implication is that in most cases channels were stable throughout the

Holocene. Stability means we can use pre-regulation maps for reconstructing wetlands, assuming no drastic changes in humidity.

Complementary data were gained by the reconstruction of the Holocene channel network (Gyucha, et al. forthcoming). The reconstruction is relevant for any discussion about travel or trade routes. Topographic maps, aerial photos, and historic pre-river regulation maps were used to reconstruct the exact location of river channels for a section of the Körös basin. Pre-regulation meanders were recognized in these datasets, traced as vector polylines in ArcGIS 9.1, and overlaid with the archaeological survey (MRT) datasets. The reconstruction of the drainage network revealed several things.

First, settlements from the Neolithic to the Middle Ages tend to cluster around river channels. Dozens of multiple component sites are found all the way up the same meander, corroborating the conclusion of stability derived from geomorphological studies in the Vésztő region.

Second, anabranching river channels, a network of multiple channels that divide and reconnect, characterize the lower Körös basin. Anabranching channels are drawn on many of the historical maps of the Hapsburg military surveys (Figure 4.5). This is also evident at a large scale in maps drawn of the hydrological network and wetland areas for the Middle Ages (Györffy 1966) (Figure 4.6). The Sebes Körös in the northeast, and the Fekete and Fehér Körös in the southern part of the Körös Basin, all indicate that rivers split into separate channels but rejoined the network further along. The Fekete, Fehér Körös, Gyepes, and Kölesér all run together in the foothills of Romania.

Third, the reconstruction indicates essentially two different channel geometries; a thin channel with meander amplitude of around 200 meters, and a wide channel with meanders from 2 to 6 kilometres in amplitude (Fig. 4.5). Gyucha, et al. (*forthcoming*) interpreted these two patterns as Holocene and Late Pleistocene channels, respectively. The Pleistocene channels occur primarily in the Dévaványa Plain, the Maros fan and perhaps areas around the Kis Sárrét; they rarely integrate with the hydrological network of the smaller channels.

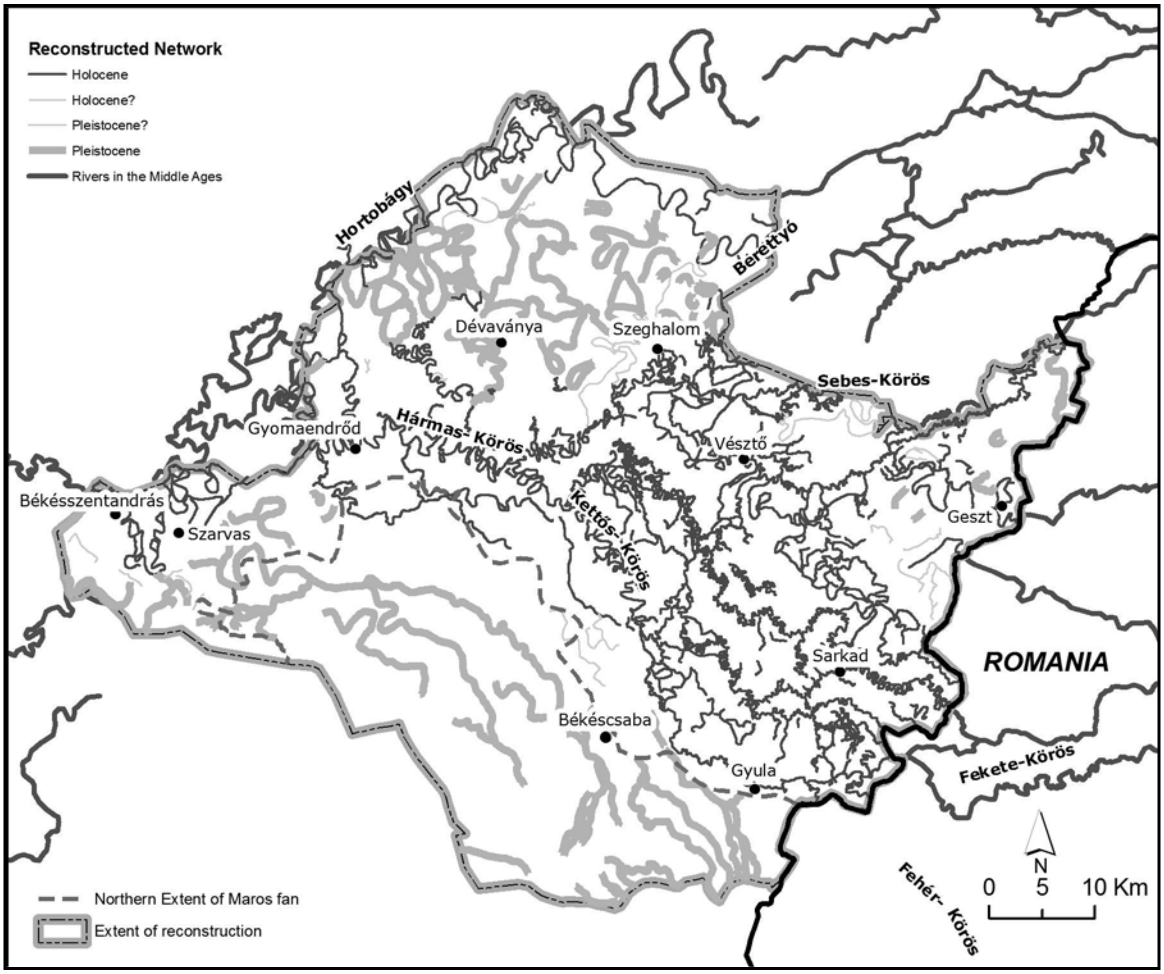

Figure 4.5. Paleochannels reconstructed in the study region. Within the extent of the reconstruction, the thin lines represent channels with Holocene geometry. The wide channels are most likely Pleistocene in origin. Thin lines of light grey could be either Pleistocene or Holocene. Anabranching rivers leaving the study area are drawn based on Györffy's (1966) maps.

Wetlands and flooding

Floods on the Tisza currently occur twice yearly, once in the early spring due to snow melt in the mountains, and once in the early summer (Pécsi and Sárfalvi 1968:48). The early summer flood is the more severe of the two, caused by rainfall and arises simultaneously on the Tisza and its tributaries. In contrast to this flooding regime, before regulation the Tisza region was prone to floods in early spring and in the fall (Huszár

(Huszár 1823)[26]. Lóczy (1988) records as much as 33 to 55% of the floodplain was inundated during spring floods, although modeling by Gillings (1995) suggests perhaps only 15% in his study area.

The potential for flooding in the Körös rivers is quite different than for the Tisza and its tributaries. The widely reported annual flooding of the Körös (Kosse 1979; Parkinson 2002b; Sherratt 1983) is called into question based on the recent field testing in the Vésztő area. Based on the channel morphology of the Sebes, for example, very little of the seasonal water in the Nagy and Kis Sárrét could have been transported there by channel flow (Frolking, *forthcoming*). These data suggest that there was not enough water in the system to cause the seasonal flooding of the landscape observed before river regulation. That massive wetlands or standing water contracted and expanded during the year is nonetheless not in doubt. The more likely hypothesis is that this expansion was the result of local precipitation events, not overbank transport. This implies that river levees in the Holocene were not overrun with water on a seasonal basis, and they were in most cases the driest parts of the landscape during the wettest times of the year.

[26] This is likely the occasional "third flood-wave' in October, mostly affecting the upper Tisza east of Tokaj (Pécsi and Sárfalvi 1968:48-49).

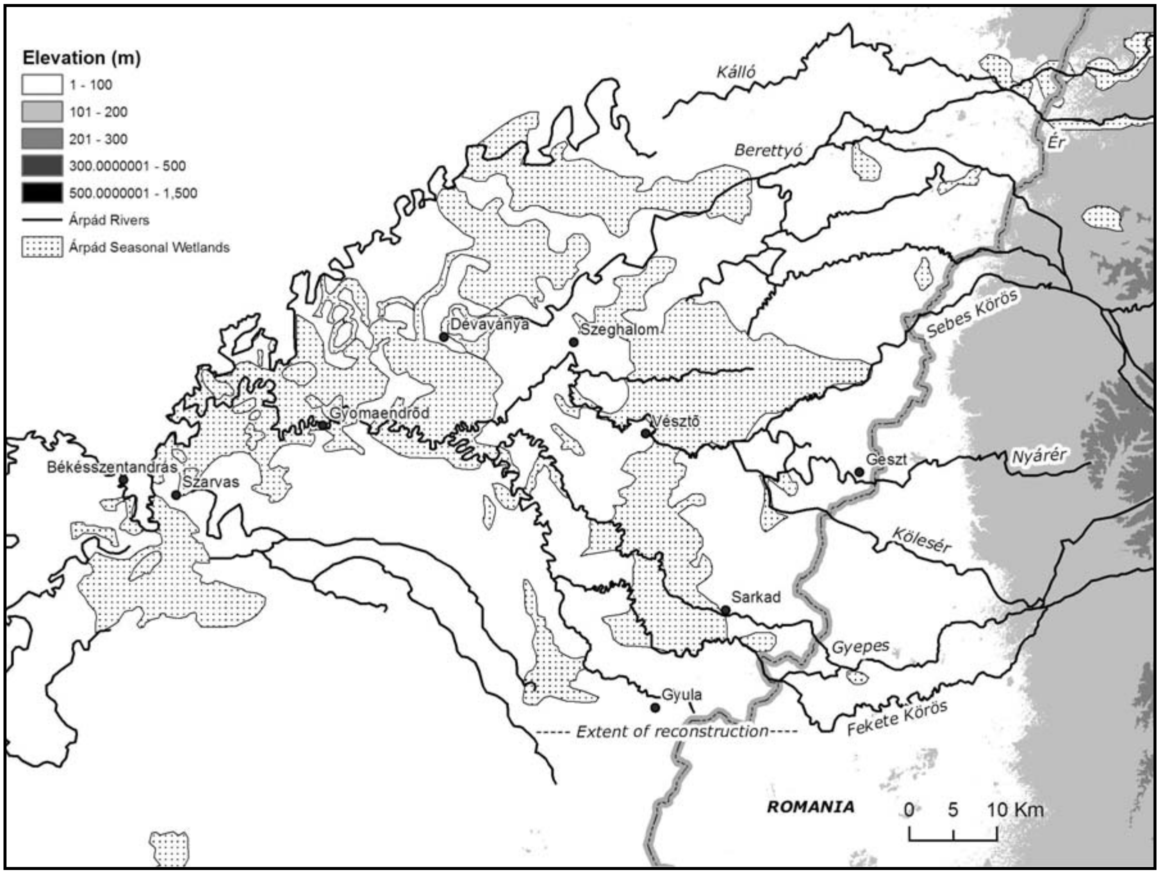

Figure 4.6. Seasonal wetlands and anabranching rivers in the Middle Ages.

Consequently, I use the Holocene network reconstructed by Gyucha, et al. (*forthcoming*) and the seasonal wetland distribution of the Middle Ages reconstructed by Györffy (1966) for overlay with settlement distributions in this dissertation. In the Körös Basin, due to the impermeability of its soils, an area of more than 1500 km^2 either permanently or seasonally held standing water before the 19th century. This is to a large extent simply a product of elevation (Tímar 2004). The two biggest wetlands, the Kis- and Nagy-Sárrét, covered a total of 1000 km^2 (Dóka 1997:27). When the MRT archaeological sites are overlaid with the distribution of pre-regulation wetlands, it is clear that with the exception of very high banks of Pleistocene meanders in the Kis Sárrét these areas were never inhabited (Gyucha, et al. *forthcoming*). It is likely that these wetlands extend back to the earlier Holocene. The wetland areas for the Körös Basin during the Middle Ages are presented in Figure 4.6. The precise extent of standing water varied from year to year.

Beginning in the early 19th century, the length of the Körös rivers in the territory of Habsburg-controlled Hungary was shortened by hundreds of kilometres as new riverbeds were dug and meanders were cut off. A massive levee-system along new riverbeds dramatically changed the natural hydrology. These constructions transformed possibilities for settlement and land-use.

Climate change throughout prehistory

Changes in climate during the Bronze Age do not currently appear significant enough to merit a promising position in the explanation of cultural change, but many questions about inter-regional variability remain. It is unclear to what extent the changes we *do* observe had consequences for prehistoric populations. Oscillations in climate are recorded primarily through temperature and humidity indicators (Figure 4.7).

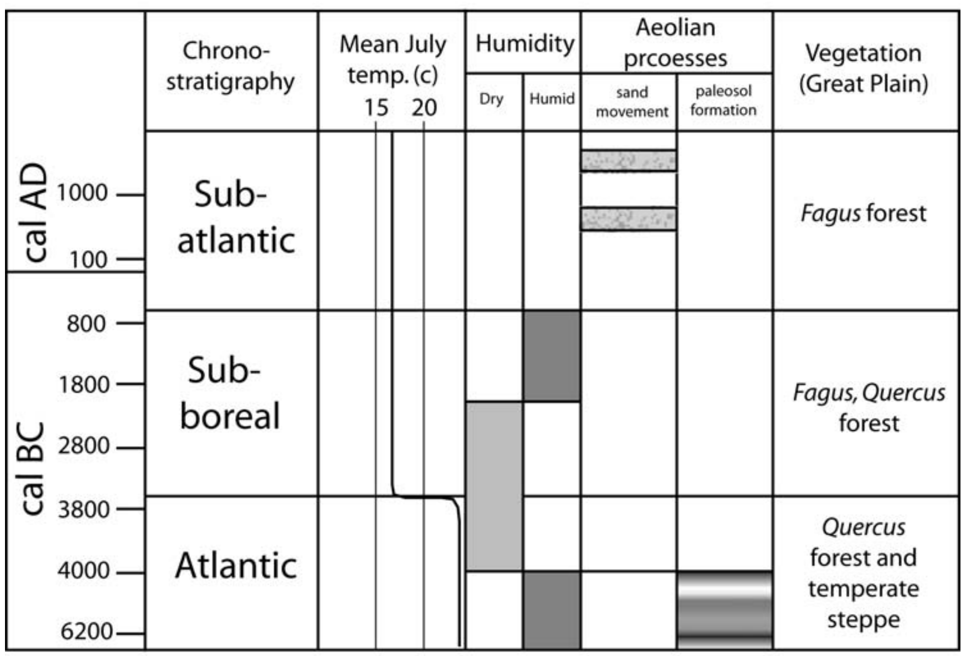

Figure 4.7. Holocene chrono-stratigraphy of the Pannonian Basin (modified from Gábris and Nádor 2007).

The Bronze Age falls within the Subboreal (3700-600 BC). A final cooling took place beginning at the end of the Atlantic (ca. 3800 BC), from mean July temperatures of 20-23 to 17-18 degrees Celsius (Nádor, et al. 2007:188; Sümegi and Bodor 2000; Sümegi, Csökmei, et al. 2005; Sümegi, Mucsi, et al. 2005). Dry conditions of the preceding Atlantic period continued throughout the first half of the Subboreal, but botanic, hydrologic, and geomorphic changes for Central Europe suggest a change to even cooler and wetter conditions beginning around 3000 BC (Starkel 1997).

There is intensive downcutting of river sediments beginning in the middle of the Subboreal, starting around 2000 BC, suggesting that the increase in humidity may have been relevant for anyone settling near rivers at this time. It is possible, however, that this increase in downcutting is also related to erosion from deforestation (Somogyi 1987)[27]. The increase in river discharge between 2000 and 1000 BC is corroborated by *Arvricola* (vole) data from the caves in the north Hungarian mountains (Gábris 1998:31). Caution must be applied when generalizing in the Carpathian Basin however, as there is no evidence of great temperature change between 8400-1500 BC from the heavily studied cores of the Bátorliget marshlands in the Nyírség (Sümegi and Gulyás 2004).

PART II: RESOURCES FOR INHABITANTS OF THE KÖRÖS BASIN

Minerals in the Carpathian Basin are found only in mountainous areas, so anyone living in the interior of the Great Hungarian Plain would have to obtain them through trade or long journeys. With the background fluvial and climatic history out of the way, a reconstruction of the immediate environment for Körös dwellers can now be provided. This background is necessary in order to understand why anyone would want to live in the Körös basin in the first place, why certain areas were more populated than others, and what kind of challenges may have faced people living in the area or travelling through. It is also important background for modeling local food production and understanding regional settlement patterning I explore later in the dissertation.

Mineral resources

Small quartzite pebbles are occasionally found in river channels, but otherwise starting material for stone tool production is absent from the Great Hungarian Plain. Prehistoric

[27] Clearance for pasture during the Copper Age has also been suggested to account for erosion in the Danube-Tisza interfluve at 4000-3000 BC (Sümegi et al 2005b: 109).

settlers in the Körös basin were over one hundred kilometres to the closest source (Figure 4.8). Raw material for stone tool production is found in the mountains and some lowlands surrounding the Great Hungarian Plain (Biró 1984, 1998). Volcanic activity in the Tertiary formed two varieties of obsidian found in the Northern Mid-Mountains. The first is transparent-translucent, dark black obsidian, termed Carpathian 1 (Slovakian). The second is non-transparent Carpathian 2 (Hungarian), with sub-groups including reddish brown, dark grey, and stripping. Silicaceous raw material also followed from the Tertiary volcanic events and is found in veins from the Danube bend into Slovakia, and up to the Ukraine and Romania. Hydroquartzite and limnoquartize, extremely variable in colour and texture and difficult to distinguish with the naked eye, are found broadly along the lowland hills of this region. Radiolarite formed during the Middle Jurassic is found in the mountains of Transdanubia north of Lake Balaton. A younger variety of radiolarite, from the Upper Jurassic, is found in the Mecsek mountains in southwest Hungary. Certain colour varieties of both types can be distinguished at macroscopic levels.

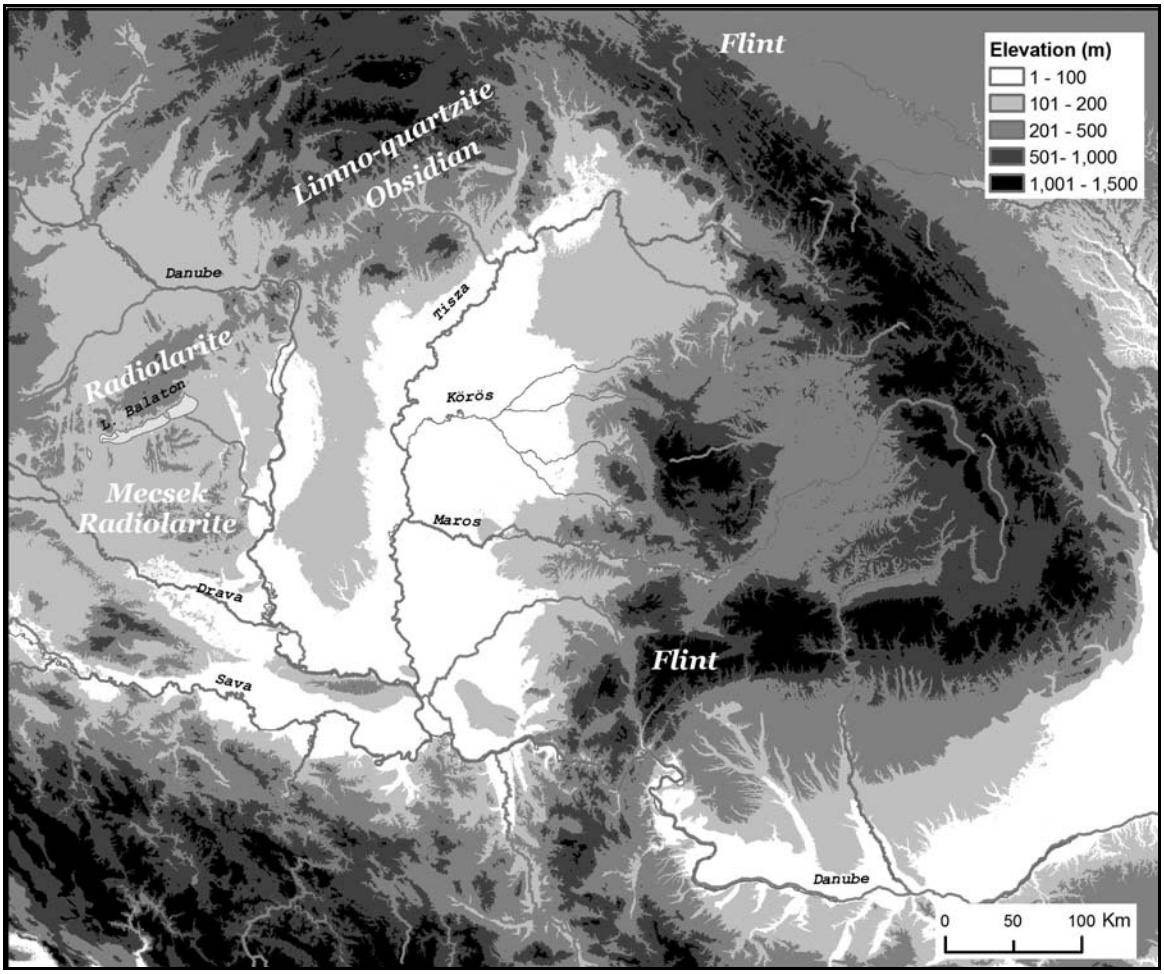

Figure 4.8. Raw material source areas in Hungary (after Biró 1998: 4).

Flints were also imported from the Southern Carpathians (Serbia and Romania) and the Northern Carpathians (Poland and the Ukraine). Some sources of Polish raw material, such as the Kraków flint and Chocolate flint, are well known and date to the Jurassic and Cretaceous period. The sources of southern flints are less well known, but are identifiable as 'Balkan flint' (commonly found with the Neolithic Varna and Gumelnițsa cultures) and 'Banat flint' (known only from archaeological sites of the southern Great Hungarian Plain). Granite, generally used for producing ground stone implements, came form multiple areas in the mountains but has proved difficult to source.

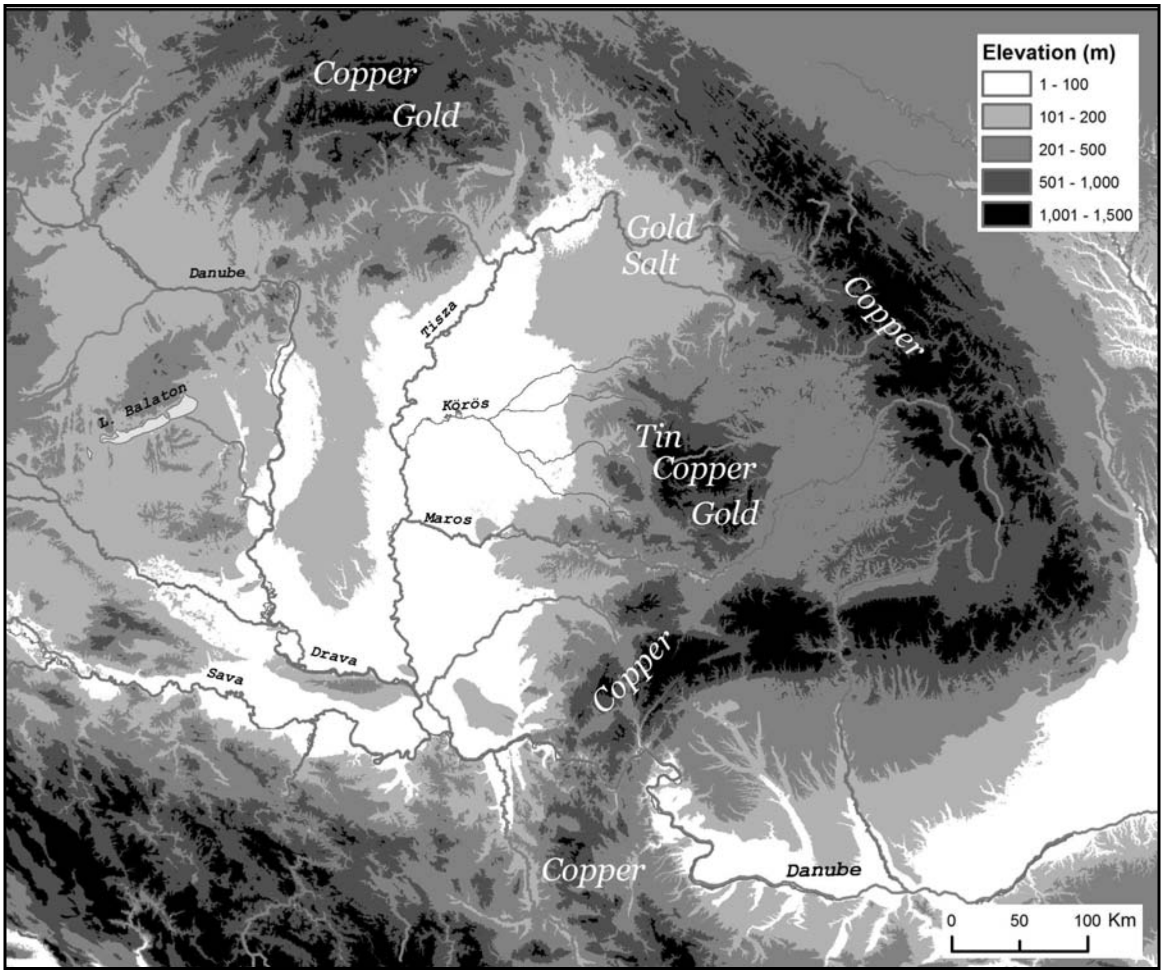

Figure 4.9. Mineral sources around the Great Hungarian Plain (Chernykh 1992:49-50; Schalk 1998).

Ore deposits usually get more attention from those studying the Bronze Age. The Carpathian Basin is surrounded by mineral-rich mountains that contain hundreds of discrete copper sources accessible from the surface (Berza, et al. 1998). There are three primary copper bearing zones in the mountains of the eastern Carpathian Basin. One range crosses northern Hungary and Eastern Slovakia, the second is a vast swathe of Transylvania and a segment of the foothills east of the southern Great Plain, and the third is located in southwestern Romania and western Bulgaria (Chernych 1992:49-50; (Földessy and Szebényi 2002; Schalk 1998). Tin and arsenic occur in copper deposits in both the Slovakian and Apuseni mountains (Papalas 2008; Schalk 1998). Native copper and copper oxides on the surface are conspicuous in colour and are found above 300 m a.s.l. in the Apuseni mountains. They would have been noticed by people living in these areas. Gold also occurs in many mountainous areas of Slovakia and Transylvania (Ardeleanu, et al. 1983:42; Schalk 1998)}. Finally, salt deposits and salt springs were likely exploited prehistorically although evidence for it is rare. The “salt road” in mountainous areas of Romania (the Sătmar Plain, the Oaş Depression, and Săpânța) is known from the Middle Ages, for example, but might extend back to the Bronze Age (Bader 1978:91).

Vegetation and fauna in the Bronze Age

Járai-Komlódi (Járai-Komlódi 1987:46) estimates that 85% of modern Hungary was forested before the Neolithic, while today’s forests cover only about 17%. These changes are a consequence of both natural cycles and human interference. He suggests that for the Great Plain in general, a mixed hornbeam-oak forest with a high degree of human interference characterized the Subboreal. Pollen cores from 1400 m a.s.l. in the southern Carpathians indicate beech/oak forests and some parkland steppe during the earlier Subboreal phase (Rösch and Fischer 2000). At the low elevations of the Körös basin, however, wetland areas may have more likely had a willow-poplar marsh forest (Figure 4.10). Birch-tree marshes found in protected areas of the southern Nyírség today are an indication of the density of vegetation in somewhat higher, better drained areas (Figure 4.11).

Figure 4.10. Willow-poplar marsh forest on an old paleo-channel in Vésztő-Magor National Park (photo by the author).

Figure 4.11. Low-lying birch-tree marshes on the southern Nyírség (Buka, et al. n.d.)

Reconstruction of the Bronze Age vegetation and fauna must be tempered by localized evidence for anthropogenic impact on the landscape of the Great Plain since the Neolithic. One of the most common forms of degradation is the removal of vegetative cover. There is evidence of heavy deforestation at the Körös site of Tiszapüspöki - Karancspart Háromág (at the Tisza-Hármas Körös confluence) as early as 5500 BC (Sümegi 2004b:331)[28]. There is certainly evidence of deforestation at the Vatya tell of Százhalombatta during the Early and Middle Bronze Age (Sümegi and Bodor 2000). A study in the Kelemér region, approximately 60 km north of the Great Plain finds that land degradation in the form of cyclical landscape burning began as early as the Middle Neolithic, and continued during the Copper Age and Bronze Age, co-incident with an increase in copper production (Willis, et al. 1998).

Nonetheless, no pollen coring in the lower Körös basin has yet been carried out. Consequently, our knowledge of the makeup and changes in vegetation during the Bronze Age is still speculative. Occasional natural or managed gallery forests along meander banks might be expected. Reeds would have been plentiful in areas of standing water and were likely used for house roof thatching; they commonly occur in Pleistocene oxbows seen on the Habsburg survey maps,. Wells, rather than slow moving tributaries were the likely sources of drinking water, a practice attested since the Neolithic (Sümegi, Csökmei, et al. 2005:150).

There is archaeological evidence from Maros sites suggesting that forests contracted between 2500 and 1400 BC. Wild animals such as red deer and boar would increase in density with an expansion of the forests, but the proportion of these animals decrease over the course of the Early and Middle Bronze Age from the Maros sites of Klárafalva and Kiszombor (Nicodemus n.d.-b). It is also possible that farmable areas decreased during the Subboreal due to a drop in temperature, but this also potentially reduced the risk of severe droughts and salinization, making agriculture less risky in some areas of the Plain (Szabolcs 1990). Potential benefits of wetter conditions would be tempered by the effects of wetter conditions on groundwater levels. Groundwater levels probably had an effect on settlement locations during the Early Neolithic. Areas of high

[28] This trend is very common but not ubiquitous. In the Nyírség, population density seemed to be low enough that deforestation did not occur until the Late Bronze Age (Sümegi 2004b).

groundwater in the lower Great Hungarian Plain were avoided, suggesting that high groundwater levels may be riskier for settlement and agriculture (Nandris 1970). Presumably during prolonged rainy periods, an already saturated water table would suffer disproportionately from high standing water, preventing crop growth.

Foraging opportunities in the Körös basin varied by season, although fish such as catfish and carp would be common in river meanders during most of the year. Roe deer and boar would be found in forested areas along the rivers, and in the vast expanse of wetlands, turtle, ducks, and other waterfowl would be common (Gál 2007).

Notwithstanding, as we will see in the next chapter, the bulk of zooarchaeological assemblages from the Great Plain do not represent wild fauna, but domesticates. Large stretches of seasonal standing water at lower elevations for much of the year means that farmland was much scarcer than grazing land. Before the beginning of the spring rains, however, there was pasture for grazing herds. Areas of solonetz soils would have been acceptable for grazing too, but not for cultivation. The higher, dryer area of the Maros fan would be more suitable for horses and cattle than the low, wet areas of the basin.

CONCLUSION

The Great Hungarian Plain is an expansive flat landscape with no naturally occurring stone, metal ores, or other minerals. Prehistorically, everything had to be either traded in or obtained through travel. The landscape of the lower Körös basin reveals the scars of massive Pleistocene channels and a network of active Holocene river segments showing very little change in position over a period of 8000 years. The study area lies in the flattest part of the Plain, a landscape covered in anabranching rivers with little power. In contrast to the much larger Tisza, flooding of Körös river banks before river regulation is unlikely. The lack of flooding should not be interpreted as dry land, however, because the clays that make up most of the soils, when wet, prevent water seepage. During seasonal rains, therefore, vast stretches of the landscape held standing water. Maps produced for the Körös basin before river regulation are a plausible guide to where these low elevation wetlands stood.

The consequence of this landscape for locals is that pasture would have been plentiful for domesticates such as sheep, goat, and cattle. If shepherds were required to lead animals to trickier areas during the wettest parts of the year, there were likely many candidates. The chernozems of the Paleo-Maros alluvial fan would have provided quality farmland, but depending on population numbers and cultivation strategy, land suitable for cultivation may have been more difficult to find. In the basin, low-risk farmland was distributed more by elevation than by region. Crops planted at lower elevations would require particularly strong resistance to excessive moisture and even then, some areas may have produced acceptable yields in some years, but terrible yields in others. People in prehistory would remember the extent of seasonal wetlands from year to year and probably had a cultural memory of hundred year cycles where, due to heavy rains, wetlands extended far past their traditional boundaries. Natural plants that required excellent drainage and were found at the highest points of this flat landscape were probably indicators of some importance. These areas were sought not only for superior arable land, but especially risk-free settlement.

If the challenges of living in or near a seasonal wetland could be met, there were certainly advantages. Deer and wild pigs could probably be found in naturally occurring or curated woodlands and gallery forests. Waterfowl would be ubiquitous. Fish in slow moving water could be collected by hand or with nets. The anabranching rivers and endless wetlands, however, would have been a bewildering landscape to people not familiar with it. It would have been especially difficult to navigate during rainy seasons, and probably kept out all but the bravest intruders. At the same time, at the wettest times of the year, people might have been able to travel in straight lines in a boat if they knew where they were going. During the dryer times of the year, the largest rivers still held water, and could likely still be traveled by boat. In many cases, however, due to the sinuosity of the network, portage, or walking, was probably faster. At any rate, unless trade was all ‘down-the-line,’ people traveled into the region with exotic goods for trade, or people left the region get obtain exotics themselves.

Chapter 5: The Archaeological Context in the Körös Region

'Princely' tombs, buried treasure and other European Bronze Age wealth have been explained differently over time. For Childe it was the independent metallurgists and traders who kept business going during tribal wars. For Gimbutas it was the invasion of a hierarchical, warlike society. More recently, archaeologists suggest that production and circulation of bronze escalated out of a network of competing elites. They may have controlled the distribution to commoners outside of the fortified walls, and kept the finest, most ideologically charged riches for themselves.

Eastern Hungary is well known for its metallurgy. It is the hoards of battleaxes and the bronze swords of 'Mycenaean' influence that have attracted scholars for so many years. Yet to argue that any of the above scenarios is plausible in the Hungarian case requires a general sense of the Bronze Age in the area, and how it contrasts with the preceding Neolithic and Copper Age. In other words, evaluating the possibility that something new emerged – such as intensified production or a class society – requires an understanding of the starting conditions. Despite changes in technology and potentially changes in social structure, Bronze Age societies had to adapt to the same geo-environmental conditions as the people who preceded them (Chapter 4).

In this chapter I provide the archaeological context required to reconstruct Bronze Age societies in the Körös region. It is composed of three parts. Part I briefly reviews the Neolithic and Copper Age background. In Part II, I recount the basic culture history, explain the research tradition, and point out anomalies in the old chronology highlighted by a synthesis of the radiocarbon data. In Part III, I provide a thematic overview of the Ottomány and Gyulavarsánd groups in the Körös area. The distribution of settlements and known mortuary contexts are reviewed, along with a presentation of the evidence for local household economies. Lastly, a summary is provided of what we know of the mining and production of metals and the exchange systems tying the Körös area into a wider cultural network. Only once the predecessors of the Bronze Age are introduced and the general landscape of Bronze Age culture on the Great Hungarian Plain is overviewed, will any new work bearing on its structure and evolution be intelligible.

PART I: ARCHAEOLOGICAL BACKGROUND TO THE BRONZE AGE

The Neolithic

Settlers of the earliest Neolithic in the Carpathian Basin were colonizers (ca. 6000-5500 BC). The evidence from the Körös region indicates people arrived with a full Near Eastern package of animal and plant domesticates (Biró 2003; Bogaard, et al. 2007; Whittle and Bartosiewicz 2007)). It is unclear what the response of indigenous Mesolithic populations was because evidence of Mesolithic camps is non-existent in Békés county, and rare on the Great Hungarian Plain. Early farming settlements were located on the driest areas of the Plain, but always near river courses (Kosse 1979). Mortuary data are few, but the existing evidence indicates that the dead were buried as inhumations in or near houses, with few social distinctions (Oravecz 2003). Archaeologists recognize a widely distributed ceramic pattern, the Körös-Starčevo-Criş, supporting a recent common ancestry and a 'wave-step' settlement pattern of dispersal into the Basin.

Patterns in material culture begin to diverge in the Middle Neolithic, indicated by different ceramic styles on the Great Hungarian Plain and Transdanubia. Pots with deeply incised geometric patterns (the Alföld Linear Pottery 'culture') extend from the Maros to the northern Great Plain in the Upper Tisza (ca. 5500-5000 BC). The Szakálhát ceramic group is a more restricted label given to the material culture at lower elevations. Burial traditions and settlement locations do not stray significantly from the Körös pattern. The Middle Neolithic, however, does mark a period of adaptation to continental European conditions. The Mediterranean animal husbandry strategy focused on ovicaprids was abandoned in favour of one more suitable past the 'agro-ecologic' barrier of the Carpathian Basin (Sümegi 2004a). By this time the colonization of Central and Northern Europe was underway, and longhouse communities of the Linear Pottery 'culture' established themselves both inside and outside of the Basin.

By the Late Neolithic (5000-4500 BC), the settlement pattern became more complx. Multiple communities of the lower Körös basin and lower Tisza were fortified and began accumulating stratified settlement debris (Horváth 1988; Horváth 1989a). Consequently, European scholars have long called these settlements *tells,* the Arabic word for 'hill,' although they bear no scalar resemblance to the Neolithic and Bronze Age settlements of Turkey and the Near East. Tells in the Late Neolithic are not the largest sites or the most common, only the best well known.

Hungarian scholars divide Tisza period settlements of the Plain into three categories: tells, tell-like settlements (1-2.5 m high, with greater extent than tells), and flat settlements (Horváth 1989b; Kalicz and Raczky 1987:16; Makkay 1982). With Polgár-Csőszhalom as the lone exception, tells do not exist in the Middle- and Upper-Tisza region. Neolithic syntheses identify tells in the Tisza group to be between 1 and 4 ha in size, while flat sites are more variable, from 1-11 ha (Kalicz and Raczky 1987:16). Makkay (1982) argues that tells result from the sustained occupation of the only areas that were available at the time. As a result, he continues, land use was intensified to produce a surplus. Most agree that the large flat Tisza sites result from movement over time, and not simultaneous occupation (Kalicz and Raczky 1987; Parkinson 2002b; Sherratt 1997:307). As both site types are occupied for a considerable period of time, however, these large flat settlements or "supersites" arguably played a similar role as the tells, as small sites tend to cluster around them as they do for tells (Parkinson 2002b). The settlement pattern occurring in the Tisza period differs radically from those that came before, and is why some researchers have argued for the arrival of new settlers from outside the region at this time (see Horváth 1989:89).

At the height of the Late Neolithic occupation of the Plain, regional styles of material culture extend for the first time over smaller areas, suggesting a re-definition of regional identities and the basic pattern of inter-community interaction (Parkinson 2006; Raczky 1987a). People buried their dead with modest grave goods on settlements (Tisza and Csőszhalom groups) or nearby (Herpály group) (Kalicz and Raczky 1987:23). Dwellings are generally long houses of wattle and daub, ranging from around 5 m wide to 5-18 m in length. Some two storied houses are known from the interiors of fortified tells (Horváth 1987a; Kalicz and Raczky 1984).

The Copper Age

The Early Copper Age of the Great Hungarian Plain is represented by the Tiszapolgár 'culture' (4500-4000 BC), an expansive material cultural complex extending across the lower Körös basin and the Tisza valley as far south as Belgrade (Bognár-Kutzián 1972). After the Late Neolithic, communities reverted to smaller hamlets and infill the landscape (Parkinson 1999a, 2002b, 2006). An increase in strontium isotope variability over the Late Neolithic may suggest greater mobility, large herd territories, or potentially smaller resource pooling units (Giblin 2009). Although settlements get smaller at this time, the Early Copper Age also marks the beginning of formal cemetery use (Bognár-Kutzián 1963, 1972). A central distinguishing feature of burials in Tiszapolgár cemeteries is copper, both cold hammered and smelted (Chernykh 1992). Small but measurable differences in status and wealth characterize mortuary assemblages(Skomal 1980). Rather than the migration of Indo-Europeans into the Plain (Gimbutas 1991)), material culture and building patterns from the transition from the Late Neolithic to the Early Copper Age suggest continuity and indigenous social change (Bailey 2000; Bognár-Kutzián 1963; Gyucha, et al. 2006; Parkinson 2006).

The Bodrogkeresztúr complex of the Middle Copper Age (4000-3500 BC) is in many ways a continuation of the Tiszapolgár pattern and its extent continues across the Great Hungarian Plain. The same cemeteries are used and absolute dates for their burials overlap with the Tiszapolgár (Bognár-Kutzián 1972; Csányi, et al. 2009; Forenbaher 1993). Settlements on the Great Hungarian Plain remain largely dispersed (Sherratt 1984). Some anomalies do appear on the landscape, however, such as the occasional 'roundel[29]' (Makkay 1981; Makkay 2001; Makkay and Séfériadès 2002).

The Late Copper Age (3500-2800 BC) is an enigmatic period on the eastern Plain. It is a time when large 'style groups' emerge in many parts of Europe (Milisauskas and Kruk 2002 (Milisauskas and Kruk 2002)). The Baden-Boleráz style found in eastern Hungary, for example, is also found in Austria and Poland. The handled jugs and cups are stylistically quite different from the preceding Copper Age ceramics of the Plain, closer formally to the material culture in Bulgaria and northern Greece (Parkinson 2006).

[29] Roundels are typically large sites with a wide ditch enclosing empty space, characteristic of the Neolithic in many parts of Central Europe.

Models of clay wagons are found in Baden contexts (Banner 1956), and suggest an improvement in the transportation and movement of goods (Anthony 1995, 2007).

Other enigmatic features of the Late Copper Age landscape are the ubiquitous mounded tumuli, called pit-grave *kurgans* by Hungarians who employ Gimbutas' Russian loan word (Ecsedy 1979). Several hundred are identified in Békés county alone. Inhumations lie within these tumuli, sometimes with red ochre, textile or container remains, and bear a strong resemblance to those of the Yamnaya culture of the Russian Steppe.

Their chronological relationship to Baden and Bodrogkeresztúr settlements is unclear, although their placement on the landscape looks to be spatially dissimilar (Sherratt 1984). To explain the phenomenon, Sherratt argued they represented an intrusive pastoral culture using parts of the landscape unclaimed by Late Copper Age farmers. If *kurgan* builders did retain a mobile lifestyle as part of a pan-steppe cultural tradition, it was quite unlike the migration of nomadic pastoralists from the east in the early historic and Medieval Period, when immigrant Sarmatian, Avar and Hungarian populations rapidly adopted more sedentary lifestyles and animal domesticates (Bartosiewicz 2003).

The Late Copper Age and Early Bronze Age transition is one of the most poorly documented periods of the eastern Plain. The *kurgans* are in large part undated by radiocarbon, and Early Bronze Age sites identified by surface pottery are few and unexcavated. In the next section, I continue with the culture history, before turning to the absolute chronology which helps to resolve some, but not all, of these problems.

PART II: BRONZE AGE KÖRÖS RESEARCH AND CHRONOLOGY

The culture history of the Bronze Age on the Great Hungarian Plain is a relative chronology that includes a baffling number of 'culture' groups and sub-phasing (Figure 5.1). The orthodox mechanisms of change in this chronology are migration and invasion, and their inclusion in the descriptions below should be taken with a grain of salt. The first section outlines the location of these groups in the traditional chronology, and the most important features associated with them. In a later section, I re-visit some of these issues in light of the radiocarbon data. The Bronze Age archaeological sites mentioned in the text below are identified in Figure 5.2.

Culture history for the Bronze Age on the Great Hungarian Plain

The *kurgans* were initially considered contemporary with the Early Bronze Age, post-dating the (LCA) Baden, Makó and Nyírség groups (Kalicz 1968). Ecsedy (1979), however, dated them to the previous late Baden assemblages. The 'Makó group' is principally a bowl / plate decoration occurring across most of the Carpathian Basin. Makó, like the Baden, covers an enormous territory, but is known almost exclusively from pits and small scatters rather than settlements or cemeteries (Kulcsár 1999, 2000, 2002; Machnik 1991). It is considered contemporary with the earliest Nyírség group, represented by numerous settlements north of the Berettyó valley, as far as the Upper Tisza, Bodrog and Szamos rivers (Bader 1978; Bóna 1994a; Dani 2001; Kalicz 1967, 1968; Kalicz 1970; Kiss 2004; Németi and Dani 2001; Tóth 2003). Bell Beaker populations are thought to have replaced the resident Makó settlers on the Danube in the Early Bronze Age (Bóna 1994a).

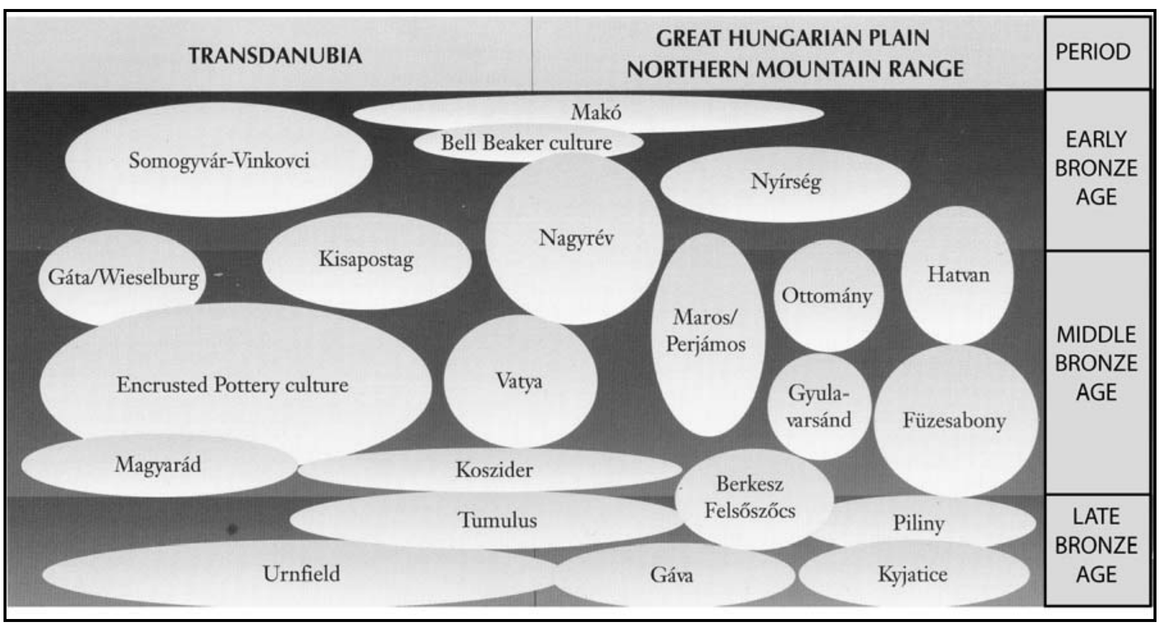

Figure 5.1. One model of the relative chronology for the Hungarian Bronze Age (modified from Vaday 2003).

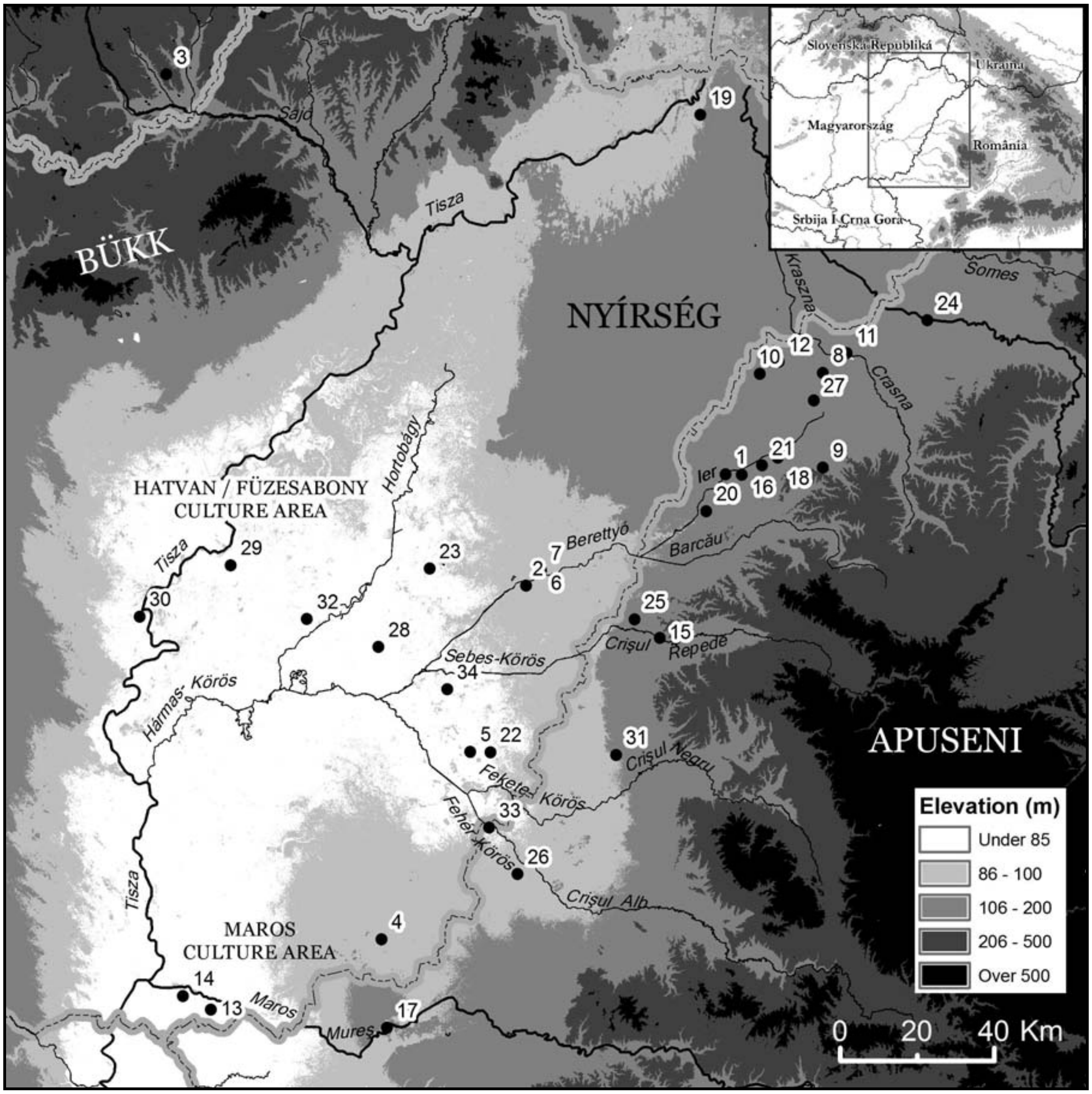

Figure 5.2. Location of sites mentioned in Chapter 5. 1. Adoni; 2. Bakonszeg-Kórógypuszta-Kádárdomb; 3. Barca; 4. Battonya. 5. Békés-Várdomb; 6. Berettyóújfalu-Szilhalom; 7. Berettyóújfalu-Herpály; 8. Carei; 9. Cehăluţ; 10. Ciumeşti- Bostănărie; 12. Domăneşti; 12. Foieni; 13. Kiszombor-Új-Élet Tsz.; 14. Klárafalva-Hajdova; 15. Oradea; 16. Otomani; 17. Pecica; 18. Pir; 19. Rétközberenc; 20. Săcueni; 21. Sălacea; 22. Sarkad-Peckesi-domb; 23;Sárrétudvari-Örhalom; 24. Satu Mare; 25. Sintion; 26. Socodor; 27. Tiream; 28. Dévaványa-Tó-Kert; 29;. Törökszentmiklós-Terehalom; 30. Tószeg-Laposhalom ; 31; Tulca; 32. Túrkeve-Terehalom; 33. Vărşand; 34. Vésztő-Mágor. Note: Topographic differences are exaggerated at lower elevations to show subtle relief on the Great Plain.

The Nagyrév complex evolved locally on the Danube west of the Tisza-Körös confluence at the same time that the Perjámos group evolved on the Maros (Bóna 1994a). Since Makó sites were found in the same area of the Pitvaros, an EBA culture around Szeged with little resemblance to them, Bóna (1965) argued that the Pitvaros represented an intrusive group that pushed the Makó out. His account invoked the migrations of people in the Balkans and Anatolia as the driving factor that brought the Pitvaros and Nyírség groups to the Carpathian Basin. This in turn was premised on Mellaart's (1958) description of mass migration of people displaced by Indo-European invasions at the end of the Early Bronze Age in Macedonia and Anatolia (ca. 1900 BC).

On the Upper Tisza, along the foothills of the Northern Mid-Mountains all the way to the Danube Bend, however, the scattered remains of the Makó led way to the emergence of the Hatvan culture– Bóna (1994a) suggests the cremation burial rite in the latter derived from the tradition of the former. He also argued that these people annihilated the residents of the Nagyrév area, displacing among them the occupants of Tószeg. As this occurred, the residents of the Berettyó and Ier valleys, the once members of the 'Nyírség' culture, began to incorporate new decorative techniques – fine incising and zigzag patterns – to became the early 'Ottomány' (Kalicz 1970).

According to Hungarian archaeologists, the Ottomány group extends from the lower Körös basin into western Transylvania. Nonetheless, Bóna (1994a:29-30) and others (Csányi and Tárnoki 1994; Tárnoki 1994) note the difficulty of attributing some sites to either the Hatvan or the Ottomány culture due to the many similarities. A lack of cemeteries in the Ottomány area south and west of the Berettyó valley made it difficult to draw the line between neighbouring groups. To the north on the Upper Tisza the Füzesabony group is supposed to have crystallized out of eastern Corded Ware group in the Hernád valley. The different burial customs of the Hatvan and the Füzesabony (cremations in the former, inhumations in the latter) suggested to Bóna (1994a) they were mortal enemies. It was not surprising, then, that the Füzesabony expanded in the Middle Bronze Age and destroyed a whole series of Hatvan settlements. It is at this time that they profoundly affect other people of the Great Plain, including the stylistic development of the Vatya, remaining Hatvan, and in the Körös basin, the emergence of the Gyulavarsánd style out of the Ottomány.

Although he considered the Gyulavarsánd locally produced, Bóna (1974) argued that the sudden influx of new motifs and forms to the ceramic assemblage in the earliest phase of Békés-Várdomb, an important tell site excavated in the 1950s and 60s, resulted from people moving into the area. Twenty years later he still didn't have an answer for how the changes in the Gyulavarsánd occurred, waffling on the relative importance of the 'northern' versus 'southern' influences (Bóna 1994b:30). The 'southern elements' in their ceramic assemblage occurred at Vattina in the Banat, Wietenberg in Transylvania, and perhaps as far away as the Aegean.

The discovery of the Battonya cemetery in a sand quarry in 1964 did not clarify the origin of the Ottomány nor the development of the Gyulavarsánd, but it did indicate an interesting contrast to the porous northern 'cultural boundary' with the Hatvan. The site is on the Száraz Ér (the 'Dry Stream') of the Maros fan, 20 km from Pecica and 40 km from Vărşand as the crow flies (Szabó 1999). Sixty burials were opened in 1965, including inhumations, cremations and symbolic graves. They were identified as part of the Maros tradition, but they did not fit the Maros pattern with respect to orientation and ceramic assemblage (Gazdapusztai 1968). Excavations continued at the site but it was never fully published by the excavators. Szabó (1986; 1999) returned to the collection, however, and analyzed the full set of 132 graves for his dissertation. Although there were on the whole more Maros style elements, Ottomány and Maros motifs and vessel forms mixed on the same pot, in the same grave, and spatially throughout the cemetery. Maros pots are found in cremations, and Ottomány pots in inhumations. There was no earlier set of ceramics, and so Szabó was unable to say which 'population' arrived first. A point of confusion emerged as to why there would be Wietenberg 'elements' in the ceramic assemblage, but no Gyulavarsánd, given the distances involved. Unlike the northern border of the culture area, the southern border with the Maros sites in the Ottomány phase was fairly obvious. The cemetery has no similar contemporaries, nor is there one like it in the following Gyulavarsánd phase.

The end of the Middle Bronze Age in Hungary was explained in early papers by Mozsolics and Bóna as a widespread catastrophe caused by invasions from the west (Bóna 1958; Mozsolics 1957). This is an important interpretation often re-surfacing in the literature; I will come back to it in my review of the absolute dates. Although Mozsolics did not later commit to an interpretation of hoard deposition, 'horizons,' such as the Koszider and Hajdúsámson, were clearly intended to denote a sudden arrival of new forms, sometimes carried by new technology or techniques, and integrated into an existing typological repertoire. The Koszider horizon, for example, was built above all from dozens of metal hoards. The Tumulus culture was described as an invasion across the Little Plain of the Danube, and few of the 'classical' Bronze Age settlements persisted into this period (Bóna 1958). Those that did, such as the Piliny in northeastern Hungary and Slovakia, evolving out of the Füzesabony, were in remote areas where the Tumulus culture did not penetrate. Some existing traditions merged with the Tumulus culture on the Danube (Kreiter 2005a, b), but most, such as the Gyulavarsánd tradition of the lower Körös basin, disappeared.

A short history of Bronze Age research

The previous culture-historical sketch is the summary of over one hundred years of research and glosses over important features of how this chronology was built. The brief sketch, like many of the 'culture maps' produced to illustrate the sequence (Bóna 1994a), also masks the fact that some areas of the Great Plain in the earliest Bronze Age have heavy occupation, and others have none. In the lower Körös basin, settlement evidence is sparse until the beginning of the 'classical' Bronze Age, the Ottomány and Gyulavarsánd phases.

The culture historical sketch also ignores the long standing differences in cultural terminology between national traditions (I used the Hungarian conventions above). I outline what these differences are below, describe how they developed, and indicate why researches in the area have to be concerned with them. I focus primarily on the Romanian and Hungarian literature because they are the most relevant for the Körös area. Incidentally, archaeological sites and rivers in Transylvania have both Hungarian and Romanian names. Both names are provided the first time I refer to them, after which time the Romanian name is used if the site or river segment is today found within Romanian national boundaries[30].

Research informing our understanding of the Bronze Age on the eastern Hungarian Plain derives primarily from three lines of archaeological inquiry. The first and largest scale is the seriation of the metal-work across the Carpathian Basin. The second is the excavation of settlements and cemeteries of the Great Hungarian Plain and the upper valleys of Transylvania. The third and most restricted scale is the systematic fieldwalking survey in Békés county. The most relevant of these research strategies has been the second, and I treat it in the greatest detail. It has been exclusively from sorting metal types and site excavation that archaeologists have built the culture-history of the Great Hungarian Plain. Major syntheses are compared in Figure 5.3.

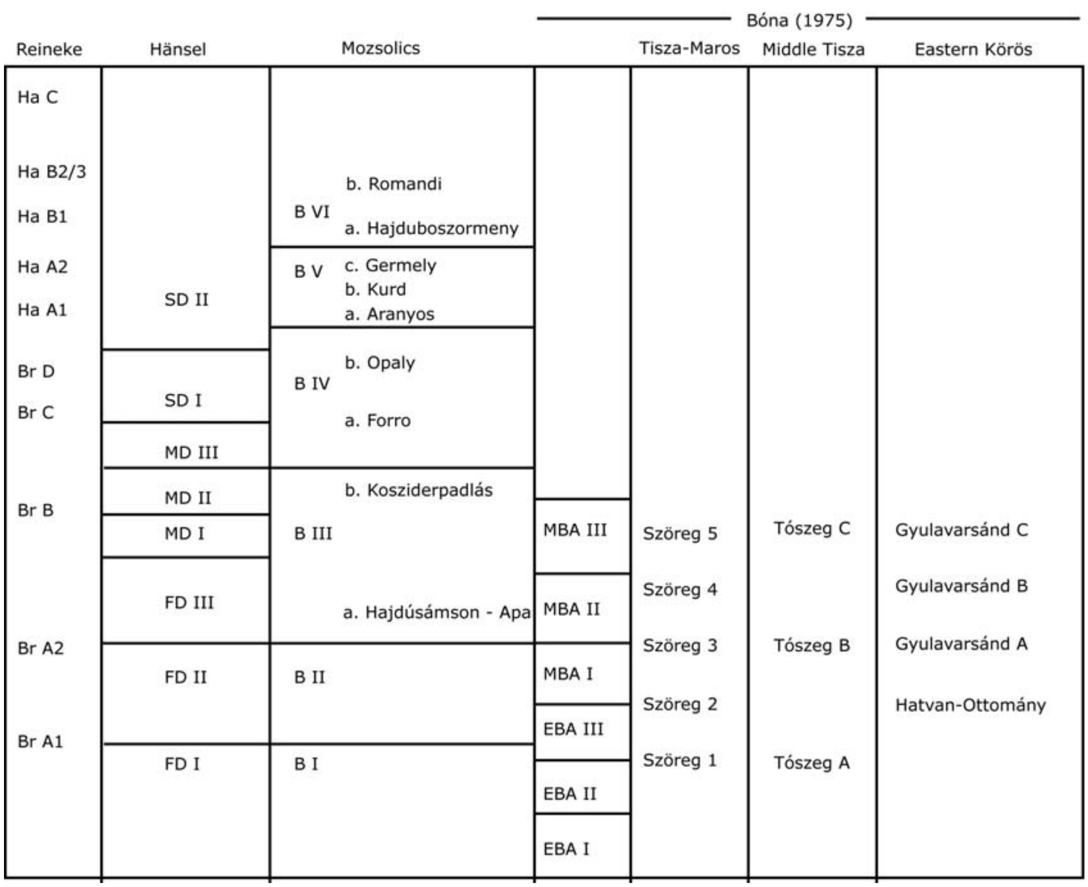

Figure 5.3. Major syntheses in relative chronology relevant for the Eastern Körös sequence.

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30 The eponymous site of Vărşand, for example, is today in Romania, but is commonly referred to by ethnic Hungarians as Gyulavarsánd-Laposhalom.

Metal typologies and occurrence sorts

The wide European distribution of metal types such as axes, daggers, and ornaments has played a large part in establishing synchronisms and relative chronology for vast areas. Hänsel (1968), trained in Heidelberg, provided an early sorting of metal types and ceramics for part of the Carpathian Basin. The tripartite typology included three equally spaced Early Bronze Age phases (FD I-III), three equally spaced Middle Bronze Age phases (MDI-III) and two Late Bronze Age (SD I-II) phases. More influential, however, was native Hungarian Amália Mozsolics. Over a period of fifty years she seriated metals from hundreds of contexts across the Carpathian Basin (Mozsolics 1967, 1973, 1985; Mozsolics and Schalk 2000). She considered ceramics unreliable for establishing synchronisms, and used copper, bronze, and gold artefacts instead (Mozsolics 1967:11). She reduced the phases at the benchmark site of Tószeg-Laposhalom from four to three: the Nagyrév, Hatvan, and the Füzesabony, based on her own excavations there (Mozsolics 1952). She provided a six part chronology for the Bronze Age which included several 'horizons,' broadly corresponding to Reineke's Central European chronology, but internally subdivided (Mozsolics 1967, 1973, 1985). Trends in metal production such as the introduction of shanks, disc-butted forms, spiral decorations, sockets and knobs to axes served to distinguish new phases in time.

The temporal distinctions in metals were important for tying material culture from settlements into the chronology. Analysis of bronze composition and decorative occurrence was also intended to locate important workshops (Mozsolics 1967:9). While useful for tying the metal types to the greater European chronology, these efforts were less influential locally than the excavation and sorting of ceramic forms and styles.

One reason is that the earliest Bronze Age had few distinct metal types. The phasing was therefore only informative for the (late) Middle and Late Bronze Age. For many, the story of the Bronze Age in the Great Hungarian Plain was about the run-up, florescence, and fall of the Middle Bronze Age. The Middle Bronze Age was a 'classical' phase in the prehistoric sequence; people can be found in cemeteries and houses, and they made beautiful things. As in the Late Neolithic, and for several hundred years, the tells rose again to heights never before seen on the Great Hungarian Plain. The research history of the Bronze Age societies is therefore in large part the study of this cultural florescence.

Excavation and the elucidation of the 'classical' Bronze Age

The first synthesis including Middle Bronze Age sites from the Körös area was actually Childe's (1929:378-380) identification of 'East Hungarian Group II.' He grouped the sites of Berettyóújfalu, Vărşand, and Sîntion (Pusztaszentjános) based on Hampel's (1886) descriptions and tied them to the ceramic forms of the fourth stratum D from Tószeg-Laposhalom. The incised spirals and small bas-relief lugs ('warts') – the 'Pusztaszentjános' ware – were the unifying feature, observable even at the end of the Tószeg C. The few data available at the time led Childe to attribute it a Late Bronze Age date.

Recognition of these cultural patterns in the Great Plain as earlier Bronze Age is in large part due to the pioneering efforts of Márton Roska. Responsible for the early excavations which delivered spiral mugs and plates from the fortified sites Vărşand (Gyulavarsánd-Laposhalom) and Otomani (Ottomány), Roska brought to the fore the names that now describe the most spectacular period of the Bronze Age in eastern Hungary and western Romania (Roska 1926-1928, 1930; Roska 1941). Roska (1941) saw strong similarities in material culture from his excavations at Vărşand, Socodor (Székudvar), and the latest levels of Maros sites and others to the south. The incised arches across the belly of double handled jugs and bossed mugs with incising were found also at Perjámos and Pecica *Şanțul Mare* (Pécska *Nagy Sánc*). Roska considered the heart shaped bosses on thin, deep bowls to be the influence of the Vattina culture (in Serbia). He believed the progenitors of the undecorated mugs at these sites were the Bell Beakers that preceded the Únětice culture in Bohemia. He nonetheless considered the development of stylistic traditions in the Southern Great Plain to be an unbroken trajectory during the Bronze Age. Vărşand and Socodor, however, were more closely affiliated with the ceramic traditions of the Körös rivers and Ier (Ér) valley, as far east as the center of Transylvania (Roska 1941:61).

It wasn't Roska, but Ion Nestor (1933) who provided the specific definition of the 'Otomani' as a stylistic group differentiated from other culture areas. Nestor's definition was based on Roska's excavations. He argued the group extended from Otomani in the northeastern Ier (Ér) valley in Romania, down the Berettyó including Esztár, Sarkad-Peckesi-domb on the old Gyepes, and Vărşand and Socodor on the Crişul Alb (Fehér Körös). Like Roska, however, he recognized the similarity between certain decorated pots especially common in the lower levels with those of the Únětice. He also agreed with Childe (1929) that the common spiral motif (the 'Pusztaszentjános' ware), found in the latest level of the Otomani excavation, was a unifying cultural feature. He noted that Otomani had much earlier predecessors however, demonstrating an *in situ* evolution. He did not provide a strong end date, but considered the Otomani group to be Middle Bronze Age, probably contemporary with Reineke's phases B-C. This argument was reproduced by Popescu (1944), who identified the Pusztaszentjános ware to be contemporary only with Roska's upper spade depths, at Otomani (spit III). In his final synthetic statement, he argues that the arrival of the Thracians in the area mix with the local populations, thereby signalling continuity with the Iron Age. This was the beginning of a divergence in how Hungarian and Romanian archaeologists built the chronology of the Körös basin and upper valleys.

This early divergence coincided with dramatic political events in the eastern Carpathian Basin, an important 'hidden passenger' that requires a slight digression. Transylvania has a complex political history extending back over three thousand years. Some of the territory of modern Romania was integrated into the Kingdom of Dacia when the Romans conquered it in AD 106. Control of the area changed frequently throughout the first millennium AD. The Magyars (Hungarians) arrived in the Carpathian Basin in the ninth century AD and ruled Transylvania until the beginning of World War I.

Most of the Carpathian Basin, including Transylvania, was integrated into the Austro-Hungarian Empire at the beginning of the twentieth century. When the Empire dissolved, Hungary became a third of its previous size and clashes in western Transylvania between ethnic Romanian and ethnic Hungarian forced several border shifts over the next twenty years. During this time, over 100,000 people in the area were relocated, and many archaeological collections and notes were lost in the chaos.

Relationships between archaeologists writing in Hungary and Romania at this time were strained. The classical phases of the Bronze Age Körös differed in some respects in the upper valleys and lower basin, but these differences were exaggerated in what became the use of two different chronological schemes. On the Great Hungarian Plain, the abandonment of the tells signalled to Hungarians the arrival of new people and the end of the Middle Bronze Age. Some evidence for continuity between the Iron Age Dacians and the Earliest Bronze Age in Transylvania could be found, but the similarities between the Middle Bronze Age and Late Bronze Age were overblown. Despite the reservations and nuance in their reading of Bronze Age material culture, the final word by Popescu (1944) argued in favour of this continuity.

Horedt (1962, 1966) produced the next synthesis of Bronze Age chronology for western Romania, also specifying Otomani continuity into the Late Bronze Age (Reineke's Br D phase). The restriction of scope to a narrow area in Transylvania was continued by Ordentlich (1971) during a time of increasing divergence with the Hungarian tradition. In the years that followed, one of Horedt's pupils, Tiberiu Bader, sought to integrate the research on the Otomani-Füzesabony across national borders in his dissertation. He was discouraged from doing so. His resulting publication in 1978 therefore focused only on northwestern Transylvania, and included an important synthesis that outlined an unbroken Otomani sequence beginning in the early Bronze Age and showing continuity with the Iron Age: Otomani I-II-III-IV. In a retrospective of his dissertation work, however, Bader (1998: 85, note 27) admitted that he was not permitted to include material from Hungary or Slovakia, nor was he allowed to indicate there was a clear discontinuity between the phases Otomani III and IV at most sites. His Otomani III was the final phase of the Middle Bronze Age, the time when Hungarian archaeologists interpreted the arrival of new populations on the Great Plain.

The cultural assignment of the 'Ottomány' handle by Hungarians had long ago broken from Nestor's characterization of a Middle Bronze Age culture extending across the Körös area, Transylvania, and Upper Tisza. Significant excavations at classical period sites took place in post-WWII Hungary. The most important of these was Tószeg-Laposhalom. Yet Tompa's findings from the fortified site of Füzesabony were used by Mozsolics (1952:157) to describe the ceramic style for the latest layers at Tószeg. She followed Nestor and Popescu's dating of the phases, but not use the Pusztaszentjános ware as a cultural element uniting northern Hungary with northwestern Transylvania. She diverged from their usage of 'Otomani,' referring to the 'Otomani group' in Romania and the 'Gyulavarsánd group' in the southern Körös as different 'facies' of the Füzesabony group.

The Hungarian nomenclature for Bronze Age cultures on the eastern Plain was inconsistent across researchers for the next several decades, although the chronology of the material itself became better established through multiple excavations. The first excavation of a Bronze Age site in the lower Körös basin after the war was at Békés-Várdomb (Banner 1955; Banner and Bóna 1974). Excavations began in 1950 under the direction of János Banner. The settlement consisted of an artificial island in a river meander, built up to a 3 m tell. Bronze Age surface scatters were found on both sides of the meander. Excavations occurred not only on the tell itself, but also outside the fortified area in an attempt to locate a cemetery and describe the funerary customs of the inhabitants.

The primary material culture they encountered was the same as what Roska had identified at Vărșand and Socodor. There were also similarities with Perjámos and Szőreg, such as two-handled pots with grouped incised lines. In the highest layers they found knobbed, spiral pottery similar to the Füzesabony area in the Middle and Upper Tisza. The lack of ceramics that could be contemporary with the Nagyrév and Perjámos suggested to Banner (1955: 140) that the region had been unoccupied until the Middle of the Bronze Age. The lowest layers of Várdomb, however, did provide some occupation evidence preceding the material culture identified by Roska (1941) at Vărşand and Socodor. One striking early motif was the parallel line cluster, running in a zigzag pattern on a shallow, closed-rimmed, wide-mouthed bowl.

Banner's (Banner 1974:69-80) final report on the cultural affiliations of the settlement's inhabitants is confusing. He grappled with multiple sites and cultural definitions by Hungarians, Romanians, and foreign nationals, and does not provide a coherent statement of cultural affiliation[31]. The early part of the site had strong similarities with the ceramic inventory from the Hatvan in the upper Tisza, at that time best known from Tompa's (1934) excavations, and the finds from Tószeg B and possibly Tószeg A. For the upper strata at Várdomb, he decided that the affinities were stronger with Vărşand than with the Füzesabony ceramics identified in the Middle Tisza (Tószeg C), but in a table identifies the final phase of occupation as the 'Vărşand-Füzesabony'.

The hardworking junior archaeologist running the excavations off the tell at Békés-Várdomb was István Bóna. Bóna's (1974:146-151) observations on changes in material culture outside the fortification were more helpful than those provided by Banner. Bóna had four layers and better excavation plans. Like Banner, he attributed the lowest layer to the Hatvan culture. It was characterized by shallow bowls with short everted rims, straight incised lines and grouped incised lines in zig-zag patterns, the same as those on the tell. The 'brushed' incised parallel lines (*besenstrichverzierter*) occurred disproportionately in the early occupation. In the upper layers, new forms and ornaments included short, impressed parallel lines, and arc shaped curved spirals similar to those identified decades earlier as part the Pusztaszentjános ware.

Bóna (1958:226) first used the generic term *Spiralbuckelgefäße* (spiral bossed vessels) to group the ceramic traditions of the eastern Hungarian Plain, with the 'Gyulavarsánd-Ottomány' and Füzesabony' as occurring as sub-groups. He revised the nomenclature soon thereafter to form a common Middle Bronze Age Gyulavarsánd-Füzesabony culture area from the Middle Tisza to the Maros. He identified their preceding phases as two distinct settling populations of the Early Bronze Age, however, the Ottomány-Gyulavarsánd in the Körös area, and the Füzesabony east of the Hernád valley, extending eventually over the whole area of the previous Hatvan culture (Bóna 1960:45).

At the same time, Nándor Kalicz's (1968, 1970) work in the Hungarian Nyírség area re-coined the 'Ottomány' for usage by Hungarians. Excavations at Rétközberencs-Paramdomb produced material culture that he identified as Ottomány, *contemporary with*

[31] Gimbutas (1965) grouped the Otomani (all of the Great Hungarian Plain east of the Danube, north of the Maros) with the similar 'Wietenberg' culture of Transylvania, but this move was rejected by both Hungarian and Romanian prehistorians.

the Late Hatvan in northern Hungary, with strong similarities to material in the preceding Nyírség phase of the area. He did not find any Ottomány III phase material, contemporary with the upper strata at Békés-Várdomb. This phase, the Gyulavarsánd-Füzesabony, nonetheless drew on elements of the early sequence. Because of the importance of local antecedents in the Hatvan area as well, however, he argued that the term 'Ottomány' should not refer to the entire area, but be restricted to the Körös rivers and tributaries, and Upper Tisza to describe the end of the Early Bronze Age.

Bóna published his opus, *Die mittlere Bronzezeit Ungarns und ihre südöstlichen Beziehungen* (1975) soon afterwards. Bóna did not think that any one settlement could be the basis for the chronology, and therefore he all but rejected Mozsolics's chronology, which relied heavily on Tószeg (Figure 5.3). Here he reintroduces the broad cultural term '*Spiralbuckelgefäße'* for the Middle Bronze Age, keeping 'Hatvan' and 'Füzesabony' as phases for the Middle Tisza. The 'Gyulavarsánd' label remained for the Körös area and western Romania for the MBA, but he used Kalicz's (1970) definition of the Ottomány as terminal EBA, preceding the Gyulavarsánd. As in his report on excavations outside Békés-Várdomb, he attributes the 'Gyulavarsánd' style to a migration into the area (Bóna 1975:120-121)[32].

Unlike the metal typologists, his strategy was to determine the internal chronology of different 'cultures' independently, and then unite them in a single Hungarian chronology through synchronisms. Tószeg had material from the Nagyrév, Hatvan, and Füzesabony cultures, but their extents changed over time and were too inconsistent to be used as universal chronological markers. Such was not the case with the Vatya and Szőreg groups, for whom detailed internal chronologies could be worked out through the cemetery sequences.

As a prolific scholar with an exceptional handle on ceramic forms, Bóna's syntheses of Bronze Age cultural material across Hungary in the 1960s and 1970s positioned him as the pre-eminent Bronze Age authority (Bóna 1963, 1965, 1975, 1980;

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[32] The 'Otomani' complex was understood by Coles and Harding (1979:75) to be the Romanian equivalent of Bóna's (1975) Füzesabony group, an error that conflated both time and space. Slovakians, however, tend to use the term to include Otomani III (Romanian) and Füzesabony (Hungarian), but not necessarily the Gyulavarsánd (Hungarian), following Bóna's distinction in the south, but not in the east.

Bóna 1994a; Laszlovsky and Siklódi 1991). While Bóna was a professor at Eötvös Loránd University in Budapest, several of his Ph.D students began new excavations in the Middle Tisza and lower Körös region to broaden the picture offered by the finds at Békés-Várdomb. This included trenches at Vésztő-Mágor (Hegedűs 1974, 1977), Tiszaug-Kéménytető (Csányi and Stanczik 1982; Csányi and Stanczik 1994), Túrkeve-Terehalom (Csányi 1986; Csányi and Tárnoki 1994) and Gáborján, Esztár, and Bakonszeg (Sz. Máthé 1988; Sz. Máthé 1994a), and Sarkad-Peckesi-domb (Jankovits and Medgyesi 1993; Jankovits and Medgyesi 1994; Medgyesi 1996). With the exception of some primary data synthesis for the Berettyó valley (Sz. Máthé 1984; Sz. Máthé 1988; Sz. Máthé 1994b) and the brief site summaries listed above, very little of this work has been published in detail. Békés-Várdomb remains the best published settlement in the lower Körös basin, and Bóna's basic distinction of the sequence still stands, although Sz. Máthé (1988) introduced some additional refinements based on excavations in the Berettyó valley.

Earlier Bronze Age chronology has been built over many years. The architects have been several generations of scholars across three national boundaries and a chequered political history. A single archaeological site in this culture area may have two or three different names, with the same deposit attributed to three cultural handles. The most recent comprehensive summary of the research history for the area lists *twenty-one different chronologies* or nomenclature defined for the same area since Nestor's (1933) first synthesis (Bader 1998). Bader (1998:72) expresses uncertainty over whether the Füzesabony, Ottomány and Gyulavarsánd are one culture or three, but leaves this as a question that archaeologists in the area should be working harder to resolve and agree upon. He also argues that the location of 'cultural boundaries' must be established between these groups, if there were in fact three, and their origin and internal development should be compared if they actually differed.

Although I engage some of these questions as the evidence demands, they are not my primary focus. Most scholars working in the area understand how to 'translate' the conventions from one area to another, and they do not seriously impede research. In this dissertation, I restrict my analyses and discussion to a natural environmental feature – the lower Körös basin and its tributaries in western Transylvania. Since my work is primarily in Hungary, I use the Hungarian conventions Ottomány and Gyulavarsánd, typically used to refer to sets of material culture in the late Early and Middle Bronze Age in this area, but not northern Hungary (the Hatvan-Füzesabony area).

Archaeological survey

The final method used to generate archaeological data on the eastern Hungarian Plain is systematic fieldwalking. A major archaeological survey, the *Magyarország Régészeti Topográfiája* (MRT) project, began in the 1960s all across Hungary. The intention was to survey the entire country, although to date, only 10 volumes have been published, about ten percent of the goal. The northern part of Békés county is complete, however, and will be discussed in more detail in Chapter 8 (Ecsedy, et al. 1982; Jankovich, et al. 1989; Jankovich, et al. 1998; Szátmari n.d.). The dataset is unparalleled in most parts of Europe. Although it has been extensively used in studies of the Late Neolithic, Copper Age, Late Bronze Age / Iron Age (Gyucha 2001, 2009; Parkinson 1999b, 2002b, 2006), surprisingly, there has been no attempt to use the survey results to address the 'classical' Bronze Age.

Chronological indicators for the Ottomány and Gyulavarsánd groups

Despite similarities, there are particular features to the Ottomány and Gyulavarsánd ceramic styles that can be used for chronological placement. Although some of these chronological distinctions apply to the Maros or Tisza areas, my intention is to supply contrasts useful for the Békés county area. These features were used during the MRT survey to date the occupation of surface scatters and I review them here because they are used to assign Middle Bronze Age surface collected sites to phases in Chapter 8. Additional definitions are found in Appendix B.

Some new vessel forms appear in the Gyulavarsánd, but much of the basic ceramic repertoire is retained from the Ottomány phase (Bóna 1975, 1994a; Sz. Máthé 1988; Németi and Molnár 2002). I focus more on the coarse resolution trends than on particular vessel forms, such as the spiral channelled lugged bowl, which may be highly diagnostic but fairly rare.

Perhaps most obvious to excavators is the replacement of wiped or brushed surface treatment with burnishing across multiple forms. Brushed ceramics (*besentrecht* in German, *seprűzött* or 'broom-stroked' in the Hungarian literature) are typically considered 'household' wares[33]. Brushed surface treatment is phased out between the late Ottomány and early Gyulavarsánd. Bóna's (1974:149) excavations indicate that 48% of the brushed ceramics from excavation came from the lowest Ottomány level (Layer 4; he was calling it 'Hatvan' at the time). The next layer above it (Layer 3), contained 28%, and the two upper Gyulavarsánd layers (Layer 2 and 1) had 18% and 6%, respectively.

The second most commonly observed change is in decoration, from straight, geometric designs in zig-zag patterns or triangles, to curved lines and spirals. Like the surface treatment of common household ceramics, this element is easily visible in even smaller samples of surface ceramics. Cooking pots, bowls, and mugs are especially good candidates for such decoration. In the Ottomány in particular, 'hanging' or 'suspended vessels' – short pots with protruding belies, high necks and holes for suspension – invariably have such decorations. During the Gyulavarsánd, spiral or otherwise curved decoration is added. The spiral feature (*girland* in German) is sometimes accompanied by a bas-relief technique or bossing (created through pushing out the interior of the vessel wall before firing). The effect, usually found on mugs or other liquid containers, heightens the visual effect of the spiral, and is not seen in the preceding Ottomány with geometric patterns.

The third feature that distinguishes Ottomány from Gyulavarsánd ceramics is the addition of 'flare' to vessel body parts. In the Gyulavarsánd, rims flare out more, lips protrude, and handles extend high above the rim. These formal modifications, along with the visual effects of bossing and incised spirals on a polished vessel all add to what can be described as a more 'baroque' style similar to the trajectory described in other parts of the Plain (Bóna 1975; O'Shea 1996; Michelaki 1999). There are also an immensurable number of motifs in the Gyulavarsánd phase, and even later Ottomány, accounting for the difficulty in producing a useful typology for them (Németi and Molnár 2002). As Gogâltan (1999:55) has remarked, the potters of the Gyulavarsánd phase seemed to suffer from a *horror vacui*.

[33] A list of technical terms and definitions relevant for these styles is provided in the Appendix.

Although I partly use the Hungarian conventions as a matter of convenience, there is a cultural and geographic logic to them. A boundary based on mortuary tradition and decorative emphasis in ceramics divides the settlers of the Körös from those of the Hatvan area in the north and west. The Apuseni mountains isolate them from the Wietenberg tradition of Transylvania. Although there are similar trends in both areas between the early and late phases (e.g. brushed surface treatment early in the sequence), ceramic forms, styles, and mortuary traditions of the Maros clearly contrast with the ceramics of the Ottomány and Gyulavarsánd; Battonya is the exception that proves the rule. Yet this 'culture area' covers about 7500 square kilometres. These boundaries might identify heightened patterns of interaction within it – marriage, kinship, exchange – compared to interaction across boundaries to neighbouring 'culture areas' (cf. Parkinson 2006). There is no certainty that the 'archaeological culture' identifiable by archaeologists, however, was meaningful to its inhabitants. Local groupings, such as community and community group, were probably much more significant to Bronze Age people. This is certainly reflected in some of the mortuary data I review in Part III, and is something that I will return to in later chapters.

Absolute dating for the Bronze Age Körös

Just as the radiocarbon revolution changed the way that the British had to understand the development of the Wessex culture, the beginning, development and end of the cultural phases isolated by Bóna, Mozsolics and others now have to be modified. Even where relative chronologies have for the most part been supported by absolute dating, the tempo of change and length of the chronology might be inaccurate. Although the relative chronology was essentially correct for the Bronze Age Maros sequence, the ^{14}C data indicated a beginning much earlier and longer than previously imagined (O'Shea 1991, 1996). Due to such shifts, explanations of migrations and new cultural elements may have to be re-explained, or at least re-evaluated in light of the radiocarbon dates.

The Hungarian Bronze Age does not lack absolute dates. On the contrary, the collection and publication of almost one hundred dates for the Early and Middle Bronze Age is a testament to the perceived relevance of the data (Raczky, et al. 1994). The dates were presented alongside the ‘old chronology,’ with a strong message that a re-interpretation was in order. Still, these dates have not yet been represented in a coherent framework. The dates and their +/- values were published only with site names and cultural affiliations, such as ‘Vatya,’ or ‘Late Hatvan.’ For sure, a radiocarbon date associated only with a ‘culture’ label puts the interpretation of the dates at the mercy of the excavator’s identification. Much more could be done with these dates if combined with detailed information about excavation contexts and affiliated material culture. Nonetheless, it is still an important starting point, and I advance a preliminary sorting of these dates in Figure 5.4. A table in Appendix A lists the 132 radiocarbon dates available and those excluded for the creation of Figure 5.4. The box ends are approximate, but based on figures produced with the calibration curve in OxCal (v.4.1.1). It should also be noted that several of the excavated sites do not have a radiocarbon date from the full range of their deposits, many of which remain unexcavated (e.g. Pecica *Şanțul Mare*).

There are 18 dates from five different sites in the Körös area. Hungarian scholars generally argue that around 3000 BC, the Baden complex was declining when new populations from the Balkans arrived in the southern parts of the Carpathian Basin carrying the metalworking technology of the Vučedol complex (Bóna 1963). Just outside the Nagy Sárrét, there are Early Bronze Age pots in the kurgan of Sárrétudvari-Őrhalom, and designs similar to ceramics from Little Poland, the Ukraine, and Transylvania (Dani and Nepper 2006; Kulcsár 2003). Several graves were identified, radiocarbon dated from ca. 3300-2500 BC. The early graves and dates correspond to the initial building of the mound, and are consistent with other dates for *kurgans* (or ‘Pit-Grave Culture’) in the east. The later dates correspond to the Early Bronze Age. Grave 4, between ca 2800-2600, is the earliest phase of the EBA, and includes a large urn similar to other pots known from Makó find sites. Grave 11 is in the same stratum, but without a radiocarbon date, has a two-handled urn with appliqué ribbing along the neck, similar to those in the eastern Körös attributed to the ‘Gyula-Roşia’ group (Emődi 1985, Fig 8.6, Fig 16.1). Another grave, dated to ca. 2600-2500 BC, has a one-handled jug most similar to pots in Transylvania. Evidence for the earliest Bronze Age is otherwise thin for this part of the Plain.

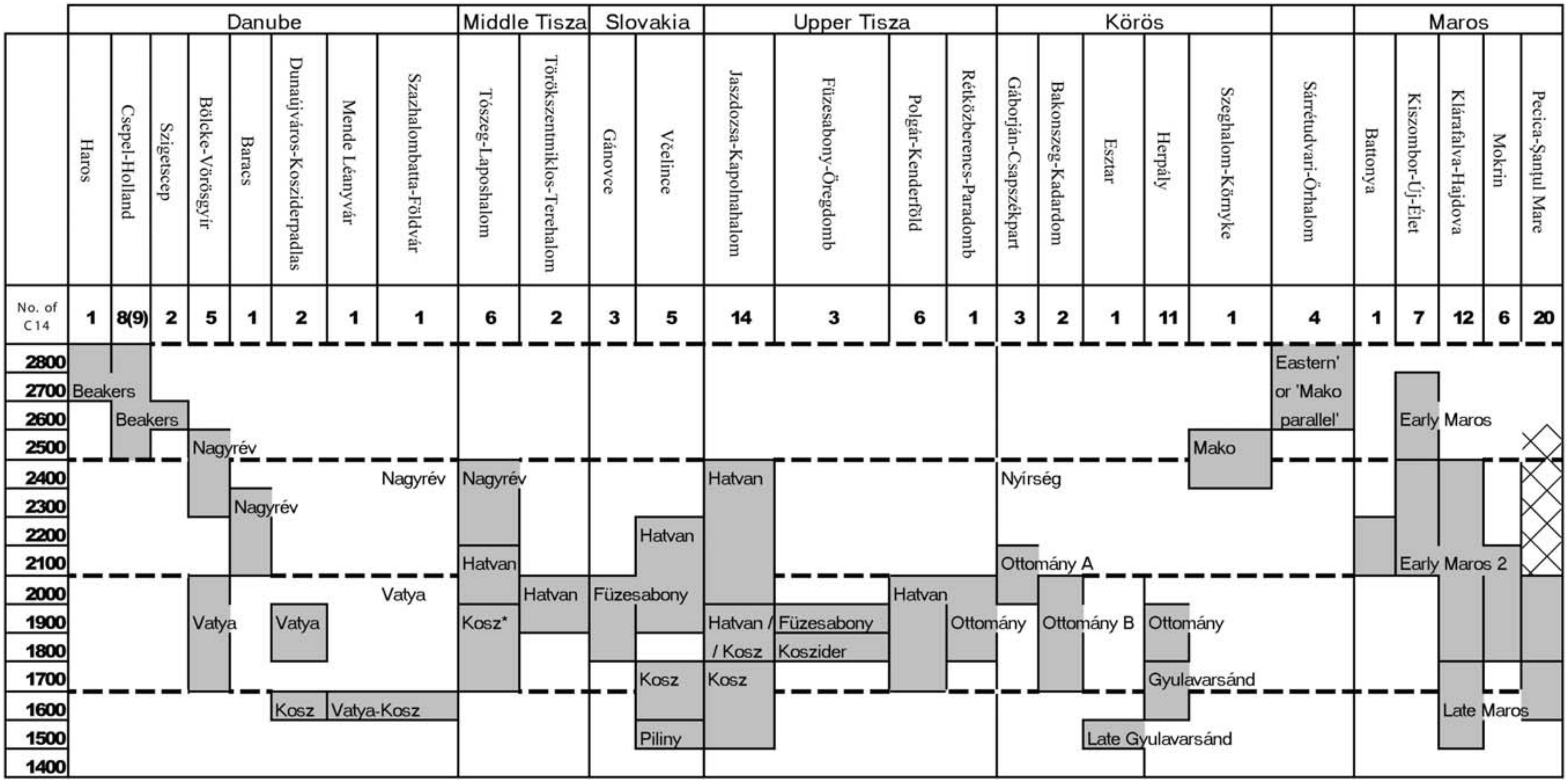

Figure 5.4. Chronology based on radiocarbon date ranges at individual sites in Hungary, Romania and Slovakia. Time value corresponds to line in the upper part of the box. Note (*): The sequence at Tószeg has a Füzesabony layer in between the Hatvan and Koszider deposits, but there was no Füzesabony date submitted for radiocarbon sampling and the Koszider period dates cover this early part of the sequence. There are unpublished radiocarbon data for Pecica extending at least back to ca. 2500 BC, probably earlier (O'Shea, *pers. comm.*)

At 2500 BC, there is another date for a 'Makó' site near Szeghalom, but this time several hundred years after the first appearance of 'Beakers' in the Budapest area, a breach of the traditional chronology. If the Makó is not a real cultural entity but a narrow range of material culture, it nonetheless has a longevity of 500 years and needs to be explained[34].

In contrast to the Makó phase, there are hundreds of known Nyírség sites, although for the most part they are found in a much more restricted area, the Nyírség alluvial fan of north-eastern Hungary and north-western Romania. There are no Nyírség dates, so we cannot evaluate its relationship to the Makó[35]. For these earliest phases of Bronze Age settlement in the lower Körös basin, thirty five sites are described as having Makó ceramics in the published MRT survey area. Eight are described as Nyírség. Together, if we exclude the *kurgans*, this means there are only 43 small sites in an area of 3780 km^2 for a 900 year period.

The frame in the Bronze Age Körös for which we actually have data from multiple settlements falls roughly between 2150-1400 BC, the Ottomány and Gyulavarsánd phases of the 'classical' period. The radiocarbon chronology, in contrast to the traditional chronology, the Hungarian Ottomány and Gyulavarsánd phases show a 100 year overlap, from 2150-1650 BC, and from 1750-1400 BC, respectively. By looking at Figure 5.4, one might note that the extended Ottomány phase is dependent on a single late date from Bakonszeg-Kádárdomb. Additional radiocarbon data for the Ottomány phase obtained during dissertation fieldwork, however, confirms this is as a real pattern (Chapter 8). Between 2150 and 1400 BC, I therefore recognized three phases in the radiocarbon data: the Ottomány (2150-1750), the Transitional Phase (1750-1650 BC), and the Gyulavarsánd (1650-1400)[36].

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[34] Potentially a useful place to do this would be the Middle Tisza, where dates for the Makó and Nagyrév overlap.

[35] See Appendix A for discussion of the 'Nyirség' date from Bakonszeg-Kádárdomb.

[36] While the 'Transitional' period might be isolated stylistically in the future using distinctions in material culture suggested by other authors, in this dissertation when I refer to events or processes as occurring in the Ottomány or Gyulavarsánd phases, it will necessarily include this one hundred year overlap. The only place I use the transitional period is when I model demographic trends using settlements attributed to either phase.

Relevance of the radiocarbon dates for the traditional chronology

The most obvious difference between the radiocarbon chronology for the Körös region and the traditional chronology (Bóna 1994a) is the earlier beginning. Bóna has the Makó emerging on the scene at 1900 BC, where the radiocarbon chronology puts it almost a thousand years earlier at 2800 BC. The time allotted for the development of the ceramic styles must be in most cases doubled or tripled, and are potentially even longer near the beginning of the sequence. The Ottomány phase is not 70 years long (ca. 1750-1680 BC) but five hundred (2150 BC-1650 BC) [37]. The Gyulavarsánd phase is about a hundred years earlier than previously thought (1750-1400 BC). Despite the lengthening of the chronology, however, *most* of the relative chronological distinctions remain unperturbed.

There are currently not enough radiocarbon dates and excavations of *kurgan*, Makó and Nyírség phase sites for us to understand their occurrence and relationship. Still, that people used *kurgans* (or continued to use *kurgans*) to bury their dead for hundreds of years across the Late Copper Age – Early Bronze Age divide at this site (3300-2500 BC) means that others may have continued to be focal points on the landscape during the EBA. There are hundreds of *kurgans* in the Körös area. The association between them and Makó and Nyírség scatters, however, has never been systematically addressed. Beginning around 2700 BC, early BA settlement is found on the Maros river in the south, but it is possible that the settlements at this time the Körös area are not only undated, but difficult to recognize because of a totally different settlement pattern.

It is possible that the Ottomány phase may extend back in time, but the presence of Nyírség under the radiocarbon dated early Ottomány layer at Gáborján suggests that Nyírség is the more likely candidate for the earliest Bronze Age cultural group after the *kurgans*. This means that in fact the Nyírség area and the upper Ier Valley are heavily occupied for hundreds of years, while the Körös area is virtually empty of such settlements.

The dating of Ottomány sites might provide an opportunity to use decorations and vessel types to increase the resolution of our chronology or detect the movement of

[37] There is a relatively flat area in the calibration curve ca. 1880-1780 BC, however, that makes it difficult to use existing dates to reliably bracket cultural phases.

stylistic patterns in space. Németi and Molnár (2002) provide the most recent synthesis for the material culture of the Ottomány phase of the sequence. Although they focus their analysis mostly on settlement patterns in the Ier valley, they list motif types and vessel forms occurring across all Ottomány sites in the published literature, including fortified sites from eastern Hungary. In total, they include six sites from the upper Ier, three from the Berettyó area, and Békés-Várdomb from Békés county in their analysis. There are 39 motifs total, including incised lines of varying patterns, geometric shapes, hatched incising, appliqué ribbons, engraved channels and spirals, bossed spirals and others. All three sites from the Berettyó included in the motif catalogue have radiocarbon dates: together they range from 2100 to 1600 BC. Bakonszeg, if excluded, however, potentially offers a useful contrast between the motifs from Gáborján (2100-1900 BC) and Herpály (1900-1700 BC). Németi and Molnár list the stratigraphic layer the motif comes from, but we do not have the stratigraphic context of the dates.

At a general level, the changes Bóna (1974) observed between the earliest and latest deposits of the Békés-Várdomb excavations are seen in the Berettyó valley as well. Parallel incised lines in 90, 180 or 45 degree angles are common in the early Ottomány deposits at Gáborján, but absent from the Herpály excavations. In contrast, in the Ottomány stratum at Herpály (Layer 4), we see the beginning of engraved channels and wide engraved 'S' motifs, absent in the earlier Gáborján layers[38].

The ^{14}C dates confirm the general understanding of the early chronological relationship between the north Plain and the Körös area. The Hatvan dates in the Upper Tisza and Slovakia begin much earlier than the Hatvan in the Middle Tisza, indicating the movement of the style from the north to the south over time. The contemporaneity between the late Hatvan and Ottomány in the northern part of the Plain also support the claim for a strong northern influence contributing to the genesis of the Ottomány (Kalicz

[38] Unfortunately, the other motifs are not helpful in improving the chronological resolution of the region. The motifs chosen and the number of motifs identifiable for any site depend on the strength of the publication record. They are listed as 'present' or 'absent' in the appendix of the volume. Four motifs are shared between Bakonszeg and Herpály, and only three are shared between Békés and Bakonszeg and Békés and Herpály. For the vessel forms, although none are shared between Bakonszeg and Herpály, Herpály has only one type of the forty-seven types listed. No spatial variation emerges from visual inspection of the data either. Clearly, there is too much variability, currently too few examples, or too precise of a vessel coding system to achieve any meaningful chronological distinctions based on the precision introduced by the radiocarbon data.

1970; Bóna 1994a). If there was a continuous cultural exchange, this helps explain the difficulty that Hungarians have in assigning sites to one culture group over the other.

The traditional interpretation of the spatial expansion during the Gyulavarsánd phase is also left unchanged by the radiocarbon chronology (Bóna 1994a). The southeastern extent of the Ottomány phase is effectively Békés-Várdomb and Sarkad-Peckesi-domb. During the subsequent Gyulavarsánd, major new fortified settlements – Vărşand and Socodor – appear on the Fekete Körös where there were none before. New fortified sites also appear on the Berrettyó, such as Esztár-Fenyvesdomb and Szilhalom, and on the Sebes Körös (Sîntion), and in the Ier valley (Pir). It is a geographical expansion of the style southeast and northeast further up river.

Bóna (1974, 1994a) argued that the crystallization of the Gyulavarsánd culture was the result of immigration into the Ottomány area. Like Roska before him, he noted that some new ceramic forms had precedents in the Vattina area to the south. Many forms in the Gyulavarsánd, such as highly polished shallow bowls with spiral engraving and lugs, were found all over the Füzesabony area to the north and west as well. He was unsure in which direction the new forms travelled because they did not have precedent in the north either. The radiocarbon data indicate that the Füzesabony clearly precedes the Gyulavarsánd, occurring between 2000-1800 BC, two hundred years before it is found in the Körös basin. If Bóna is correct about the population movement into the basin at about 1750 BC, it is perhaps more likely that they came from the north and west. This would then mean a northern origin out of the Hatvan for the Ottomány and a northern origin from the Füzesabony for the Gyulavarsánd.

Final mention must go to the duration of the Koszider 'horizon'. This was supposed to be a short phase of cultural florescence bringing the Middle Bronze Age to an end in most areas. It is known mostly through the more than 40 metal hoards across the Great Hungarian Plain, but is also a style of ceramic. The style is most strongly represented around the Danube Bend and up into western Slovakia. It was initially believed to represent the burial of riches due to the invading Tumulus group across the Little Plain. This picture changed with the building of a better understanding of the Tumulus horizon, which is now considered to be separate waves and post-Koszider (Bóna 1994a). The radiocarbon dates indicate that this 'horizon' is in fact 500 years long, dating from 1900 to 1400 BC. Rather than springing from the Danube, as Bóna suggested, it appears to have its earliest dated representation on the Tisza. It is therefore contemporary to the later part of the Ottomány and the Gyulavarsánd in the lower Körös basin. This is significant because the presence of the Koszider on the Danube and Tisza was considered to be an indication of outlasting the Gyulavarsánd sites of the Körös basin. That they are in fact contemporary indicates that for the most part, these sites were abandoned simultaneously, as late as 1400 BC.

PART III: THEMATIC OVERVIEW OF THE MIDDLE BRONZE AGE

Having given an overview of the 'Ottomány' and 'Gyulavarsánd' ceramic phases to the extent possible with the radiocarbon data, I can turn to more specific cultural features of this Middle Bronze Age landscape. It is against the Neolithic and Copper Age background that features of Bronze Age societies must be compared before making strong arguments for population replacement, intensification, or the emergence of stratified societies. Although I focus most heavily on the lower Körös basin, I also review the Middle Bronze Age occupation evidence in the northern Körös tributaries of Romania. This large expanse of territory provides slightly different cultural signatures in different areas that should not be overlooked. In later chapters, I seek to reconstruct cultural patterns for the lower Körös basin and these differences must be born in mind.

For subsistence, metallurgy, and other themes where there are few data from the Körös basin to draw on, I extrapolate from the Great Hungarian Plain more broadly, but am careful to note the source of these inspirations.

Settlement patterns

Ottomány and Gyulavarsánd sites are restricted to the extent of the Körös river drainage. Settlements follow meandering rivers up into the lowlands of the Apuseni mountains across a great number of coalesced alluvial fans (Figure 5.2). The elevation range covered by these settlements is between 75 to 100 m on the Hungarian side. On the Romanian side settlements are rarely found above 140 m. The extent of settlement in the north and northeast follows the sandy dunes of the Nyírség, and the confluence of the Crasna (Kraszna) tributaries in northwestern Romania. The earliest Ottomány settlements are probably in the Ier (Ér) valley and Carei (Nagykároly) Plain (Bader 1978; Németi and Molnár 2002). Far fewer sites are recorded west of the Apuseni mountains on the Romanian side between the Barcău (Berettyó) and Crişul Negru (Fekete Körös) rivers, but they do exist (e.g. Tulca and Oradea) (Dumitrescu, et al. 1983:144). Socodor south of the Crişul Alb (Fehér Körös) is generally thought to be the extent of the Gyulavarsánd, but might extend as far as the eastern Mureş (Maros) in Romania (Gogâltan 1999). In the Gyulavarsánd, the northwestern boundary is usually considered to extend as far as Törökszentmiklós-Terehalom, where the Szolnok-Túr Plain meets the Tisza river (Tárnoki 1994). As indicated in Part II, however, archaeologists have difficulty pinning down discrete cultural boundaries, especially in the north and west.

Settlements tend to be close to wetlands. Settlements at lower elevations are strongly tethered to the high levees of Holocene or Pleistocene watercourses, but this tendency dissipates as one moves up into the Ier valley and surrounding plains. Although the upper reaches of the Körös tributaries might have undergone frequent cutoffs affecting settlement stability, seasonal wetness in the Körös basin was more likely due to precipitation than anything else (see Chapter 4).

By the Ottomány, deep fortification ditches are again dug, tell deposits build up, and flat sites appear in greater numbers. The Late Neolithic tells Vésztő-Mágor and Berettyóújfalu-Herpály were re-occupied, but more often Bronze Age tells do not form on Late Neolithic predecessors. In the Gyulavarsánd, there is an increase in site numbers noted for the Ier valley and the Hungarian side of the Plain (Bóna 1994a). Inhabitants of the Ier also extended into new areas, some of lower quality (Németi and Molnár 2002:47). This ‘increase’ probably hides the reality of a much greater increase in site number, given the longer duration of the Ottomány style in radiocarbon years in comparison with the Gyulavarsánd. Excavation at Carei (Nagykároly) and Bakonszeg indicates that tell sites expanded in the Gyulavarsánd phase (Sz. Máthé 1988; 1994).

Ottomány settlements, especially the tells, are often fortified. Many settlements lie on meanders with water on three sides. Sometimes they have a ditch on the exposed side, effectively creating an artificial island. This settlement type is found in the lower basin (e.g. Békés-Várdomb) as well as upriver (e.g. Medieşu Aurit – Potău). Natural islands in rivers (atolls) and fortified sites on hills and river terraces are also found in the upper valleys of Romania (Bader 1978). In these upper valleys, probably about a third of all sites show some sign of fortification on the surface (Bader 1982; Németi and Molnár 2002:52-3) On the Dévaványa Plain, the high banks of old Pleistocene meanders are virtually the only parts settled in the MBA, and these too were defended with artificial ditches (e.g. Dévaványa-Tó-Kert[39]). Yet despite increases in defense (usually at tells), most flat sites such as Rétközberencs (Kalicz 1970; Dani 2004) and Cehăluț (Bader 1978:35) were small and probably undefended.

Mortuary patterns

In contrast to the Maros and the Tisza culture areas, the mortuary rituals during the Ottomány/Gyulavarsánd sequence on the Körös are very poorly understood. The area with the most positive evidence is the Ier valley. Burial forms usually take the shape of cremations in urns or pits in the Ottomány phase, similar to the Nyírség forms that came before them (Bader 1978:41). In the following Gyulavarsánd, inhumations become the norm, but late in this phase cremations reappear alongside inhumations.

There are few formal cemeteries during the Ottomány phase, but enough to know they exist. One example is Ciumeşti-Bostănărie (Csomaköz), a site on a tributary to the Crasna River, which had twenty-three cremations in urns, quite similar to those found on nearby settlements (Ordentlich and Kacsó 1970). Romanian archaeologists excavated forty-two graves from Pir (Szilágypér), primarily Gyulavarsánd (Otomani III), all but one inhumation (Székely 1966; Székely 2000). These were only a fraction of the burials from this cemetery located next to the tell. In most other contexts, such as Săcueni (Székelyhíd) and Sălacea (Szalacs) in the Ier valley, there are isolated graves in urns in the foregrounds of settlements (Bader 1978:36-6, 39; Ordentlich 1972). A single Ottomány grave is known on the Hungarian side of the Berettyó river – a lonely cremation at the Berettyóújfalu-Szilhalom tell (Sz. Máthé 1988:42). South of the Berettyó, however, there are no unambiguous examples of either cremations or

[39] Dévavanya 66 (Ecsedy et al. 1982:50-51).

inhumations associated with these archaeological phases. The exception mentioned in Part II, the 'bi-ritual' cemetery of Battonya, is an anomaly by most accounts (Gazdapusztai 1968; Szabó 1999; O'Shea 1996).

Subsistence economy

The basis of Bronze Age economies was developed during the Copper Age during what Andrew Sherratt called the "Secondary Products Revolution", a time when secondary animal products such as milk and cheese, wool and traction became increasingly important (Sherratt 1981). People living on the Great Hungarian Plain had been consuming animal milk since the Early Neolithic, and the processing of animal products may have intensified over the course of the Copper Age (Craig, et al. 2003; Hoekman-Sites 2008).

Strong differences in collection strategies on the Great Plain make faunal comparisons difficult at best. Moreover, microenvironmental characteristics play an important role in the development of local economies (Choyke and Bartosiewicz 2000). Taken on the whole for the Körös, however, the ratio of domestic to wild animals in the Early Bronze Age (9:1) is similar to the Late Copper Age (Nicodemus n.d.-a). Age profiles of faunal assemblages are not available for the Late Copper Age sites, but it is likely that secondary products such as milk, cheese, wool or traction continued to be important, as they were at the Early Copper Age site Körösladany-Bikeri (Nicodemus and Kovács forthcoming). At Late Copper Age sites from the Great Plain, sheep and goat tend to dominate the assemblages. Pig becomes more prominently represented in the Bronze Age however, and increases at the expense of caprines over time. The percentage of wild animals represented at earlier Bronze Age sites of the southern Great Plain shows that tell sites generally have 10-20% wild fauna (Klárafalva, and Pecica[40]). Freshwater mussels could have been more common in the diet than is now believed (Gulyás and Sümegi 2004). Despite differences in recovery and small samples, the overall sense is that throughout the Copper Age and Bronze Age, a mixed economy of meat production and secondary product use prevailed, conditioned by microenvironmental influences.

[40] Kiszombor is an exception.

It is difficult from such fragmentary evidence to reconstruct how much time was devoted to activities such as animal husbandry versus agricultural pursuits, but the presence of permanent houses and cultigens suggests that livestock rearing was only a part-time job. Evidence compiled by Ferenc Gyulai indicates that several domestic plants were utilized in the Early and Middle Bronze Age (Gyulai 1993). The earliest Bronze Age sites contain common wheat added to the Neolithic package of einkorn, emmer, barley, lentils, and peas. The only data (from Bakonszeg-Kádárdomb) suggest that emmer may have been the preferred staple in the Körös region (Gyulai 1993:21). Evidence for wild berries collected from sites of the Plain include blackberry, elder, cornelian cherry, crab apple, and blackthorn. The weeds found associated with domestic plant remains at Túrkeve-Terehalom suggest that Bronze Age people planted wheat in the fall for a spring harvest (Gyulai 1994:67). Reaping was done by hand at the mid-section of the plant with stone blades hafted in sickles. People processed seeds into flour with heavy grinding stones, usually found in household contexts (Horváth 2000).

Despite the potential for certain kinds of specialized food production at this time, on sites of the Maros analyzed to date, the evidence points to a mixed meat-secondary products economy, and not a specialization in secondary products such as wool (Nicodemus n.d.-b). Intensity of stock rearing is often considered to increase over the course of the Bronze Age, but the evidence for this is equivocal, as intensification might simply mean putting more animals on the landscape. The plough was added to the agricultural repertoire in the Copper Age, but it does not mean that it was adopted by everyone; if it was, labour and land had to be organized differently (Halstead 1995).

Aside from agriculture and animal husbandry, the quotidian lives of BA people in the Körös area probably revolved around the village. Building and maintaining houses of wattle and daub required the felling of trees and branches for walls, and the collection of reeds for roof thatching (Sz. Máthé 1984, 1988; Csányi and Tárnoki 1994; Banner and Bóna 1974).

Little is usually known about what happened outside of the fortification ditch of tells, but it is clear that people normally settled there. At Săcueni there is evidence of houses outside the fortification ditch (Bader 1978:38). As mentioned above, Bóna (1974) excavated structures on the other side of the meander opposite the Békés-Várdomb tell island indicating not only that settlement extended outward, but that the deposits had considerable depth (1.8 m).

Ritual and spirituality was probably interwoven with daily and seasonal activities, though specific evidence of such activities is scarce. Nonetheless, there is at least one structure interpreted as a 'sanctuary' from the southern section of Sălacea in the Ier valley (Ordentlich 1972). This building is 8.8 x 5.5 m in dimension, with three rooms, two of which have 'altars.' Geometric motifs and friezes are found on the walls. Aside from this and occasional zoomorphic or anthropomorphic figures, mostly in the upper valleys in northwestern Romania, material culture of this sort is rare, and evidence of village activities is more mundane. Such activities suggested by material culture include making and repairing nets for fishing, for which we have many net weights as examples (e.g. Bóna 1975: Tafel 146, 12-15). A single seed of flax from Tiszaalpár indicates that this plant may have been harvested for making clothing (Gyulai 1993), and loomweights for weaving cloth are commonly found in household contexts at sites such as Vărşand (Bóna 1975: *Tafel* 148, 12-24).

Many tools for processing hides or making clothes were not in stone, but bone and antler. Several of the forms found in the Körös region, such as large mammal rib scrapers and sheep metapodial perforators, are found in other regions of Hungary (Choyke 1982-1983; Choyke and Bartosiewicz 2000). Some of these tools were used a few times then disposed of. Others were made from carefully chosen animal parts, and clearly used over a lifetime or even generations. Bone and tooth were not only used for tools, but also for ornamentation. Perforated pig tusks and wolf canines are among many different ornaments that occur across 'culture areas' of Bronze Age Hungary.

The productive process involved in making ceramics is not well studied for the Körös region, but by most accounts, potting was not a specialized activity on the Great Hungarian Plain. Nonetheless, ceramic products became very well made and carefully executed by the end of the Middle Bronze Age and people of the Plain might have contained the social makeup necessary for a transition to more specialized production (Bader 1978:42; Bóna 1994a; Michelaki 1999).

Metallurgy

The earliest exploitation of the Rudna Glava mine in Serbia is contemporary with the Early Copper Age on the Great Hungarian Plain (4500-4000 BC), a time when mainland Greece had very little metal production and nothing comparable in scale or variety to south-eastern Europe (Glumac and Todd 1991; Renfrew 1969, 1973; Zachos and Douzougli 1999). Copper smelting in Hungary was probably derived locally, since it appeared as early as the Early Neolithic (Bognár-Kutzián 1976:74). Alloying copper with tin to form bronze first occurred among Bell Beaker groups in the Carpathian Basin, though to a very limited extent (Liversage 1994:80). The increased demand for metals in the Copper Age could have led to experimentation with materials and techniques, resulting in local alloying (Papalas 2008).

Although there were many copper sources accessible to inhabitants of the upper valleys of the Körös tributaries (occasionally co-occurring with arsenic and tin), there is currently no archaeological evidence known from them (Borocoş, et al. 1983; Papalas 2008). Known ores occur above 300 metres in the Apuseni mountains. Known Ottomány and Gyulavarsánd settlements fall short of this elevation, but this may result from a lack of survey in the Romanian foothills.

Despite the early start by the Bell Beaker phase, most of the metals submitted to the *Studien zu den Anfängen der Metallurgie* (SAM) compositional analyses show that the Early Bronze Age (up to ca. 1800 BC) in Hungary was characterized by copper artefacts and not by bronze (Liversage 1994:80-81)[41]. These data also suggest that there are a few different sources of copper exploited at this time (in Reinecke A1): one from the eastern Alpine region, and a couple from the southern Carpathians. Metals smelted from the southern sources are understandably most common from cemeteries on the Maros and from settlements such as Pecica and Vărşand (Liversage 1994:71-2, 99). Nonetheless, for a variety of reasons, composition data must be taken as suggestive only (Craddock 1995; Papalas 2008; Rapp Jr. 1999).

Two piece moulds in ceramic or stone occur in the beginning of the Early Bronze Age (Ecsedy 1983). These moulds allow a greater degree of freedom in the form

[41] Only two out of fifty-three Bell Beaker objects had over four percent tin. Although tin bronze occurs in Maros contexts, they are rare and contain under two percent tin, within the range of bronze produced by natural tin impurities in copper ore.

produced and are a real technological advance over single piece moulds. This innovation aside, there is little in metallurgical production to contrast between the Copper Age and the earlier part of the Bronze Age. By the Middle Bronze Age (Reinecke A2) however, there are several changes in metal production. First, there may be a reduction in the number of sources exploited (Liversage 1994:108). Second, there is a significant shift in the composition of alloys. Bronze at its hardest is produced most efficiently with ninety percent copper to ten percent tin. While the use of tin alloying up to twelve percent was introduced in the Gyulavarsánd phase, by the deposition of Hajdúsámson type hoards (ca. 1500-1400 BC?), tin bronze had become standardized, with a unimodal mean of six percent. Metal smiths by this time clearly knew what they were doing, and there even appear to be different grade alloys for different finished products. Towards the Late Bronze Age axes and weapons always have the highest tin content (up to twelve percent), while its percentage is lower in sickles and ornaments (Liversage 1994:84).

Unlike finished bronze objects, which can be melted down and combined with other sources, biproducts of metal production are actually more conducive to pinpointing ore sources. During a smelt, metal is melted out of fused rock into droplets called *prills*. Some of these sink to the bottom of a crucible while the molten rock floats on top, though some remain in the rock. These molten rock by-products – slags – are useful to archaeologists because they are resistant to weathering and are rarely recycled (Papalas 2008).

Slags from two excavated Maros sites (Klárafalva-Hajdova and Kiszombor-Új-Élet Tsz.) have now been analyzed with the same techniques used for characterizing the ore sources (Papalas 2008). The copper prills imbedded in these artefacts, visible with a scanning electron microscope, supports a metallurgical origin. The presence of shale in the slags suggests that smelting, and not only re-melting, occurred at these sites. That the slags derive from multiple parent materials indicates that several different sources of copper were exploited, traded in or mined by direct procurement over 100 km away.

During the Copper Age, copper mining and production seems to have occurred at the family level (Ryndina, et al. 1999:1067). Copper ore and slag from the agricultural village of Selevac also suggests it was a common household activity (Tringham, et al. 1980:27-28). Similar production probably characterized bronze production in Hungary.

The organization of metal production might have changed by the Middle Bronze Age, however. In phase B at the tell site Tószeg-Laposhalom there is copious evidence of both stone and clay moulds, but there are none found in phase D (Bóna 1994b:50). The implication is that by then metallurgical production had gone off the tell, perhaps due to a change in scale and degree of specialization. Nonetheless, there are no analogies of the Vatya workshop at Lovasberény-Mihályvár (Transdanubia) on the eastern Great Plain (Kovács 1977:36-7; Petres and Bandi 1969). There is work by real masters by the Middle Bronze Age (Hajdúsámson stage). The bronze forms new to the Middle Bronze Age include ornaments and weapons, both of which become highly decorated as never before (Bóna 1994b; Mozsolics 1967, 1973). Certainly by the Urnfield period of Central Europe, the contexts in which various metal types occur suggests two-tiered production was the case, even if most smiths were part-time specialists (Wells 1996).

The mobility of people and goods

Given the lack of resources indigenous to the Plain, even utilitarian objects such as ground stone, obsidian and salt had to be imported (Chapter 4). These exotics were traded in by food producers as early as the Neolithic. Still, it is unknown how trade routes and access to exotic goods changed during the Bronze Age. Ground stone was needed for pulverizing emmer into bread flour, and this was certainly imported. Good quality lithics were needed for hafting into sickles, and these somehow made their way from the Tokaj or Mátra mountains. Amber from the Baltic Sea arrived into the more mountainous area of the Körös region at Foieni and Battonya (Bader 1978:112; Szabó 1999:20).

The kind of exchange that permitted amber, lithics, and bronzes to circulate in this area has received little attention. If we postulate an alternative to down-the-line exchange, there are four ways of travel that could have been involved. The first is by foot. Foot paths expected between settlements are perhaps not as straight forward to guess as one might expect, however, due to the prevalence of wetlands and seasonally active streams and floodplains. An alternative form of travel, given the number of rivers and marshes, is by boat. Most archaeologists do not doubt that travel by boat was common, though there is little evidence of it on the Great Hungarian Plain. Two small indications include a boat shaped pendant from the Late Bronze Age Satu Mare hoard (Bader 1978:114; Mozsolics 1973:117), and a dugout canoe found by Tompa and Márton at Tószeg, since lost (Banner 1955:142, fn.3). The wagon is a third mode of travel and transport for which there is at least plenty of indirect evidence. Model wagons, or minimally their wheels, are very common at Ottomány and Gyulavarsánd sites. Several examples come from Vărşand (Bóna 1975: Tafel 144-5) and Békés-Várdomb (Banner 1974: Tafel 2-4). I noted above that the wagon appeared first in the Copper Age, but it is unknown whether its importance for transport differed in the Bronze Age. The final category of travel, by horse, is likely tied into economies of prestige. However, we have yet to archaeologically disassociate horse raising and trade from draft animals and elite riding[42].

Eastern domestic horse breeds seem to have made it into the Carpathian Basin in force during the Bell Beaker-Csepel phase, but high proportions of horse are rare in Körös faunal assemblages (Bökönyi 1978, 1988). Contemporary with the Ottomány, horse in the Great Hungarian Plain occurs in the greatest numbers on major Tisza and Maros confluences, at Tószeg (25.7%) and Kiszombor (12.5%). Only Carei at the northern extent of the Ottomány area, situated on a tributary to the Crasna, carries horse in the double digits at this time (11.8%). By the Gyulavarsánd, horse at Carei increases (to 18%), and becomes significant at Bakonszeg-Kádárdomb (11.2%), indicating that the use or movement of this prestigious animal may have been restricted to the higher valleys. Yet in comparison with sites such as Barca and Spišský Štvrtok, horse trappings are uncommon in the heartland of the Ottomány (Bader 1978:59; Hüttel 1981)[43]. Where faunal analyses have been carried out in other parts of the Plain (e.g. Békés-Várdomb, Klárafalva), horse accounts for less than 4% of the assemblage, suggesting that at lower elevations horse raising and trade is mainly through Vattina areas (e.g. Foieni-Gomila with 26.1%).

The horse might be argued to be a crucial element for a militarized riding elite. After all, the use of horse would increase the effectiveness of a warrior class several fold

[42] One indicator of horse riding – bit wear on tooth P2 – is known from the Black Sea area as early a 3500-3000 BC (Anthony and Brown 2000; Brown and Anthony 1998). However, not everyone agrees that this tooth wear must be produced by riding (Levine 1999). Moreover, bitless bridles could also have been used for riding, producing no wear at all (Dietz 2003; Littauer 1969). Most importantly for riding is the horse training involved, rather than specific equipment, making it difficult to identify archaeologically.

[43] It is important to note that horse trappings such as cheekpieces serve to direct the animal in either riding or driving as a draught animal (Dietz 2003).

in the event that some villages dominated others (Anthony 1986:301-304). Though riding and horse chariotry are mostly considered to originate in the state societies of the Near East (Sherratt 2003), new radiocarbon dates from the Volga-Don area show that the steppes of Eastern Europe have the earliest evidence of the chariot (c. 2000-1800 BC) (Kuznetsov 2006).

Like rare breeds of useful animals, metallurgy also provided new opportunities for the accumulation and display of exotic goods (Earle 2002; Kristiansen 1987). Although it is difficult to quantify, given the numbers in bronze hoards, by the Middle Bronze Age the demand in metals may have changed by an order of magnitude in comparison to Copper Age usage. Even gold ornaments are found in considerable quantities at settlements such as Adoni (Éradony), Săcueni, and Vărşand (Bóna 1994b:54).

Orthodox view of the social makeup of Bronze Age societies

Although the ethnicity and specific cultural affiliation of Körös settlers remain unresolved, over the decades the social character of people in the Körös basin has changed very little in the minds of its researchers. Roska's excavations at Socodor and Vărşand had him convinced that the fortified artificial hills were not only settlements, but refuges where the tribal chief, his family, and retinue lived (Roska 1941:57). In times of threat, the rest of the tribe could join them in the fortified enclosure. An identical interpretation was offered for Várdomb some time later (Banner 1955:139; 1974; Bóna 1974). Bóna (1975, 1994a) was one of the last to address the social characteristics at the supra-site level. He essentially agreed with Roska and Banner, but also considered tell inhabitants to be the primary agents of change because they were the elite mercantile class, occasionally expanding at the expense of their neighbours. Németi and Molnár (2002:36) repeat this idea in the most recent synthesis for the Middle Bronze Age in the Ier valley.

Many Hungarian archaeologists believe that advanced agricultural production in the Bronze Age enabled settlement in a smaller area without having to move from time to time due to soil exhaustion (Kalicz 1968; Bóna 1975, 1994b; Reményi 2005). Gyulai (1994) supposes that draught animal use in agriculture was the rule, and that soils were used as long as possible, and then fell into fallow. The identification of settlement movements into areas of lower quality soils is also commonly cited as evidence for intensification, but it has remained a statement rather than a demonstration (Németi and Molnár 2002:47).

The idea that the number of people on the landscape increased over the course of the Bronze Age, and that their agricultural production had to become more advanced as a result, remains a standing assumption in the literature. As is in the case for much of Bronze Age Europe elsewhere (Chapter 2), the dominant model is that these communities became hierarchical, with a minority of the population controlling the production and trade of wealth. When I investigate this possibility in the Körös area, this landscape of a populous hierarchical people intensifying production due to land scarcity will be referred to as the *null hypothesis*. In order to confidently establish any archaeological pattern to the contrary, when modeling various features of Bronze Age society such as population size or availability of arable land, I consistently choose to err in favour of the null hypothesis. Although the models will therefore often be exaggerated in one way or another, the deviations from the null hypothesis will be strong evidence that an alternative model of Bronze Age society is required.

CONCLUSION

Many hypotheses concerning the operation and evolution of Bronze Age societies in continental Europe have been offered over the past one hundred years. The Körös basin is an ideal location for evaluating these ideas because it is known as one of the great bronze producing areas of its time. A long tradition of archaeological inquiries provides a depth of investigation not possible in many other parts of the world.

Explanations of change in the Bronze Age, however, must be predicated on an understanding of prior conditions, and therefore the Neolithic and Copper Age predecessors should be thought of as part of the greater social trajectory, even if questions about the genetic heritage of these cultures remain.

Syntheses concerning the chronology and cultural affiliation of the Bronze Age peoples investigated here have been produced since Childe's (1929) identification of the

‘Pusztaszentjános’ ware on the Sebes Körös, but the major advances in our understanding came from excavations by Márton Roska in the earlier part of the twentieth century. Despite differences in terminological definitions for the Körös sequences since the 1930s, and the headaches awaiting curious but unprepared foreign archaeologists, Hungarian and Romanians have essentially seen the same thing: a cultural development indigenous to the Carpathian Basin beginning in the earliest Bronze Age and ending almost everywhere in the Körös region with the abandonment of the tells at the end of the Middle Bronze Age.

The insertion of the radiocarbon data to the traditional chronology has confirmed some of the developmental trajectories posited by Hungarian chronologists, allowed us to decide between some unresolved alternatives, and forced a re-evaluation of others. For the lower Körös basin, we face the likelihood that people of the ‘Ottomány phase’ were descendants of, or share an ancestry with, those people identified as Nyírség and Hatvan in Upper Tisza and northern Körös tributaries. An overlap in the chronological phasing of the material culture 1750-1650 BC indicates a period of transition in the radiocarbon dates, a time when Hungarian researchers have argued that people were migrating into the region and settling with existing populations. Although there were no strong grounds for deciding the source of these populations before, the refinement in the chronology allowed by the absolute dates indicates that this migration, if it took place, likely came again from the north; many stylistic elements are shared between the Gyulavarsánd and Füzesabony complexes, but the Füzesabony is the older of the two.

Regional idiosyncrasies seem to exist throughout this broad ‘culture area;’ burial traditions are observable in some areas but not others. The relative importance of horse use differs by location. The culture history of the Körös area indicates an expansion from the Ottomány into the Gyulavarsánd phase, often argued to correspond to a period of intensification. The earliest known sites are in the northern valleys, although by the end of the Ottomány there are fortified sites as far south as the Fekete Körös. Additional sites are established at that time further up river and in the south, and their inhabitants share a set of ceramic styles also found in the Vattina area. It is during this final phase of the classical Bronze Age that the most stunning bronzes and ceramics are produced.

Beyond the material culture, however, what do we know about how these societies operated and evolved? Hungarian and Romanian archaeologists have long believed that the inhabitants of Bronze Age tells were an elite class that controlled metallurgical production, trade, and settlements in the hinterland. In the next chapter, I introduce archaeological tools for taking another look at this commonly held belief.

Chapter 6: Middle-Range Theory for Middle-Range Societies

In Chapter 2, I suggested that the terms and social categories used in the literature for Bronze Age Europe mask social variation in the archaeological record. In Chapter 3, I introduced eight socio-economic dimensions for describing variation in middle-range societies: the primary unit of production and consumption, segmentation, household distinction, access to exotics, specialization, demographic scale, intensification of food production, and regional consolidation.

Social dimensions are broad abstractions that allow the comparison between two societies that may be structurally similar but different in the details. Archaeological variables for these dimensions must therefore be tailored to the particular sequence under investigation in order to realistically account for local conditions. In this chapter, I use the archaeological and ethno-archaeological literature to construct reasonable indicators for these social dimensions.

As I argued in Chapter 3, however, these social dimensions are fundamentally interrelated. For example, intensity of craft production is related to intensity of agricultural production (substituting for labour) to the extent that without capital intensive agriculture there can be no full-time craft production. The labour required for such craft production is identifiable in productive units such as households, which may require access to exotic starting materials. Moreover, although an indicator like household architectural distinction might often co-occur with prestige goods or other status signals inside the house, social dimensions are broken down into independent measures that can be evaluated on their own *and* together. This precision has the potential to identify changes in variables for a similar aggregate (such as vertical distinction) at different points in time, ultimately allowing for more sophisticated explanations of culture change.

Here, I build on the particular geo-environmental circumstances of the lower Körös basin (Chapter 4) and the culture history for the Middle Bronze Age of the area

(Chapter 5). The archaeological indicators I construct are therefore specific to this investigation, although they can in most instances be easily modified for use in other areas.

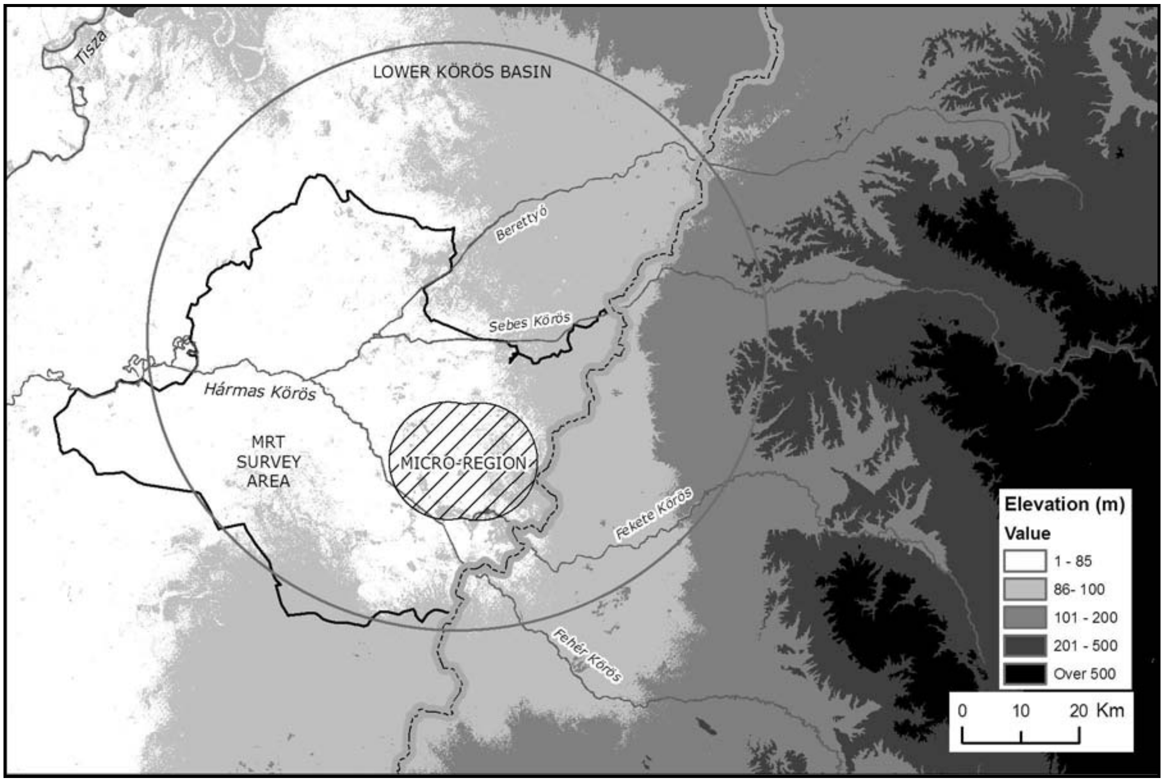


Figure 6.1. Map indicating the extents of the three regional scales referred to in the text.

There are three primary scales at which I investigate patterning in the archaeological record (Figure 6.1). The first and largest region is the lower Körös basin, defined as the Körös river catchment below around 100 m in elevation. It reaches from the Berettyó river on the Hungarian side, to where the Fehér and Fekete rivers meet the foothills of the Apuseni mountains in the southeast. The lower basin is heterogeneous in environmental features, but has a low vertical gradient and common climate and vegetation (see Chapter 4). Although this is not the full extent of the 'culture area', it is an adequate starting point and one of three groups identified within the culture area pointed out by specialists (Bader 1998:103). The second scale is the *Magyarország Régészeti Topográfiája* (MRT) survey region introduced in Chapter 5, for which detailed settlement data are available. The micro-region is the third scale, about 15 percent of the

MRT area, and the primary focus of fieldwork. It is exceptionally rich in settlements and has two excavated fortified settlements at its core. The micro-region and MRT area are discussed at greater length in Chapter 8.

For the eight social dimensions, the archaeological indicators presented here are evaluated using the published literature, original fieldwork and lab analyses. For some indicators the data are very fragmentary, but still worth exploring if only to guide investigation at a finer resolution in the future. For example, at the moment we can sometimes compare house sizes to one another on the same site, or between sites at the regional scale. The published evidence for dietary variation (fauna) is scarce, however, and rarely reported at the level of the household. Faunal assemblages therefore cannot be compared between contexts on the same site, although site-wide data can often be compared between villages in the lower Körös region. Some spatial analyses I introduce in this chapter required detailed settlement data only available in the MRT survey region. Other questions, such as those regarding craft production, can only be addressed using my surface collection and excavation results because there are no data for the lower Körös basin.

Each measure has a minimum necessary resolution to return meaningful information. A variable such as group segmentation, for example, cannot be easily studied using data from houses. Segmentation is an emergent social property, and identifying it archaeologically requires focusing on the entire village or a set of villages. Identifying other patterns still minimally requires comparison of two or more villages because the relationship between settlements is the concern. The distribution of storage at different sites as an indication of the control of grain stores is an example. Although the inclusion of fragmentary datasets in some instances will not provide a nuanced understanding of the region, it will nonetheless allow us to formulate a complete and coherent model (or models) of social life for villagers during the Bronze Age.

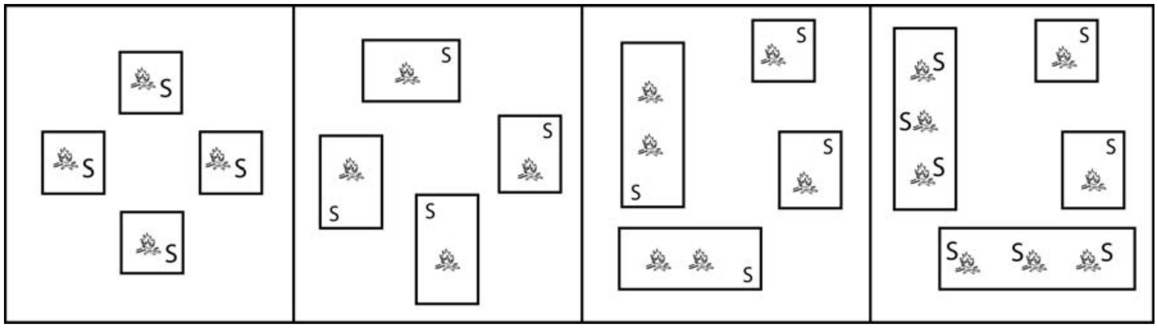
The background for these social dimensions, and their social and evolutionary relevance, is provided in Chapter 3. In this chapter I focus on the archaeological measures themselves and issues of preservation and recovery. A table indicating a limited set of plausible archaeological possibilities for a middle-range society is presented at the end of each section. To the extent possible, all archaeological indicators are evaluated with respect to the published literature for the lower Körös basin in Chapter 7. In Chapter 8, I provide general descriptions of the open settlements and fortified sites I re-visited, surface collected, and excavated. In Chapter 9, fieldwork data are presented as measurements to specific indicators for Dimensions 1-8. A final regional analysis is presented for 'Regional Consolidation' (Dimension 8) in Chapter 10.

DIMENSION 1: PRIMARY UNIT OF FOOD PRODUCTION / CONSUMPTION

Houses are structures in which people live, while households are decision-making units sharing rights, responsibilities and resources (Wilk and Rathje 1982; Hayden and Cannon 1982; Wilk and Netting 1984; Netting, et al 1984; Netting 1990; Blanton 1996; Coupland and Banning 1996). Although they are not the same thing, several archaeological indicators can be used together to plausibly reconstruct the household unit. Most important among these is the configuration of dwelling morphology and domestic features such as hearths and storage areas. I address this morphological variation through three indicators: house size, storage location and food preparation areas. An additional variable, the distribution of environmental resources, is potentially important for identifying the corporate group boundary, but this can only be discussed once local resources (e.g. land availability and productivity) are known.

1.1. House size and productive labour

Large houses often contain multiple families (Chapter 3). This will involve one of several kinds of integration. Archaeologically, shared resources are indicated by the localization of stores. The co-residential units of Northwest Coast groups, for example, can be observed in the replication of archaeological features, such as hearths and work areas within a single large structure (Coupland and Banning 1996). For Northwest Coast groups prehistorically, hearths sometimes had their own storage areas (Hayden 1997; Prentiss, et al. 2008).



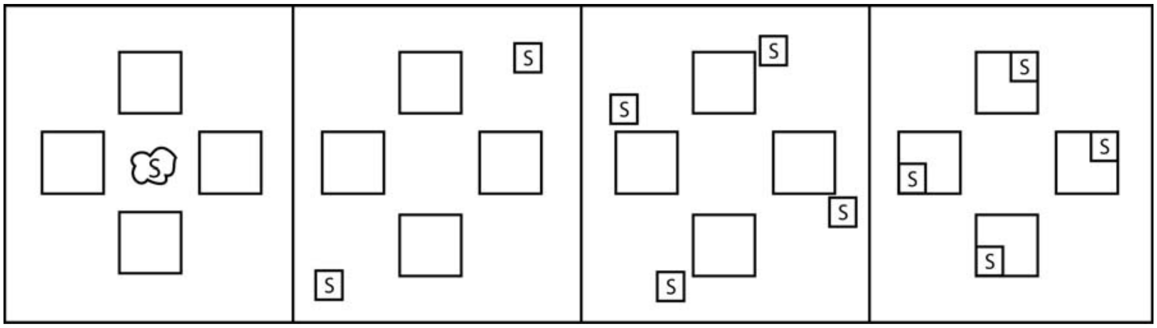
Single, small family household units	Single family household units of varying sizes	Households incorporating multiple nuclear families	Households incorporating multiple nuclear families, with limited corporate sharing

Figure 6.2. Household size configurations. 'S' markes storage location.

I measure house size by square meter, using the dimensions of houses where all four walls have been located. Repetition of hearths and storage locations, where identifiable, suggests more than one nuclear family in a single domestic structure (Figure 6.2). The type of storage in this figure is held constant for clarity of presentation, but is in fact another variable.

1.2. Storage location

The articulation of storage with a household and regional pattern is an indication of who controls it (Ames 1996; D'Altroy and Earle 1982, 1985; Earle 1991; Halstead and O'Shea 1982; Kelly 1991; Margomenou 2008). Where possible, storage should be investigated through three lines of evidence: 1) technology, such as architecture, ceramics, and basketry, that may vary by term (long-short) and type (dry-liquid) of storage; 2) spatial distribution, visibility and accessibility; and 3) volume and variability of stored staples. Dry goods may be stored in pits, ceramic vessels, or baskets, while liquids require impermeable containers. If storage is regionally controlled, it will be found predominantly at the regional center as opposed to households and hamlets (see also section 8.2 under heading 'Regional Consolidation' below).



Communal storage between	Storage for groups of houses	Houses with individual storage outside	Houses with individual storage inside

Figure 6.3. Food storage configurations. ‘S’ markes storage feature.

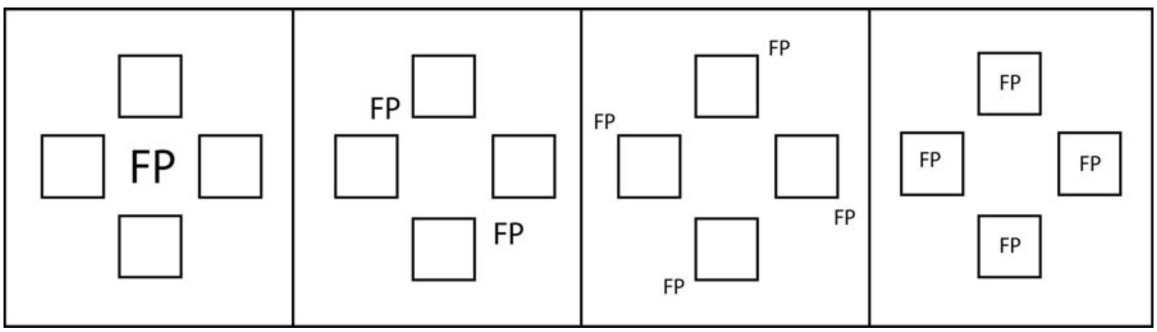
If Bronze Age people used wooden boxes or hung dried fish from the rafters, there is little chance of archaeological recognition. Ceramic storage vessels and storage pits, however, are part of the Bronze Age inventory. The location of these features suggests the minimal and strongest unit of pooling (Figure 6.3). Centrally located storage implies sharing between households and diffuse control of the resource (but see section 8.2 for a regional pattern with potential for equifinality). Storage evidence associated with clusters of housing will be taken to indicate neighbourhood pooling, or residents of two or more structures working as a corporate group. If storage occurs outside but beside houses, we might suspect that individual control took place at the household level. Storage in plain sight, however, might mean pressure to share was potentially higher (Hegmon 1991). When all storage is inside domestic structures, household stores can be downplayed because of their lack of visibility.

1.3. Food preparation area

For agriculturalists outside of industrialized food production, crop processing can only occur in so many ways given a limited technology[44]. We are often able to identify the

[44] There are difficulties testing the hypothesis that activity areas – for example, where food was prepared – can accurately be identified in archaeological contexts due to loss and abandonment of tools and debris associated with them (Kent 1984:164-175). In Kent’s study, this results primarily from the adoption of large quantities of Euro-American manufactured goods, making large bulky items (like tin cans) less likely to remain by a fire, and more likely to be carted off to a nearly pile or trucked to a community dump.

stage of processing of a given context if a large enough botanical sample has preserved (Hillman 1981; Jones 1983). Small, free, and heavy weed seeds remain wedded to the large, free heavy grains throughout winnowing and coarse sieving. A high proportion of small heavy weed seeds (in comparison to the lighter, freer components) found alongside grains indicates fine sieving, the final stage of removing the spikelet from the straw. Fine sieving can be done immediately before food preparation, so the presence of small heavy weed seed can indicate a food preparation area. Grains are also often stored with chaff, however, so under some circumstances the presence of emmer glume bases or barley rachis may indicate the final stages of food processing (van der Veen 2007). In both circumstances, fragmented pulses and wheat grains in higher proportion would indicate immediate pre-cooking preparation areas.



Communal food preparation areas between houses	Food preparation areas for groups of houses	Individual food preparation areas outside of houses	Individual food preparation areas inside houses.

Figure 6.4. Food preparation configurations.

Additional indicators of food preparation which are easier to detect with the naked eye include hand grinders and grindstones for the milling and pounding of grains. Animal butchery is also likely to leave remains near domestic structures (Kent 1984). Both cultural artefacts and animal bones are important indicators because in a continental climate, seeds and chaff will not preserve unless charred. Food preparation location is also an indicator of the minimal unit of pooling, potentially patterning in the same way as storage with similar consequences for social configurations (Figure 6.4).

Primary unit of production and consumption: summary

The three archaeological indicators outlined here, when used in tandem, provide the possibility to reconstruct the primary unit of production and consumption at a basic level (Table 6.1). Horizontal exposures of entire villages and botanical samples from multiple contexts are ideal for reconstructing the primary unit, but more conventional data such as the partial exposure of houses, indicating hearth and grinder location can be suggestive. The scale at which I investigate is the lower Körös basin because excavated contexts are required. However, none of these measures used in isolation can generate enough information to identify household boundaries and the corporate unit.

Arch. Variable	**Range of values**				**Arch. measure**
1. House size and productive labour	Low			High	Structure floor space (m^2), hearth configuration
2. Storage location	Centralized between houses	Outside but close to individual houses	In house pooled between minimal units	In house but associated with minimal unit	Storage jars, associated pits
3. Food preparation area	Collective	Grouped between houses	Outside individual houses	Inside individual houses	Sieving debris and seeds, grinding stones, animal butchery

Table 6.1. Summary of archaeological indicators for primary unit of production and consumption.

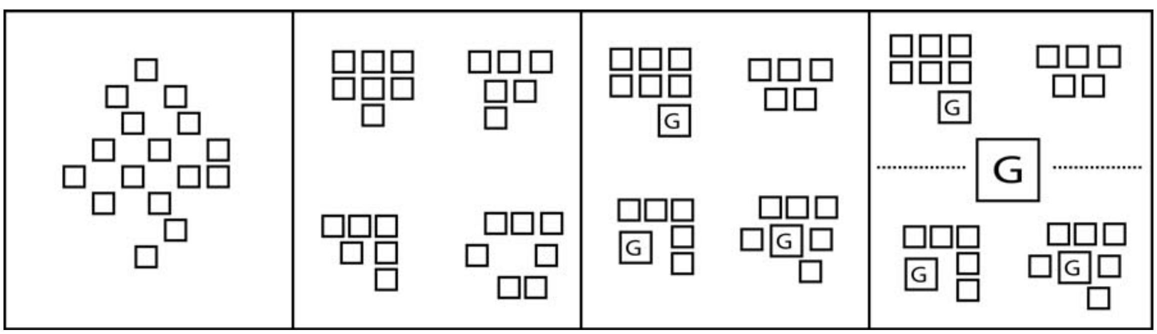
DIMENSION 2: SEGMENTATION

2.1. Segmentation within the village

I argued in Chapter 3 that horizontal social distinctions above the household but below the village level can have a strong impact on architecture and community layout. Houses that form extended households or lineages might cluster together to form neighbourhoods. Such dwelling clusters may indicate corporate groups.

Segmentation such as this can be identified archaeologically, but the correct level of resolution must be attained before a pattern emerges. The procedure is like attempting to capture the image in a “magic eye” poster. Residential clusters or central features may emerge only with the correct scale of observation. Group houses or ritual structures might integrate segments (Alder and Wilshusen 1990). Without large-scale horizontal exposure, this exercise is easier in areas such as Peru or Mesoamerica where standing architecture such as platforms and house bases are identifiable on the surface.

Since large scale horizontal excavation is not an option in Hungary and there is no standing architecture (except fortifications), I rely on the distribution of artefacts on the surface and limited shovel testing to provide an initial indication as to whether any village segmentation existed. Structural indications such as daub stains and artefact sets will be a proxy for residential areas (Figure 6.5). This patterning will be sought primarily in the micro-region because field testing is required. Perhaps the greatest source of error in such an exercise comes from the horizontal movement of villagers at a site over time. Unfortunately, there is currently no way to effectively deal with these post depositional effects.



None	Residential Wards	Residential wards, group houses	Residential wards, group houses, village moieties

Figure 6.5. Segmentation within the village. ‘G’ marks group houses or common spaces.

In addition to architecture, material culture might present indications of horizontal distinctions between segments, but this marking depends on particulars of environment and culture history. Consequently, reconstructing segmentary lines and marking tends to be, at least initially, a fairly inductive process of pattern recognition. As we begin to recognize particular associations between geography, artefacts and architectural patterning in the archaeological record, we can create more specific hypotheses about how they articulate.

Feasting is a feature that often occurs at events uniting segments, although it also can be difficult to identify archaeologically (Hayden 2001; Weissner 2001). Feasts may be held in open spaces or special structures because the whole village, a privileged sub-section of the village, or outside village members are involved in the activities. Alternatively, if there are bigger houses, feasting might occur within them, sponsored by more influential or wealthier household heads.

In either event, rare or labour intensive foods and prestige items might be given away or broken. Unusual or large food preparation and serving vessels might be more common at the locus of feasts than elsewhere in a settlement. The size of hearths and intensity of dumping of animal bones readily suggests a scale. As with the investigation of village segmentation, systematic surface collection and shovel testing can provide a general indication of the distribution of activities such as habitation or feasting, but excavation and multiple contexts are required for any substantive reconstruction.

Segmentation: summary

The evidence for segmentation and feasting can potentially be found in faunal remains and large hearth or consumptive debris in spatial configurations such as those in Figure 6.5 (Table 6.2).

Arch. Variable	Range of values				Arch. measure
1. Segmentation within the village	None	Residential Wards	Residential wards, group houses	Residential wards, group houses, village moieties	Intra-village clustering of surface material

Table 6.2. Summary of archaeological variable for supra-household integration.

Distinctions in material culture at the community level may be misidentified as vertical distinctions rather than segmental affiliation. Totemic or segmental markers may have differential preservation (for example, bone versus wooden earrings) preventing an accurate contrast in how segments (e.g. lineages) are marked. Care must be exercised in concluding that particular archaeological patterns mark hierarchy rather than horizontal distinctions.

DIMENSION 3: HOUSEHOLD DISTINCTIONS

Both vertical and horizontal social distinctions are perhaps most often studied in archaeology through mortuary categories (Binford 1971, 1972; Brown 1971; Goldstein 1980; O'Shea 1984, 1996; Tainter 1977). This is for good reason, as mortuary programs often offer an essentialised version of the social categories that the deceased inhabited during life. Since a mortuary treatment is assembled by the living and directed at an individual, gender and age distinctions, achievement and heredity all have the potential to be recorded. Yet there are many other ways to recover information about social distinctions. Because the archaeology of the Körös region has a weakly understood mortuary record, I place my emphasis on alternative variables associated with houses: placement, build, and special treatment of the exterior.

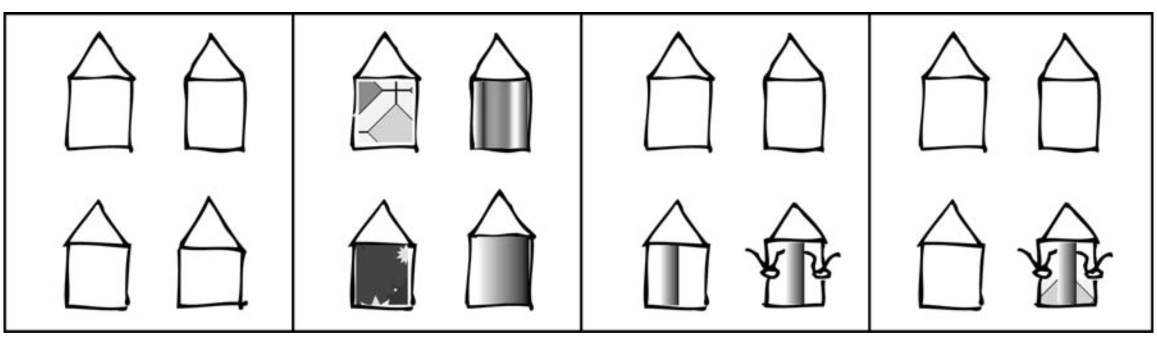
3.1. Structural or placement distinction

Archaeologically, it is difficult to identify proximity to a sacred tree or spring, unless it is redundantly associated with another pattern, such as the center of the village. One obvious distinction that was surely meaningful to prehistoric peoples is which side of a defensive ditch one lived on – the inside or the outside. Given that many of the sites in the Körös River basin are fortified, the placement of house structures inside and outside of the fortification can be considered alongside other household features.

If domestic structures are built differently from one another, these formal differences are also potentially meaningful. Shape (round versus rectangular) is an obvious difference, but the amount of time put into the construction of a domestic structure can also be recognized archaeologically. The size and spacing of posts maintaining daub walls is usually fairly obvious to the excavator if there is any floor or wall trench remaining to follow. Conspicuous use of a rare material such as wood could also be important, although preservation issues affect recovery.

3.2. Special treatment of exterior

Recognizing meaningful patterns in the treatment of house exteriors archaeologically requires identifying distinctions in sufficient numbers to believe they were culturally significant for inhabitants, and not simply idiosyncratic musings without a common interpretive framework. This can be captured both in the number of individual distinctive markers and their redundancy (Saxe 1970:56-58). For example, if some houses are painted, others have stucco, some have textile impressions in geometric patterns, and a few houses have no treatment, it would be difficult to make an argument for any differing status between them without other corroborating evidence (Figure 6.6, box 2). However, if most houses have no treatment, and only a small number are painted with stucco lentils and textile impressions arranged in geometric patterns, a different status distinction is plausible. Displaying trophies such as cattle crania on or within particular structures might also suggest inequalities. If there are multiple, co-occurring distinctive indicators, a redundancy is built into the social message conveying a strong sense of distinction for the inhabitant.



All structures look the same	All structures look different	Distinctive markers are unequally distributed	Distinctive markers are inter-connected and unequally distributed

Figure 6.6. Relative differences in house decoration and construction.

This indicator is particularly weak because its recognition is inherently susceptible to loss not only because of the potential for failed recognition by excavators, but also because of the likelihood of perishable materials being used in distinguishing house exteriors. Nonetheless, I include it here because the exteriors of wattle and daub houses are easily modified in clay by the inhabitants, and often preserve if a house is destroyed by fire.

Household distinctions: summary

Social distinctions are generally sought in the mortuary record because the attachment of social categories to a prehistoric individual is immediate and intuitive to the analyst. Yet we should not forget that social relationships manifest themselves in the built environment as well, and in middle-range societies this evidence may provide a contrast with the burial record (Table 6.3). Excavated contexts are generally required to identify these differences, so my analysis proceeds at the level of the lower Körös basin.

Arch. Variable	Range of values				Arch. measure
1. Structural or placement distinction	Impermanent houses, no wooden uprights	Small corner posts, no central beams	Large corner posts but no central supporting beams	Large central supporting beams and corner posts	Wood beam size and location
2. Special treatment of exterior	All structures look the same	All structures look different	Distinctive markers are unequally distributed	Distinctive markers are inter-connected and unequally distributed	Designs in plaster

Table 6.3. Summary of archaeological variables for household distinctions.

DIMENSION 4: ACCESS TO EXOTICS

To establish the extent to which people had differential access to exotic materials – or differential abilities in obtaining them – we first have to establish what was valued. Exotic materials such as lithics, bronze for weapons or ornamentation, foreign beads and ceramics are all items commonly used to measure differences in access between households or individuals. I use imported stone, bronze, gold, and horse trappings as measures of exotic goods. Great distances were involved for obtaining raw material for stone tools or metal production, so we can assume these were valued resources (Chapter 4). I measure access to exotics using sites in the published literature of the lower Körös basin at one scale and surface collection in the micro-region at another.

Ideally similar contexts would be compared across regional sites, such as house floor to house floor or burial to burial, but this is often not possible because the context of the find is not well understood, or it has not been recorded or published. In this study, the site itself or a stratigraphic level of the site is often the most precise information available.

Difference in access is most easily measured by density of exotic artefacts in a particular area. Consequently, densities of exotics are calculated by estimating the amount of Middle Bronze Age sediment moved during excavation. Recovery strategies also differ by site excavation and these certainly affect the values I produce. This measure is therefore very coarse, useful for only the most general of comparisons.

Here I offer two indicators of access to exotics, each derived from a single measurement based on the published literature. This root measurement is the sum of exotics recovered by category (bronze, gold, horse trappings) and divided by the sum of all (MBA) soil excavated, to achieve exotic / m^3. For surface collection contexts in the micro-region, I present comparisons as exotic / m^2 or ha.

The relevance of the values produced by these measures is assessed based on the overall absolute quantities (and therefore the reliability of the measure), the weight of the values in space, and the way in which the exotics are expected to move (down the line, direct procurement, central place, etc).

4.1. Distribution of exotics

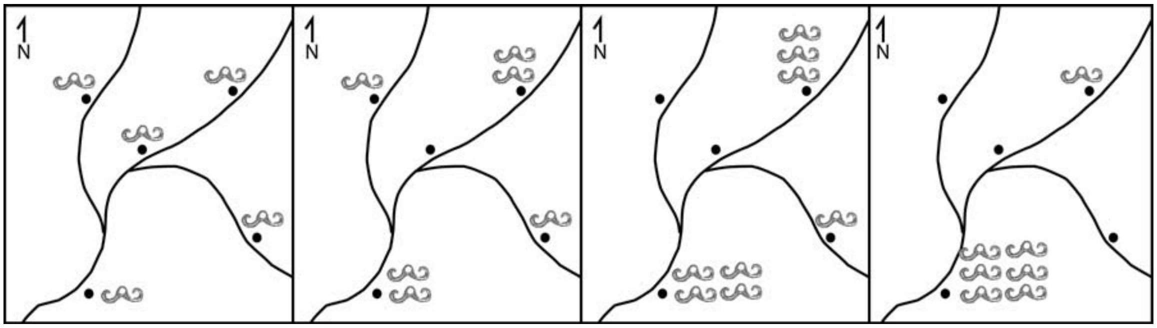
The first measure is meant to indicate which sites, in a very general sense, have access to a particular exotic. I begin with the measure described above, object per m^3 of dirt moved. Since exotics are generally found in low numbers, I standardize them for comparison by making the highest value worth 100. Thus:

$$\text{Index} = \frac{100\ (\text{object}/m^3)}{\text{Highest value of object} / m^3 \text{ in set}}$$

The first measurement is a presence / absence indicator where the threshold for "presence" is above 2.5 % percent of the highest value. This is not a statistical measure, but simply a familiar quantification of where the vast majority of a certain class of object will be found. For surface collected contexts in the micro-region I instead rely on systematically collected units from transects and do not create an index. A different density measure – presence by square meter of surface collection – is used to produce summaries of access to exotics. Since excavated and surface collected sites numbers are based on different recovery methods, they cannot be merged for comparison – they can only be compared between scales of analysis.

4.2. Degree of access to exotic finished goods or resources

This measure indicates variability in access to exotics, and permits a finer reading of the association between exotic access and other site attributes such as ceramic phase and whether or not the site was fortified. The degree of access is measured by the standardized value of artefact by dirt moved, a less stark contrast than the presence/absence representation. Because the measure is put together with fairly coarse methods, although it provides more precision, the values are more inaccurate. Presentation of results from the surface collected sites will depend on sample size. I include a discussion of associated site attributes such as fortified versus non-fortified and ceramic phase. Again, there is a degree of comparison possible between the regional scale and the micro-regional scale, although they cannot be lumped together in a single analysis. Figure 6.7 illustrates the spectrum of possible outcomes.



Equal access. For exotic, all values are 100.	Somewhat unequal access: two sites values are 100, two sites are 50. One site is 0.	Largely unequal access: one site value is 100, one site 75, and one site 25. Two sites are 0.	Highly unequal access. One site is 100, one site is 16.6. Three sites are 0.

Figure 6.7. Access to exotic finished goods or resources. (For readers not familiar with the eastern European Bronze Age, the exotics in this illustration are bronze moustaches.)

Access to exotics: summary

Table 6.4 summarizes the archaeological indicators for access to exotics. Although they are both based on the same measurement, they represent the data differently. The interpretation of *why* differential access exists is not built into the measure. It could result from proximity to resources, location on a trade network, or privileged access by birthright. The possibility that these exotics served as a currency in a regional hierarchy of sponsorship and patronage can only be assessed combining these data with other lines of evidence, but I consider this possibility later in my discussion.

Arch. Variable	Range of values				Arch. measure
1. Distribution of exotics	Equal access	Somewhat unequal access	Largely unequal access	Highly unequal access	Presence / absence threshold for exotic, based on normalized object per volume or area measure
2. Degree of access to exotic finished goods or resources	Equal access	Somewhat unequal access	Largely unequal access	Highly unequal access	Standardized object per volume or area measure

Table 6.4. Summary of archaeological variables for access to exotics.

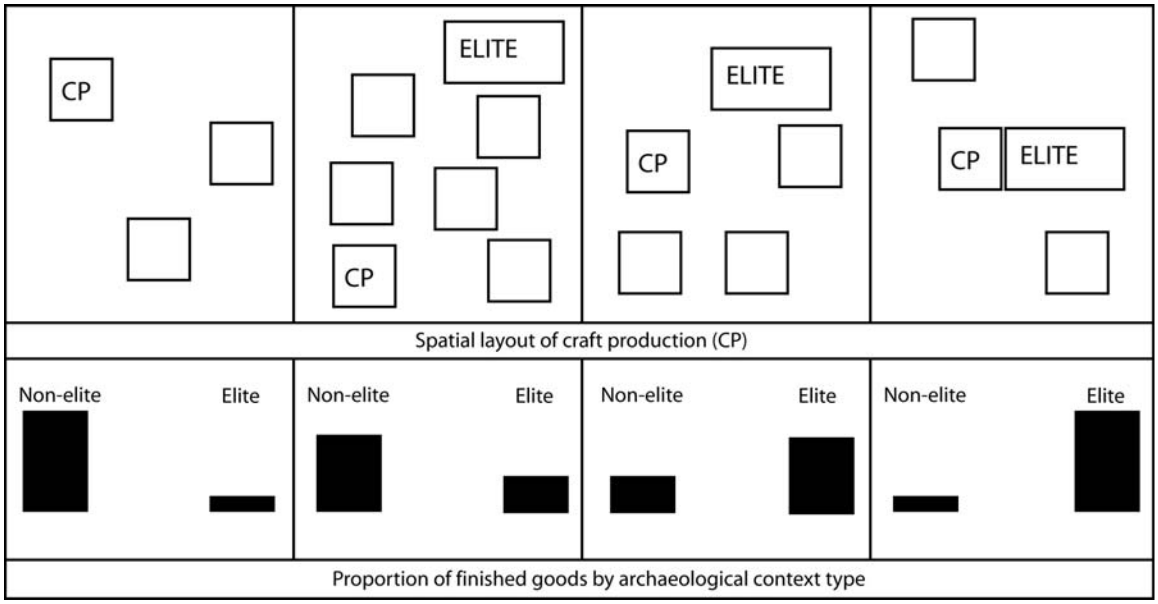
DIMENSION 5: CRAFT PRODUCTION

Craft production has attracted considerable attention by archaeologists, particularly for more complex societies (Brumfiel and Earle 1987; Costin 1986; Costin 1991; Flad and Hruby 2007; Spielmann 1998, 2002; Wailes 1996). Costin's (1986, 1991) four parameters of craft production are again reproduced here. The archaeological study of craft production focuses attention on the distribution and relative quantities of raw material, facilities, and productive waste by collection unit. The specifics of course differ by product. For ceramics, we pay attention to tools, wasters, firing pits, kilns, moulds, and unworked clay. For lithics, we look for the tools of production – hammerstones, punches – and blanks, cores, misshapen flakes and debris. For textiles, we look for needles, spindle whorls, and loom weights. For metals, we look for raw ores, ingots, crucibles, furnaces, slag and scrap metal.

In my treatment, I review the available evidence for the excavated material in the lower Körös basin. I pay particular attention to the micro-regional level for surface collected materials, however, because productive debris such as metallurgical slag is not typically collected by archaeologists working in the area. Although indirect measures of specialization such as standardization have proved useful elsewhere and hold promise for the Carpathian Basin, they are not directly explored here (Costin 1991; Costin and Hagstrum 1995; Shennan 1999).

5. 1. Context (independent – attached)

Attached specialization by definition requires an elite who can control producers, so the presence of this elite must be demonstrated archaeologically before the presence of attached specialization can be posited. Two interrelated measures allow us to assess the context of production: spatial proximities and the contexts of object deposition (Figure 6.8).



Fully independent	Production occasionally required for patron	Production mostly restricted to full time patron	Fully attached to patron

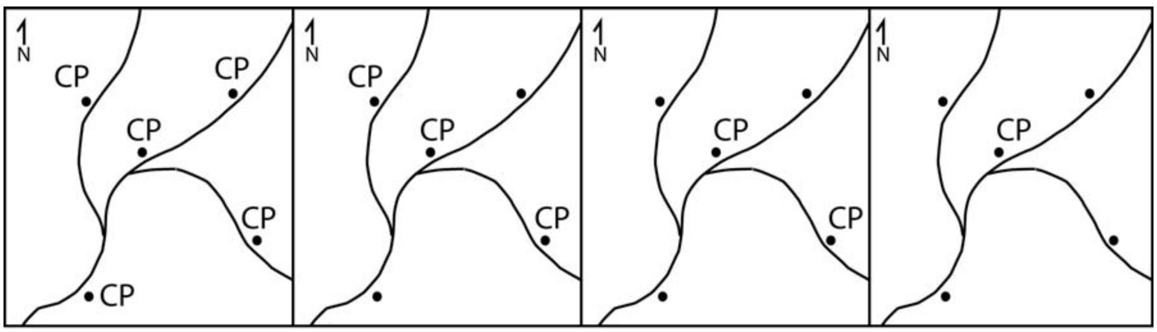
Figure 6.8. Context of production.

Effective control is brought about through spatial proximity and supervision, so we would expect production of particularly valued goods to be located within or next to elite households for full attachment to patrons. By contrast, fully independent craft production can take place wherever is most convenient.

A second way of measuring the likelihood of attachment is in the proportion of deposition in elite versus non-elite archaeological contexts. If bronze clothespins and gold earrings are found only in contexts with other indicators of high status, such as large, distinctive houses, it could be that demand was high enough but from few enough people that a relationship of dependency developed between a craft producer and the craft consumer. Both measures together help us distinguish between various degrees of a craft producer’s attachment to an elite patron. These two measures are often grouped, or assumed to co-vary. Pulling them apart and considering them independently leads to a refinement of questions about how craft production articulated with the broader social context, and how to measure it with archaeological data. Note that where craft producers *are* the elite, the same signature will hold.

5.2. Relative regional concentration (dispersed – nucleated)

Gauging the concentration of production is a matter of defining a region, adequately sampling across site types within it, and measuring the extent to which production is concentrated (Figure 6.9). Costin defines a region as the extent of a particular consumer network. I will break from her approach and instead use a natural geographic area – the lower Körös basin, for one scale (excavated contexts), and the 'micro-region (via surface collection) – for another.

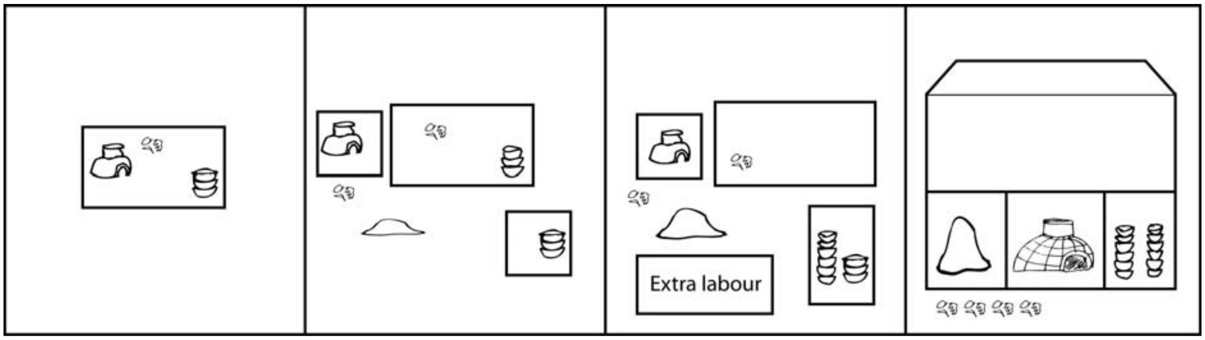


Dispersed, in every community	Broad distribution but not in every community	Nucleated in a few communities within a region	Nucleated in a single community in a region

Figure 6.9. Relative regional concentration. 'CP' stands for craft production.

5.3. Scale (household – factory)

Scale of production is fairly straight-forward to study archaeologically, as it is correlated with the size of the productive facility (Costin 1991:29). At one end, the household produces a particular craft, and its manufacturing equipment and debris are found within or alongside it (Figure 6.10). At the other end is factory production, an industrial scale only found in the most complex middle-range societies, if at all.



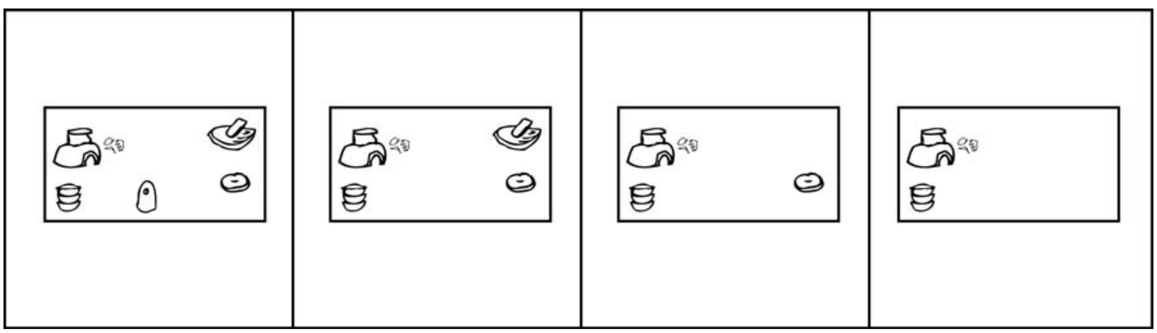
Small, household	Extended household and fictive kin	Extra-familial labour employed	Factory, wage labour (does not occur in middle-range societies)

Figure 6.10. Scale of production. Ceramic production in kilns is illustrated.

The smallest scale can leave very ephemeral remains, and we are often left wondering if this is why craft production is so under-observed archaeologically. At the other end of the spectrum, we expect large scale facilities organized into specialized compartments. The labour used in factory production by far exceeds what we would find even in the largest of households. During surface survey, both the extent to which craft production debris extends across the surface and the density within this area are important indications of scale. The extent of manufacturing debris must not be confused with the size of the productive unit in measuring craft production scale. For example, four households could be independently smelting ore in a particular area away from the settlement without it being a productive scale four times that seen on another settlement where only one household smelted ores. Thus surface collection can be suggestive, but organizational units are best identified through excavation. All regional scales will be included in the discussion of this variable and the categories offered in Figure 6.10 are illustrative only. When the unit of scale changes the efficiency of production will also change in the direction of greater compartmentalization.

5.4. Intensity (part-time – full time)

Intensity of participation in a craft economy is the most difficult of the four parameters to measure (Costin 1991:30-31). The ratio of productive debris to consumptive debris has been offered as a potential measure but is unconvincing. The most productive gauge of intensity, at least at the household scale, is to compare the range of specialized tools between houses (Figure 6.11). Where households with particular craft specialists do not show the range of tools found in houses participating in the agricultural economy, we should consider the reasons for their absence. Due to taphonomy and the reasonable possibility that food production tools are not kept in the house, their absence in the houses of craft specialists is not strong evidence of high intensity craft production. Their accidental presence would nonetheless be meaningful in suggesting that craft production is *not* intense. In the figure below, a house includes a kiln found next to stacked pottery and wasters. Also included, however are a loom weight, a grind stone and slab, and a nut cracker. As intensity of production increases, the objects and their associated activities become phased out and the consistence of the pattern may indicate production for exchange. Of course, with arguments by negative evidence we at least want to base our analysis on examples of catastrophic abandonment, such as when artefacts are left *in situ* in the event of an unexpected house fire.



Part-time, in addition to full time subsistence production	Subsistence production not full time	Mostly craft producing, little subsistence production	Full-time, no subsistence production

Figure 6.11. Intensity of production.

Craft production: summary

Attached and full-time work at regional centers is often the assumption made in interpreting evidence for craft specialists. Clearly, we often observe this cluster of attributes in state societies. Yet despite Costin's pioneering work, the four parameters of craft production outlined here are rarely considered independently and systematically for middle-range societies (Table 6.5). For this reason, and given the range of variability in the ethnographic literature for anyone interested in teasing them apart, the archaeological record has a great deal to offer – not only for descriptions of a single period, but also considering how these parameters interact with one another over time in a broader socio-economic context. Although many configurations exist, relatively few of them require the direct involvement of an elite or even suggest close association with them.

Arch. Variable	**Range of values**				**Arch. measure**
1. Context of production	Fully independent	Production occasionally required for patron	Production mostly restricted to full time patron	Fully attached to patron	Spatial proximity of production to identifiable patron; placement of craft product redundantly associated with other likely status marking
2. Relative regional concentration	Dispersed, in every community	Broad distribution but not in every community	Nucleated in a few communities within a region	Nucleated in a single community in a region	Spatial distribution of production in region
3. Scale of production	Small, household	Extended household and fictive kin	Extra-familial labour employed	Factory	Relative productive capacity and output by excavation or surface finds
4. Intensity of production	Part-time, in addition to full time subsistence production	Subsistence production not full time	Mostly craft producing, little subsistence production	Full-time, no subsistence production	Ratio of subsistence production to craft production evidence

Table 6.5. Summary of archaeological variables for craft production.

DIMENSION 6: DEMOGRAPHIC SCALE

In Chapter 3, I described the interaction between population numbers, stress, segmentation and hierarchy. I have provided measures of segmentation and vertical distinctions elsewhere; here I provide an independent measure of population that we can compare with these findings.

As in many other archaeological ventures, estimating living numbers for archaeological populations is fraught with perils but still instructive (Brumfiel 1976; Chang 1968; Hassan 1979, 1981; Kramer 1982b; LeBlanc 1971; Parsons 1972; Postgate 1994; Schreiber and Kintigh 1996; Trigger 1967). While comparing site sizes alone can be useful (e.g. Brumfiel 1976, Steponaitis 1981), population numbers are required for three topics explored in this dissertation: the implications for segmentation and scalar stress, the likelihood that intensification of food production was required in the micro-region, and the possibility that populations at fortified sites exceeded their productive catchment.

Because density of occupation likely varied by location on a settlement, I use two different measures. First I provide an estimate for the square meters of a house occupied by a single person. Second, I offer an occupation density for two kinds of space, the fortified tell and the open settlement.

Major determinants of housing type are degree of sedentism, climate, and cultural tradition. Since traditional Hungarian peasant houses were made of wattle and daub, and in similar form to Bronze Age houses, I use them to estimate the number of people that would typically live in a house of a given size. Using traditional Hungarian houses has the advantage of controlling for climate and basic domestic economy (small scale, non-industrialized agriculture and animal husbandry). It should be clear, however, that a homological argument is not being made; the Magyars are historically attested to arrive in the Carpathian Basin in AD 895-896. Any population number per unit space I can produce is artificial and can be considered wrong or objectionable in some way. My error will be predictable however, and I discuss it below.

Demographic studies of household size and composition for Hungary are common (Andorka 1976; Andorka and Faragó 1983; Sigmundová 1985), but house measurements less so. I draw on a particular village ethnography that is exceptional in this regard (Fél and Hofer 1969). In Átany, as in most parts of Hungary, houses were made of wattle and daub and traditionally comprised four rooms: a kitchen (*konyha*) foyer (*pitvar*), parlour (*fogadószoba*), and a pantry (*éléskamra*) (Figure 6.12). As in Bronze Age Hungary (Chapter 5), no farm animals were kept in the house. People moved between rooms (or outside) throughout the year, depending on season and household composition.

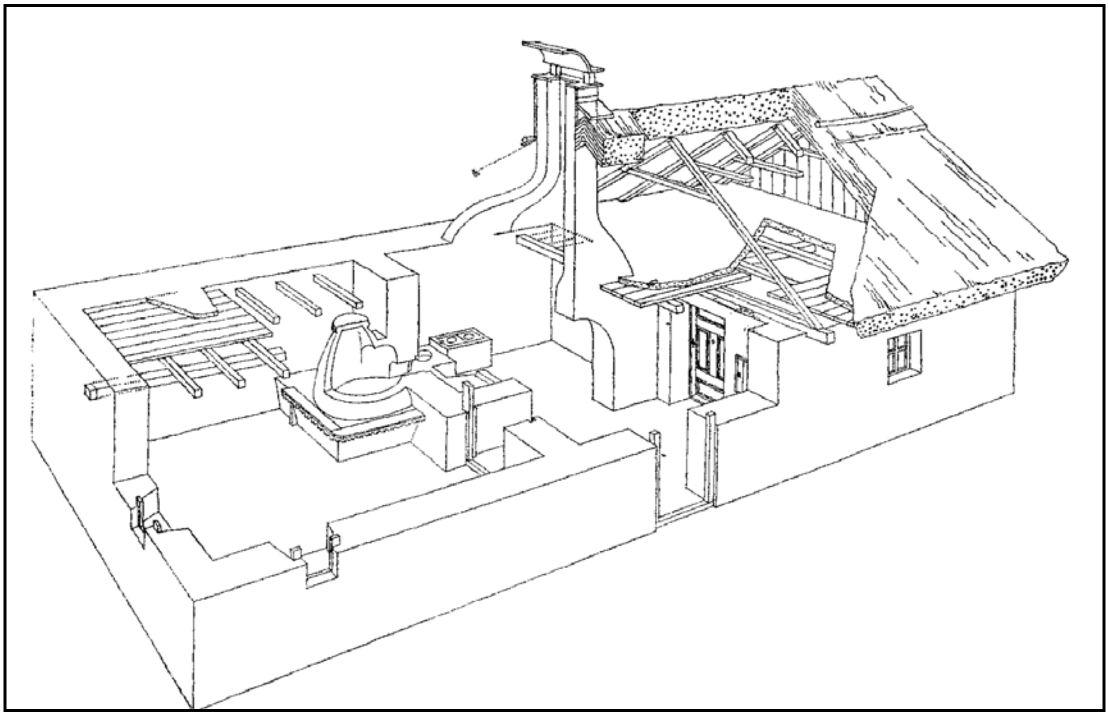


Figure 6.12. A traditional (late 19th century) Hungarian house cutaway (reproduced from Fél and Hoffer 1969:80).

A small house in the village with a nuclear family, the most common co-residential unit, was about 44-52 m^2 (Fél and Hoffer 1969:80-81). The most common number of people in a household was 4, the mean for a 'married couple with children' was 4.09, and the mean for the entire village was 4.1 (Appendix F, N=2033). If we take the 'married with children' mean to be typical for a 'small house', we get an average value of 8.5 square meters per person. A large house in the village typically fell between 70-96 m^2 and housed two to three couples and their children. Such a 'complete stem family' household averaged 5.5 people, yielding an average value of 15.1 m^2 per person. This value would be higher still if we recognize that a large Hungarian *család* (household) extended sometimes over two or three houses. I will keep my estimate at a conservative 10 m^2 per person, broadly agreeable with other such estimates made in the literature for rural agricultural societies (Kramer 1982).

As we saw in the previous chapter, there are two main types of settlement: open and densely settled fortified. Estimating population numbers for these two site types will each require a different calculus, but the floor space per person estimate will remain constant. Plausible population estimates for Bronze Age villages requires simultaneous use of excavation data, survey data, and the overlap between them when available. For this reason, I outline the procedure here with some additional details about Bronze Age house and settlement.

6. 1. Open site population size

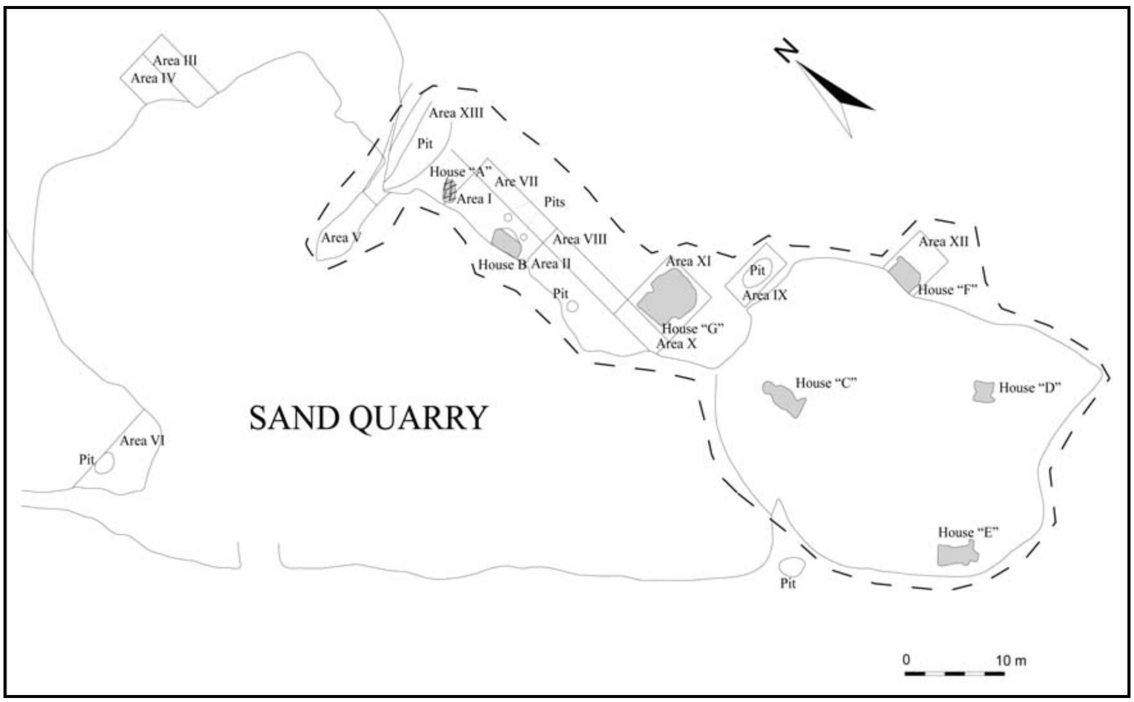


Figure 6.13. Réközberencs-Paromdomb (after Dani 2004, Map 49). Dashed line indicates the 'housing area.'

The largest areal excavation of an open Ottomány or Gyulavarsánd site on the Great Hungarian Plain is Réközberencs-Paromdomb (Kalics 1970; Dani 2004: 293). Excavation in and around a sand quarry uncovered seven houses in a 0.11 ha area (dashed line in Figure 6.13). It is unclear if the deepest part of the quarry would have destroyed all archaeological evidence, but it seems likely. The outlines of most houses even in the higher areas were incomplete, totalling only 54 m^2. I believe this is artificially low, and a product of poor preservation; data presented in the next chapters will indicate why this is so. If we assume an average of 5 by 5 m in dimensions (25 m^2), the total would be 175 m^2 in floor space over 1100 m^2; I use this as a basis for population estimation. With 1 person per 10 m^2 of floor space, and *assuming that all structures were inhabited simultaneously*[45], I calculate that 17.5 people lived here. The summary calculation derived from this is 159 people per hectare.

Although 159 people per hectare might be a reasonable maximum, it does not directly suggest how these archaeological features would be represented on the surface. Réközberencs was not surface collected so we do not know how large of a surface scatter these archaeological features produced. Where this correlation has been addressed for prehistoric sites on the Great Hungarian Plain, surface artefacts seem to extend from 5-25 m to over an area up to four times that encountered during excavation (Raczky, et al. 1985; Zatykó 2004).

Modern ploughing likely accounts for some but not all of a four-fold size inflation. Many suggest that low density "field scatters" radiating out for several kilometres around urban centers probably indicate manure transport to agricultural fields rather than a halo of residential areas (Bintliff and Snodgrass 1988; Wilkinson 1982, 1989). Although the scale at which I believe manuring occurred in the Bronze Age of the Carpathian Basin is much smaller than that studied for the urban centers of the Near East, the patterns might be similar. Based on observed surface artefact fall-off rates for Hungarian sites, I suggest 0.25 – 1 sherd per square meter can easily be a product of manuring (based on a 4 square meter collection unit). Less frequent than 0.25 sherds per meter or very sporadic occurrences I attribute to modern ploughing.

High numbers of ceramics on the surface generally indicate trash in residential areas. The only Bronze Age site both surface collected and excavated suggests between 8-14 sherds per m^2 on the surface of archaeological features such as pits and houses. Shovel testing suggests the same in a screened 20 L sample[46]. There is a fall-off for the density of surface artefacts observable as one moves away from the housing area to midden areas with no surface daub. I illustrate it in Figure 6.14, but do not provide a numerical threshold as I do for manuring and extent of modern surface scatter.

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[45] This assumption is further discussed below.
[46] Based on the average of 9 STP and 6 2x2 over a structure at Tarhos 26 in a quarter-hectare area (Duffy, unpublished notes).

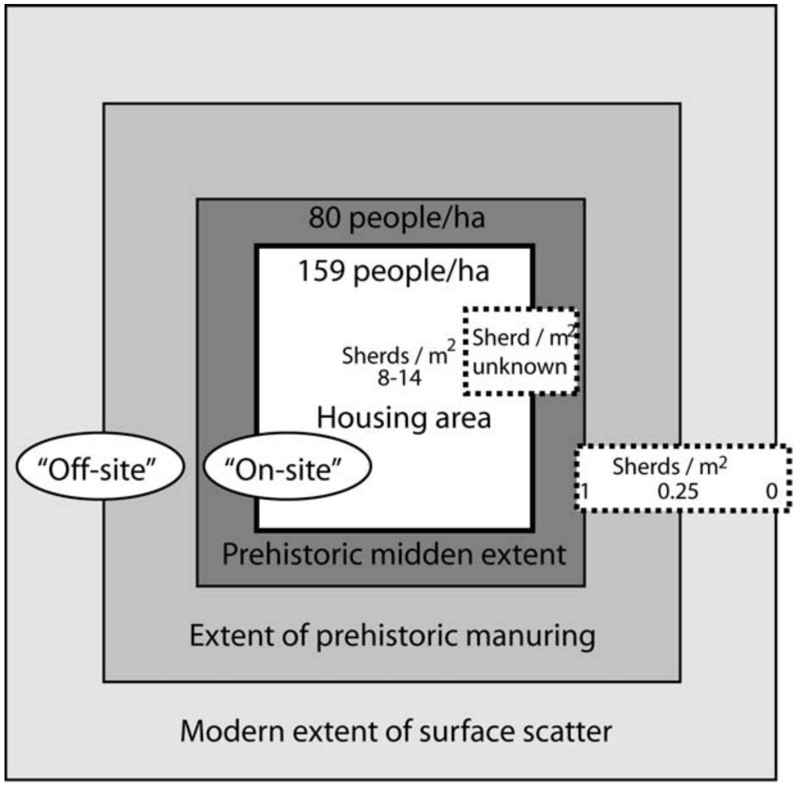

Figure 6.14. Proportional spatial model of prehistoric housing, midden, and manuring areas with the modern surface scatter densities. Population estimate in figure assumes contemporaniety of all structures at Rétközberencs.

A high resolution of surface sampling would be required to define housing areas, where 159 people / ha is a maximum estimate. As a solution I propose a coarser measurement that defines the 'archaeological site' as both the housing area and midden extent. When the housing area is conflated with the midden area, the size doubles to what becomes recognizable as a surface scatter. The population estimate for the area defined at Rétközberencs, must therefore be cut in half: 80 people per ha.

In summary: the term 'on-site' indicates *over* 1 sherd per m^2 in a shovel test or surface collection unit, and the maximal population estimate for on-site areas is 80 people per hectare. If I am wrong about the manuring scatter and this area is plausibly settlement, I provide an alternative, more conservative (larger) estimate in defining boundaries of sites visited during fieldwork: one sherd per *four* square meters (Chapter 8). When the measurement likely includes non-diagnostic sherds from other periods, however, I raise the bar for defining the extent of the prehistoric midden as over two sherds in either a surface collection m^2 or shovel test probe[47].

Having now reasoned how to estimate population numbers for Bronze Age sites in the Körös area, I note that I believe this number is artificially high. This is because I think it likely that only half of the structures at Rétközberencs were inhabited at any given time. I therefore use half of this number, 40 people per hectare, as a more realistic estimator.

6.2. Fortified site population size

As I indicated in Chapter 5, there are generally two components to fortified settlements: an enclosed area of densely built up debris and an open settlement halo surrounding it. The population estimate for the settlement halo will be calculated the same way as other open settlements. For the 'tell' area inside the fortification, as in estimating for open sites, I use the population estimate of 1 person per 10 m^2 of floored space. But the ratio of built environment to open area is much higher than the 10% calculated for Rétközberencs. I use the floor space at Berettyóújfalu-Herpály (55.1%) as an estimator of architectural space to non-architectural space, as it is the largest contiguous exposure in the lower Körös area[48]. Both the magnetometry at Túrkeve and trenches at Sarkad-Peckesi-domb reveal an abrupt fall off in the built environment as one approaches the ditch surrounding the tell (Csányi and Tárnoki 1994; Jankovits and Medgyesi n.d.). More likely this reflects the process of habitable space reduction within an enclosure as the tell deposits pile up, even if they are regularly levelled. Though wary of the likely differences by site due to length of occupation and edge effects, for simplicity I use the figure of 80% of the tell, as suggested by Csányi and Tárnoki, to estimate the percentage of built area inside the enclosure. Multiplying the tell area inside the enclosure by 0.8, and again by 0.551, generates the total estimated floor space.

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[47] Qualitative differences and field impressions between sites make a case by case judgment the most sensible approach for when the volume of non-BA periods present justifies raising the bar to 2 sherds.

[48] This percentage was calculated in ArcGIS 9 based on the site plan for Level 4 in Sz. Máthé (1984:139). The cut away or eroded area of House 9/10 was not included in the area of floor space. It appears that House 9 precedes 15 or postdates it, although the excavators argue that it is contemporary with the others. 195.75 m^2 built space in 355 m^2 of excavation yields 55.1 % built space.

Using this calculus, my estimate maximum is 440 people / ha inside the tell enclosure[49]. This surpasses some estimates for tells in the Near East (Van Beek 1982). This is because 70% of the area at sites such as Tell Marib (Yemen) is in open courtyards, despite multi-level buildings. On fortified Bronze Age sites, there are a few mentions of 'open spaces' – such as at Túrkeve – but no details about size (Csányi and Tárnoki 1994:163). Postholes arranged into a circle and semi-circle suggest a wicker enclosure functioning as a walled pen or sty in Level 6 of Bakonszeg-Kádárdomb (Sz. Máthé 1988:28). These are open spaces of negligible size. The alleyways or 'streets' between houses are therefore the only open spaces we can currently calculate. The lack of obvious courtyards, public spaces, temples or government buildings on fortified sites in Hungary is a powerful contributor to my estimation of residential space and population aggregation.

Nonetheless, because this measure is based on all houses at Herpály being inhabited simultaneously, it too is artificially high. As with open settlement above, I believe that half of this number – 220 people / ha – is a more reasonable estimate of population density inside the enclosure.

6.3. Regional population size

Seasonality, site abandonment, and horizontal shift over time confound not only our sense of the number of sites in a system at a given time, but also their size. Fission and fusion between sites can occasionally be identified using high resolution phasing from ceramics (cf. Blitz 1999, 2006), but I am currently unable to parse out such distinctions due to low data resolution. I use broad ceramic phase dating, the MRT survey data, observations from field visits, and a few plausible assumptions to estimate how many people were around at any given point.

I reconstruct the changes in population numbers for the micro-region in detail (418 km^2). It contains three fortified sites and dozens of open sites with site boundaries published in the Hungarian site gazetteers. I was able to visit several of these, surface

[49] Its actually 440.8 people / ha, but I'll use round numbers to partially lift the false sense of accuracy such precision implies.

collect them and get an indication of the limits of the published survey data. I use conclusions generated from this work to extrapolate the size of sites in the micro-region I could not visit. The result is a size estimate for all of the MBA sites in the micro-region. In general, I err in the direction of 'high' size estimates, invariably inflating the reality of the prehistoric population.

The MRT site list for the micro-region contains occupation evidence for the Ottomány and Gyulavarsánd phases between 2150 and 1400 BC. In Chapter 5, I parsed the Ottomány and Gyulavarsánd into three phases based on the radiocarbon data. These are phases of different length so I use a 'one hundred year occupation' rule for open settlements. Archaeological sites are palimpsests of horizontal movement over time. Due to the slow accumulation of garbage and vermin, I argue that a period of 100 years is a good average length for an open settlement area to be occupied before it shifts horizontally or is abandoned.[50] Because we have evidence of continuous occupation at the tells, I assume they were inhabited at any given time. Taken together, I can estimate how many people lived in the 'micro-region' at a given point in the Middle Bronze Age sequence. I think it likely that the same process of horizontal movement occurred in the open settlement areas around fortified tells, so I also divide these area totals by time (using the 100 year occupation rule) to generate a more realistic population estimate for fortified site clusters. Although artificial, these numbers nonetheless provide a relative idea of the regional population useful for contextualizing major environmental obstacles for settlement and farming, and evaluating claims of population density and 'pressure.'

Demographic scale: summary

Although population estimates are best made on a site by site basis, the detail of information available for individual settlements is rarely adequate for such precision. Therefore I extrapolate based on our best current information for the region (Table 6.6).

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[50] At about 300 years of occupation, Tarhos 26 (see Chapter 8) is an outlier in this respect. The site also has an unusually rich distribution of surface material, and probably more stratigraphic deposit than other open settlements.

Arch. variable	Range of values				Arch. Measure
1. Open village population size	Low			High	Greater than 1 sherd / m^2 or 1 sherd / 20 L STP * 40 persons / ha (Contemporaneity by phase calculated assuming 100 year occupation of site area)
2. Tell village population size	Low			High	Enclosure area (ha) * 220 persons /ha PLUS surrounding open settlement population, as measured above
3. Regional population	Low			High	Gross estimate based on tell and open settlement measures above, MRT site boundary, description, field collection and extrapolation

Table 6.6. Summary of archaeological variables for demographic scale.

The utility of deriving these numbers comes in being able to engage other dimensions of socio-economic life, including the ability of a catchment to feed its population, or the number of segments required to integrate that population, given the tendency of pigs to misbehave in other people's gardens. Since the same basis for estimation is used for all phases, relative changes in population can be observed, even if one rejects the specific population densities suggested here (or chooses to 'correct' them according to the particular parameters I have included).

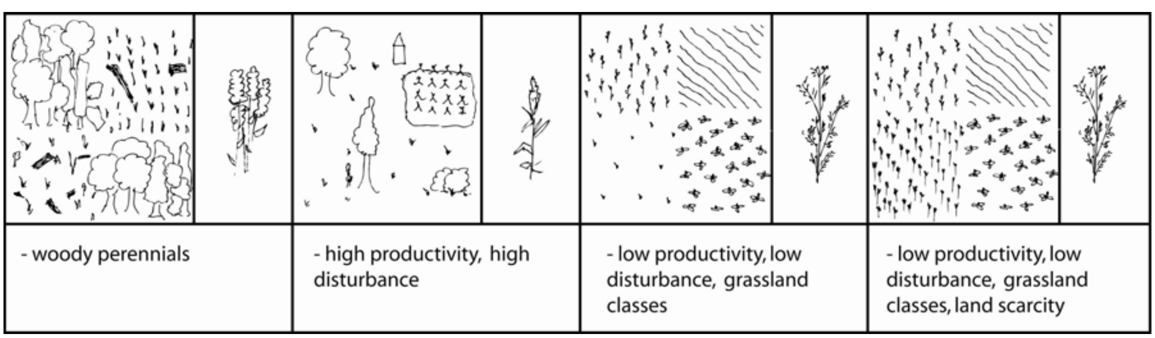
DIMENSION 7: INTENSIFICATION OF FOOD PRODUCTION

Since the faunal evidence for Hungary indicates that no specialization of secondary products took place during the Bronze Age (Chapter 5), the measures of intensification outlined here center on what we know of prehistoric European farming. The expectations for two different variables – general planting strategy and the regional population density compared to available land – together create a tool useful for reconstructing the intensity of food production. A further type of intensification by site locus, including plough agriculture, is incorporated into models built below under 'Regional Consolidation.'

7.1. General planting strategy

There are two archaeological components to reconstructing a general planting strategy. The first and most important is to know the suite of crops in production. Macro-botanical seeds must be recovered through flotation of archaeological sediments, and isolated for identification using a reference collection. These results are essential for modeling productive outputs and reconstructing the seasonal round for a settlement's inhabitants.

The second component is indirect evidence for degrees of intensification. Paleobotanical indicators offer great potential for reconstructing planting strategy, even if they can only be addressed in theory here. Different varieties of weeds grow in intensive gardens and extensive fields on a two-three year rotation and their ecology is becoming increasingly understood. In a study of pulses on the Greek island of Evvia, it was possible to recognize a set of weeds that co-occur with either extensive or intensive cultivation (Jones et al. 1999, 2000). The presence of the same set of weeds in intensively cultivated wheat in Asturias, northwest Spain, and in fall-sown cereals in Germany (using a different set of attributes) confirms that the suite of functional attributes can be used in different geographical areas for different crop types (Bogaard et al. 2001; Charles et al. 2002). These functional attributes (large-canopy dimensions, leaf area per node: leaf thickness, length of the flowering period, etc) are summarized in Bogaard (2004:76-87).



Shifting cultivation (no plough)	Intensive gardening (plough optional)	Short fallow (plough required)	Crop rotation (plough required)

Figure 6.15. General planting strategy suggested by weeds in archaeobotanical samples.

The paleobotanical signature of recently cleared woodland areas sown with little tillage or hand weeding during the growing season – typical of shifting cultivation – is characterized by perennials, especially woodland perennials (Figure 6.15)[51]. Identifying shifting cultivation is easier than identifying other sowing regimes and cultivation intensity. The evidence for intensive gardening provides its strongest contrast. Weeds in fertile environments with infrequent disturbances are typical of intensively kept, manured garden plots. Identifying the two forms of extensive cultivation offered in Figure 6.15 is the most challenging. Weed class is perhaps the most helpful indicator in this respect (Bogaard 2004:138-9). Particular grassland classes are more indicative of extensive cultivation regimes as they correspond to less fertile and/or disturbed conditions (but see discussion in Bogaard 2004:142-5). The plough (ard) was possibly used in combination with intensive gardening, but was not required unless beyond 'normal' surpluses were required. Due to the development of weed roots in short fallow systems, they are untenable without animal traction and plough (Boserup 1965:24-5). The argument for multi-cropping over short fallow might be more convincing if short fallow was difficult to maintain due to regional population density.

7.2. Regional population density and land availability

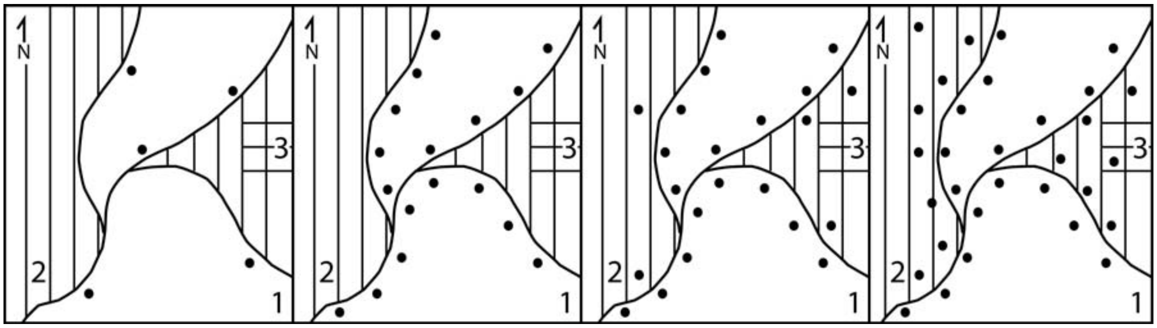
A different way of measuring intensification in planting strategy is to identify an increasing use of lower quality agricultural plots. Recognizing land shortages can only be undertaken using a fine-grained reconstruction of the productive landscape and an estimation of the number and distribution of consumers. For this measure, I use the intensive gardening method because it has the highest productivity per high quality land unit and is attested in the Hungarian Neolithic (Bogaard et al. 2007). This cultivation strategy, its productive capacities and the population's nutritional requirements, are outlined in the 'Regional Consolidation' section below. More intensive use of the region consists of less and less arable land available, and less desirable land brought under cultivation.

Land can be ranked into three classes: 1) prime, 2) sub-prime, and 3) unfarmable. The quality of land in the micro-region is most strongly affected by two inter-related

[51] Analysis of archaeobotanical weed assemblages involves habitat associations, planting season, and taphonomy, and cannot be adequately summarized here. The expectations offered in Figure 6.15 are highly simplified.

factors: soil and hydrology (Chapter 4). At a macroscopic level, the soil of the micro-region is grouped into meadow clays and solonetz. The latter is unfarmable without modern techniques (Botyánski, *pers. comm.*). The second issue is groundwater depth, as inadequately drained land on the Plain prevents crop growth (Nandris 1970). Although groundwater depth is related to elevation, it is not as strongly correlated as one might expect (see Chapter 10). Areas of the micro-region with groundwater 0-1 meter in depth will be considered too wet for grain production. With the areas of high groundwater and solonetz extracted, a base layer remains in which prime and sub-prime land areas can be calculated. The difference between 'prime' and sub-prime is drainage, the most important factor for productivity. Within the lower Körös basin, drainage is strongly conditioned by a small range of local elevation. Even though 'meadow clay' is the major soil class for the micro-region at the 1:100,000 scale, the higher areas (such as river levees) are fertile, while the lower areas are heavy clays only farmable with modern machinery. This is evident on high resolution soil maps (1:5,000) and during field survey.

What constitutes 'high enough' to farm? Whatever it is, it must account for the fact that the mean elevation of the landscape gently rises as one moves east. I argue that elevations in the micro-region with settlement debris from the Bronze Age were permanently dry, and therefore land at or above this elevation was the best drained and prime for agricultural use. First I create an interpolated landscape of values for the micro-region based on the elevations of the settlements. Land 0.5 meter below this was probably farmable most of the time too, but I estimate less reliable during years of higher moisture impacting the groundwater depth and potential for soil saturation. I consider this riskier elevation 'sub-prime' agricultural land. The productive potential of the entire region is then summarized based on these values. As with the demographic estimates, these are conservative assumptions that support the null hypothesis (land scarcity). The reality of farmable conditions was certainly much more complex than this, probably possible at lower elevations than I have specified, but also dependent on vegetation and micro-environmental features.



Prime agriculture land abundant (Twice required by regional popluation	Prime agriculture land rare (Less than 10% prime available)	Prime agriculture land rare, sub-prime land used (Less than 10% of prime available; up to 25% of sub-prime land required)	Prime agriculture land rare, sub-prime land rare (Less than 10% of prime available, less than 10% of sub-prime available

Figure 6.16. Regional population and land density. Numbers indicate rank of land quality.

I gauge intensification by measuring land availability during the Ottomány phase and the Gyulavarsánd phase given the distribution of settlements on the landscape and the minimum nutritional requirements of the settlements (Figure 6.16)[52]. In doing so, I use some admittedly arbitrary numbers simply to delineate a continuum of possibility. For both of these periods, if twice the amount of prime agricultural land was available in the micro-region than was required by the population, regional land use was not at all intense. If less than 10% of prime land was available (my estimated error at coding land quality), then regional land use was somewhat intense. If less than 10% prime land was available and more than 25% of sub-prime land was used, regional land use was intense. If both prime and sub-prime land categories fall in less than 10% availability, then regional land use was very intense. In the latter two categories, some of the population was using sub-prime land presumably because they were unable to secure access to better land, implying some kind of inequality, even if it minimally distinguished new comers from late comers.

Intensification of food production: summary

Table 6.7 summarizes the two archaeological variables for agricultural intensification. Each involves particular relationships between population and the arable environment.

[52] The details of this procedure in the GIS are provided in Chapter 9.

Consequently, each has implications for the adoption of technologies (such as the plough), the viability of moving away from demanding leaders, and the potential market for crafts of specialized producers. Planting strategy depends on paleobotanical samples for which only a few could be obtained during fieldwork in the micro-region, and no specialized weed analysis was undertaken. Population density and land availability is calculated assuming a model of intensive gardening for the entire micro-region, where an accurate, high resolution topographic map was available. Relative differences between the Ottomány and Gyulavarsánd landscape use are quantified to evaluate the potential that intensification of food production occurred during the Middle Bronze Age.

Arch. variable	**Range of values**				**Arch. Measure**
1. General planting strategy	Shifting cultivation	Intensive gardening	Short fallow	Crop rotation	Macro-botanical remains, weed evidence and associated conditions
2. Regional pop density and land availability	Prime agriculture land abundant	Prime agriculture land rare,	Prime agriculture land rare, sub-prime land used	Prime agriculture land rare, sub-prime land rare	Frequency of occupation of areas with sub-prime arable land

Table 6.7. Summary of archaeological variables for intensification.

DIMENSION 8: REGIONAL CONSOLIDATION

There are several archaeological methods for gauging the extent to which a region was politically consolidated. The variables offered here are not independent, but do assess different aspects of social relationships involved in political consolidation. The first component concerns the productive abilities of the presumed centers in the region. By using the population estimate, size and productive catchment of a village, we can estimate whether food surplus from the outside would have been required. The second measure used concerns the control of surplus, and the distribution of storage features across different site types. A third measure, the faunal remains from centers and hamlets, allows a perspective on whether diets were different and if prime-aged animals or high quality meat cuts travelled to the center from the periphery. Finally, I map the spectrum of spatial configurations and develop a way to measure regional consolidation in space by comparing settlement patterns from the Late Neolithic and Middle Bronze Age.

8.1. Catchment productivity for fortified sites

With this indicator I assess the ability of people from a single fortified settlement to grow enough food for themselves. If they could not, the argument might be made that they obtained surplus from other settlements as tribute (Brumfiel 1976; Steponaitis 1981). For this measure, we would ideally know the cultivation strategies and use a collection of flotation samples from several different areas of settlement to identify where different kinds of cultivation took place (see indicator 7.1). For this study, no such data exist, nor was excavation possible, so I instead model two different land use strategies by Bronze Age villagers at the large fortified sites.

Intensive Gardening. The first strategy assumes continuity with the intensive gardening of the Neolithic, where each household farms its own land (Bogaard 2004, 2007). The parameters of intensive garden cultivation have been worked out based on ethnography from Greece, Germany, Spain, and the Near East. The practice is labour intensive, involving row seeding or dibbling, hand weeding and hoeing, manuring and watering (Jones 1992, Jones et al 1999). Seed yield using the dibbling technique is the most effective planting strategy, as a negligible fraction is needed for the next year's seed (Halstead 1987, 1990, 1995). Harvesting is time sensitive and generally all able hands are out in the fields for long hours of the day until it is done (Stone et al 1990; Wilk and Netting 1984). Under intensive gardening regimes, few people go further than 1 km from the village boundary, and it has been argued that 90% might fall within 500 meters of the settlement (Jones 2005; Jones et al. 1999; Charles et al. 2002). No fallowing is required in intensive cultivation, because yearly manuring restores the nutrients. With manuring and middening, the same plot could be used for centuries without exhaustion (Bogaard 2004:161).

Extensive Plough Agriculture. The other cultivation strategy assumes a plough based cultivation regime, where a segment of the population spent their productive energies on activities other than farming but could provide additional labour required during harvest time (Halstead 1995). Seeding is a lot faster because seeds are broadcast rather than dibbled. As a consequence however, seed yield ratios are much worse for broadcasting methods, so significant deductions of seed corn need to be made after harvest yields to estimate availability for consumption (Bogaard 2004:Table 2.1). The distance people will travel for extensive cultivation, however, is much greater: potentially up to 4 km (Charles et al. 2002; Jones et al. 1999).

Grain content of diet. I assume that grain was the dominant source of calories in the diet. This assumption is plausible because the higher the percentage of grain in the diet, the higher the overall caloric value (Gregg 1988). The disadvantage of maximizing grain in the diet is the greater potential of catastrophic losses during a bad year or bad run of years. Eighty percent of the dietary calories from grain and a 'normal surplus' is the baseline used for modeling here (Halstead 1989). At this percentage, arable land is the critical feature, as fodder for animals is abundant on the wetlands and fallow land if plough cultivation is being used (Chapter 4; Nicodemus, *pers. comm.*). Even marsh might be grazed for three months of the year, although inter-annual variability can be high. Labour for collecting and storing the brush during the dry months is the only required input.

Productive yield for cultivation strategies. Under the intensive gardening strategy spelt planted and cared for under this regime yielded up to 1700-1900 kg/ha with 800 kg in the lower end (P. Halstead, fields notes, in Bogaard 2004, Table 2.1, see also Charles et al. 2002). These are comparable to the yields from the Little Butser field trials, which were weeded with hoes three times during early growth but received no manure application (Reynolds 1992 in Bogaard 2004, Table 2.1). To estimate wheat yields for the extensive plough strategy, I use Gregg's (1988) data from the period between 1880-1891 in the statistical yearbooks from Württemberg, Federal Republic of Germany (Statistisch-Topographisches Bureau 1850-1905). The average yield is 1045 kg/ha (Gregg 1988:73). Although the raw data used to produce this average are not presented, the standard deviation is (Gregg 1988: 74, Table 3). At two standard deviations, the lower end equivalent to the intensive garden strategy above, is 665.2 kg/ha (after deducting seeds for next years planting).

Nutritional requirements. According to the World Health Organization, an average human caloric requirement is about 950,460 kilo-calories a year (Gregg 1988:17, Table 1)[53]. If wheat composed 80% of the Bronze Age diet, about 760,000 kilo-calories from wheat were required per year per person. Given 3,300 kilo-calories per kilo of wheat (Gregg 1988:73), 230 kilos of wheat were needed per person, per year. The variables and the values under intensive labour versus intensive capital inputs are presented in Table 6.8 below.

	GROSS output (kg/ha)	**GROSS output (kg/ha) poor year**	**Seeds deduc -ted**	**NET output (kg/ha)**	**People fed per ha****	**Till speed**	**Culti va- tion radiu s**	**Labor bottle- necks**
Intensive garden	1800 kg/ha	800 kg/ha	Neg.	800	3.48/ year	0.035 ha/day	500 m	Tillage, Harvest
Extensive plough	1045 kg/ha	855 kg/ha	20%	685*	1.12/ year**	0.2 ha /day	4000 m	Harvest

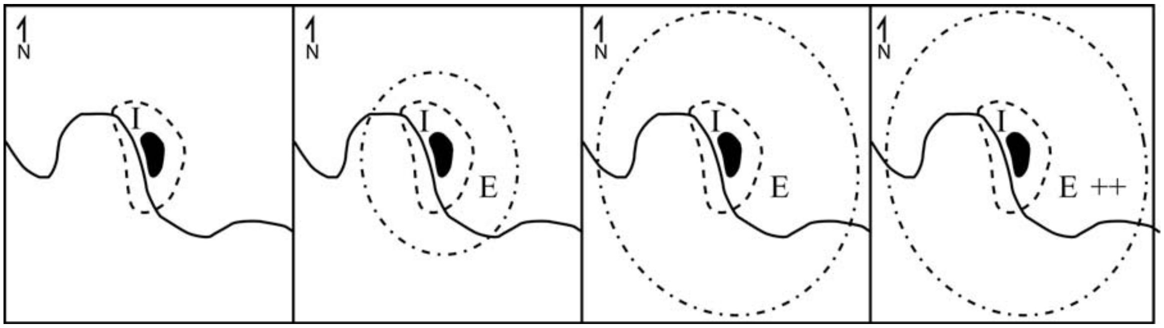
* Not including fallow year
** Including fallow year

Table 6.8. Key differences between intensive garden and extensive plough agriculture by variable.

Similar to my estimate for prime land at the regional level, I use the settlement elevation occupation of the site catchment to model prime arable land, excluding solonetz and peat areas[54]. The number of hectares at or above the elevation of the settlement within 500 m of the village serves as 'prime land' for the 'intensive gardening' scenario. I subtract an estimated 'built space' quantity, and multiply the number of hectares by 800 kg to provide the total productive output. If the needs of the estimated population could be met by intensive gardening only, the most likely explanation is that everyone was farming independently, and the settlement did not draw surplus from others (Figure 6.17). At the other end of the spectrum, it is possible that not only intensive gardening but extensive plough agriculture took place up to 4 km around the settlement, 685 kg per hectare, and still could not provide enough food for the residents. In this circumstance,

[53] Based on two very active adults (male, female), two adolescents (male, 10-12, female, 13-15) and one child (4-6), the average is 2604 kCal per day.
[54] The resolution of the groundwater maps is not high enough to be reliable for overlay.

the asymmetry of required surplus from other settlements strongly suggests that regional political consolidation was achieved.

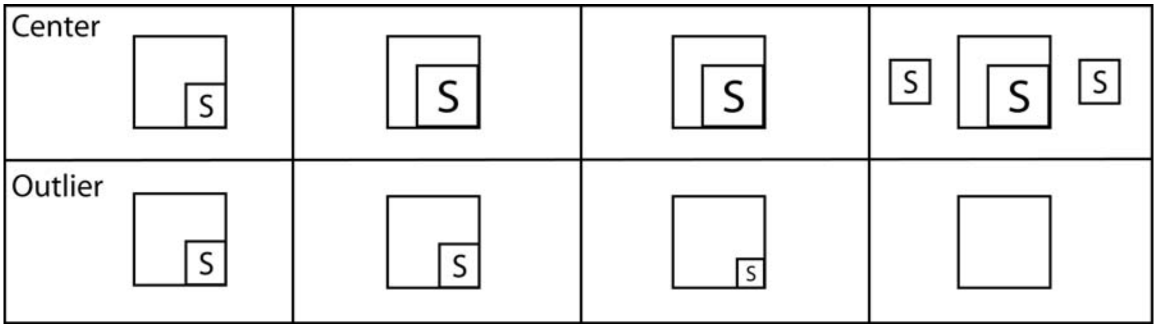


Population needs could be met by intensive garden strategy within 500 m of settlement	Population needs could not be met by intensive garden cultivation alone, but possible with limited extensive agriculture	Population needs could be met only by mixed intensive cultivation and extensive agriculture utilizing fields up to the 4 km radius	Large populations at centers required surplus from other villages

Figure 6.17. Settlement population and stress on the productive environment of centers. 'I' marks intensive gardening catchment, and 'E' marks extensive plough agriculture catchment.

8.2. Control of food storage

Storage capacity at different settlements should not be proportional to their populations if it is being controlled by the center (Figure 6.18). In the study region, long term storage of dry goods would have taken place in large ceramic vessels, in granaries, and in storage pits (see section 1.2). Ideally, similar contexts (inside and outside domestic structures) would be quantitatively compared using the proportions of storage vessel to other ceramics. These proportions could then be compared across site types. The resolution of the data available in this study is such that only a qualitative discussion of storage location can be undertaken.

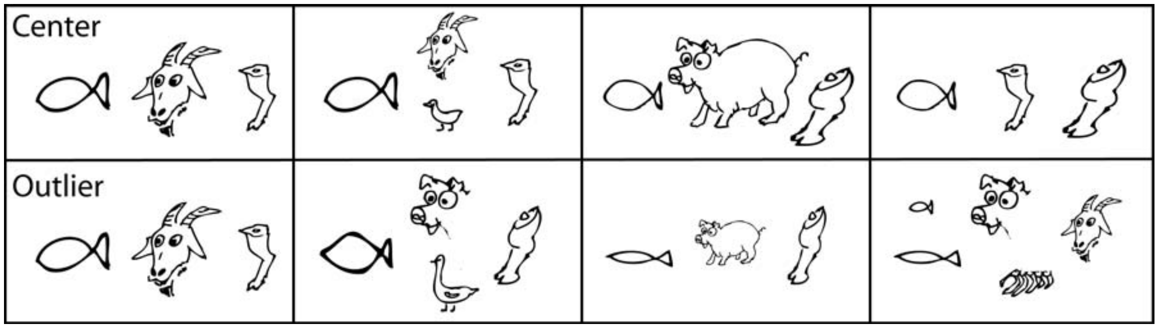


All storage is local for need, communal or intra-household	Local storage, center stores beyond requirements	Food storage mostly at centers	All storage at center

Figure 6.18. Control of food storage.

8.3. Provisioning of meat

I use a comparison of faunal remains between settlements to assess the possibility that people at fortified sites had privileged access to food resources. If a territory falls under the control of an elite social stratum, families of higher social position may have been afforded the opportunity to hunt certain animals that others were not (Crabtree 1990; Jackson and Scott 2003; Welch and Scarry 1995). This possibility is explored through the comparison of two faunal assemblages from the micro-region, Sarkad-Peckesi-domb and Tarhos 26 (Nicodemus n.d.-c). The sample sizes are small, and the sites were collected using different recovery techniques; Tarhos used a screen for recovery, but Sarkad did not. Moreover, they occupy slightly different points (and durations) in time, although there is a chronological overlap. For these reasons, coarser than usual comparisons are made between the sites, in most cases lumping all deposits in order to generate sample sizes large enough for meaningful comparison.



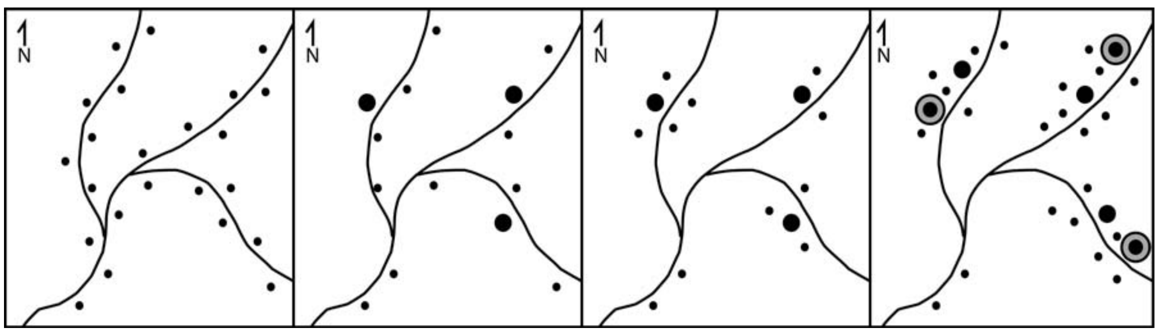
No difference	Differences in kind, but not quality	Differences in quality	Tributary relationship cuts

Figure 6.19. Provisioning of meat.

In the first slot of Figure 6.19, there is no observable difference in species diversity. The operational measure at the coarsest resolution for this is NISP, and all contexts within each site are both grouped for comparison between them, and presented as 'within house' and 'outside house' contexts. If there are differences in species representations but not necessarily in differences in quality (box 2), we may be observing cultural or ecological differences in subsistence patterns. Age profiles of animals serve as the basis for identifying differences in the quality of animals consumed between the fortified center and the outlier site. Prime-dominated mortality curves are dominated by the animals with the highest meat and fat content, and all contexts are lumped together at the site level to bolster the sample size. Inverse mortality curves by species between sites are strong indications of asymmetry. The final scenario is measured by a body part comparison using general meat utility indices. If some households were provisioning other households with choice cuts of meat such as the hind legs as a tributary offering, it will be recognizable in the body part comparison. I do note, however, that the movement of live animals *between* sites, and the movement of tributary cuts *within* sites, tends to the norm observed ethnographically (Chapter 3).

8.4. Regional consolidation in space

In Chapter 3, I outlined several factors influencing settlement location. The meandering river network of the Lower Körös remained fairly stable during prehistory, and therefore changes in settlement over time indicate changes in cultural priorities rather than responses to environmental circumstances (Chapter 4; Gyucha, et al. *forthcoming*). The fortified tell sites of the MRT region were occupied primarily in the Late Neolithic and the Early-Middle Bronze Age (Chapter 5). These sites are considered settlements of regional importance for both periods. Yet the political systems are believed be quite different. Late Neolithic groups in the area are generally considered more or less egalitarian, tribal societies (Parkinson 2002b; Tálas and Raczky 1987). Comparing the settlement patterns of the Late Neolithic and the Middle Bronze Age (Gyulavarsánd) in the MRT region, then, will allow me to identify the influence of regional political differences in the Bronze Age if present (Figure 6.20).



Tendency towards dispersal	Tendency towards aggregation	Site clusters in hierarchy and buffer zones	Primary and secondary centers to facilitate tribute movement

Figure 6.20. Regional consolidation in space.

If there is a tendency towards dispersal then we could expect equidistant sites making maximum usage of available land; deviations from this indicate a tendency toward aggregation. An additional tendency towards aggregation can be measured by differences in site sizes (box 2). This is identified using site size frequency distributions. The third category is the regional site hierarchy with settlement clustering. This is measured by identifying regional population centers and the clustering of smaller satellite sites around them. I add the ‘antagonistic regional polities’ characteristic to this slot, identifiable in the emptying out of productive zones between settlement clusters. The fourth pattern again involves a combination of different site sizes and settlement clustering. Rather than a simple clustering of satellites around centers, however, an additional cluster of secondary centers closer to a primate center is present to ease tribute movement. As patterns 3 and 4 involve polities between 20 to 40 kilometres in diameter, these are best identified as modules in a contiguous survey area 100 kilometres or more across. The MRT area covers an expanse close to this, but I expand the analytical scale to the lower Körös basin for broader inspection.

Settlement size is estimated by using the observed patterns in the micro-region (see section 6.3, 'Regional Population'), a study of single component sites in each period, and qualitative valuations based on individual site descriptions in the MRT. There is no simple way to control for contemporaneity or duration of site occupation, so in essence one palimpsest is being compared to another[55]. First I describe the relationship of site size to fortification. Second, I compare the site sizes between periods as an indication of tendencies towards dispersal and aggregation. Third, I compare site clustering by period by counting the number of sites within set distances of fortified settlements as a percentage of all settlements. If competing regional hierarchical polities emerged in the Middle Bronze Age, there should be an increase in the percentage of sites close to the fortified centers. Finally I consider the possibility that secondary centers emerged in the Middle Bronze Age by undertaking a qualitative assessment of the emergent size categories and relative site position.

Regional consolidation: summary

Table 6.9 summarizes the four variables used in reconstructing regional consolidation. The advantage of such a model is having a matrix of estimated values on critical parameters of the regional socio-economic structure. I use several sites in the MRT regions to evaluate the possibility site size exceeded catchment productivity and tribute was required. The spatial comparison with the Late Neolithic also takes place at this scale. For storage, I look at all the excavated contexts in the lower Körös basin. The identification of meat provisioning relies on Nicodemus's (n.d.-c) comparison of faunal assemblages from an excavated open settlement and a fortified site.

[55] Simulating occupation by randomly selecting a sample of open settlements representative of a given time slot, such as the '100 year period' defined in the 'Demographic Scale' section, might be one solution, but was not undertaken.

Arch. variable	Range of values				Arch. Measure
1. Productivity of catchment at fortified sites	Population needs could be met by intensive garden strategy, land abundant	Population needs could be met by intensive garden cultivation alone, land scarce	Population needs could be met by mixed intensive cultivation and plough agriculture strategy	Large populations at centers require surplus from other villages	Tell population to model capacities under intensive and plough farming regimes in site catchment
2. Control of Food Storage	All storage is local for need, communal or intra-household	Local storage, center stores beyond requirements	Food storage mostly at centers	All storage at center	Regional distribution of known storage pits
3. Provisioning of meat	No difference	Differences in kind, but not quality	Differences in quality	Tributary relationship cuts	Relative faunal composition aggregated by site
4. Regional consolidation in space	Tendency towards dispersal	Tendency towards aggregation	Site clusters in hierarchy and buffer zones	Primary and secondary centers to facilitate tribute movement	Deviance in BA to settlement pattern in Late Neolithic

Table 6.9. Summary of archaeological indicators for regional consolidation.

Asymmetries often exist in a regional exchange between members of autonomous villages. A populous settlement may trade for the surplus it needs, or a small settlement made trade out prime-aged animals for another product. Archaeological identification of regional consolidation as a feature of a politically-based site hierarchy therefore requires more evidence than a single asymmetry to inspire confidence. The identification of this regional hierarchy is the classic definition of the chiefdom (Oberg 1955), and much closer to the pre-state political formations required for state emergence than any other form of local inequalities presented in this chapter (Wright 1994).

CONCLUSION

In this chapter, I presented 21 archaeological variables for eight different social dimensions of middle-range societies. Some of these variables contain additional measures within them, or are useful for several classes of artefact. Each dimension is relevant for understanding other dimensions. Some measures are for the most part independent, while other variables, such as intensification of food production, require data from other variables to be computed.

There is value in having multiple measures of the same dimension. If one measure inflates the actual variation because an assumption is flawed, another measure may deflate it for the same reason. By presenting this list of measures and socio-economic dimensions, I am therefore providing a framework through which to evaluate the archaeology of any middle-range society. Of course I have focused on those particular measures that are applicable to the regional focus here, but the dimensions themselves are of broad relevance and easily modified to study an archaeological sequence somewhere else.

Unfortunately, some measures described here have only small samples of data available for analysis in this dissertation. This chapter not only serves as a guide for the present work, but as a toolkit for future research. In any event, even the starting data produced by these measures will provide a better social model for Bronze Age societies, as the social dimensions are built on theoretically informed premises and the archaeological indicators are independent of homologies and assumptions about the co-occurrence of social attributes.

Such a broad program of work is required to evaluate what we really do and do not know about social variability in many regions of Bronze Age Europe. Although there is much more to say on any one measure and indeed any particular dimension, my goal here has not been to be exhaustive, but to draw out the archaeological consequences of some of the observations presented in Chapter 3. In the following chapter, I present the first test of these indicators for the published literature of the lower Körös basin.

Chapter 7: A Preliminary Study of Societies in the Körös Region

In the preceding chapter I introduced 21 archaeological indicators that can be used in the lower Körös basin to reconstruct the socio-economic organization, complexity and inequality of a prehistoric society. These measures are field proxies for variables of social dimensions introduced in Chapter 3 that, in combination, I argued were essential for understanding the operation and evolution of middle-range societies.

This chapter attempts to accomplish two tasks. The first task is to organize and evaluate the existing data for the lower Körös basin according to these archaeological indicators. The second task is to point out what evidence we are missing for creating a better model of the middle-range society under investigation. This chapter therefore provides a point of departure and point of comparison for the three chapters of fieldwork and analytical results which follow.

I exclusively use the published literature for this preliminary evaluation of the social variability in the Körös region, with the exception of unpublished data from Sarkad-Peckesi-domb. There are also published survey data for the Körös region, but because these sites are multi-component and must be coded in a particular way to be useful, they are not included until some basic site assumptions established during fieldwork can be laid out (Chapter 8).

Evaluating diachronic patterns at the sites in the published literature within the Körös area would be ideal, but in most cases the requisite chronological resolution to address them is not provided in the literature. There is also a concern raised by the one hundred year transitional period during which both Ottomány and Gyulavarsánd ceramic styles co-existed (Chapter 5). Although I group data sets by ceramic phase for comparison when possible, the potential of this contemporaneity must be borne in mind. Also, because I am dependent on the published literature for my information here, I reproduce the precise language from reports in the tables, providing interpretations in the main body of the text.

The primary sample of excavated sites for the lower Körös basin with an Ottomány phase are Gáborján-Csapszékpart, Berettyóújfalu-Herpály, Bakonszeg-Kádárdomb, Túrkeve-Terehalom, Sarkad-Peckesi-domb and Békés-Várdomb. Additional sites with a Gyulavarsánd component are Esztár-Fenyvesdomb, Berettyóújfalu-Szilhalom, and Vărşand (Gyulavarsánd-Laposhalom). The location of these sites is provided in Figure 7.1. Their components, dates of excavation, amount of sediment moved and references are provided in Table 7.1.

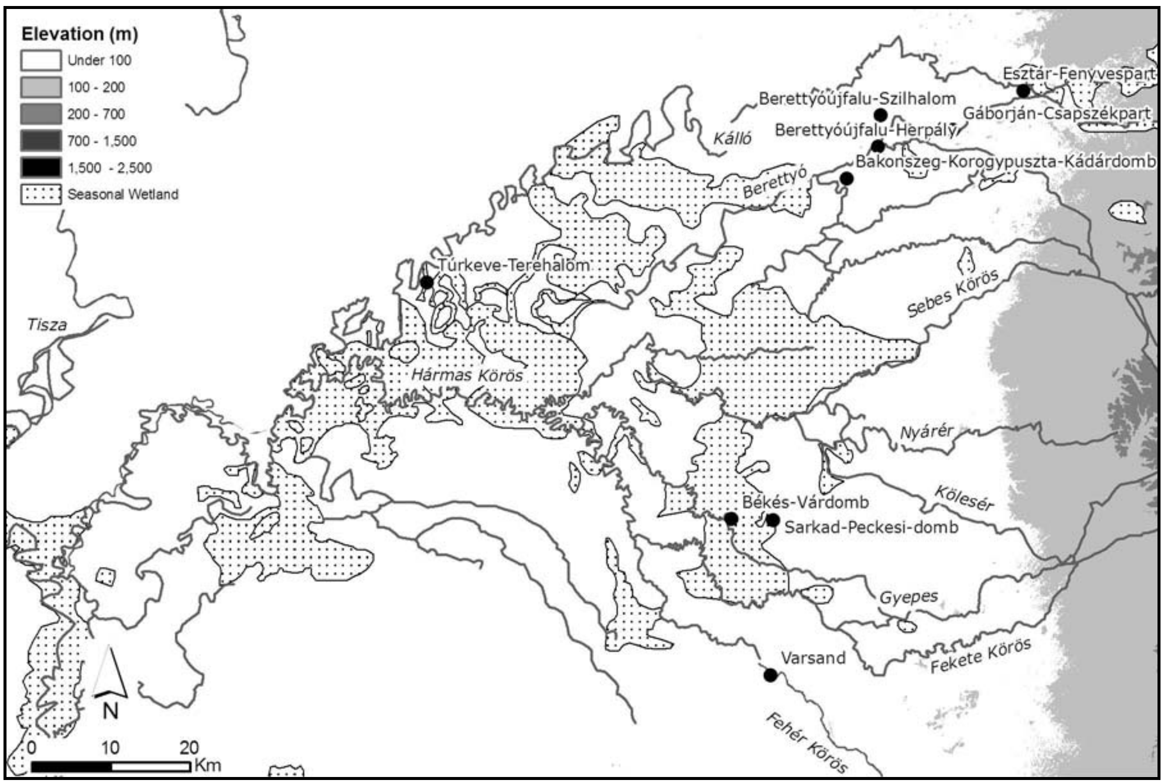


Figure 7.1. Location of sites in the lower Körös basin excavated sample.

Site Name	Phases excavated	Primary Excavation	Volume (m^3) excavated	References
Bakonszeg-Kádárdomb	Ott, Gyl	1974	48	Sz. Máthé 1988
Békés-Várdomb	Ott, Gyl	1950, 1952, 1954-5, 1956-60	1073	Banner 1955, 1974; Bóna 1974
Berettyóújfalu-Herpály	Ott, Gyl	1977-1982	1105	Sz. Máthé 1984, 1988
Berettyóújfalu-Szilhalom	Ott, Gyl	1976, 1979	51	Sz. Máthé 1988
Esztár-Fenyvesdomb	Gyl	1973	32	Sz. Máthé 1988
Gáborján-Csapszékpart	Nyir, Ott, Gyl	1971-1972	114	Sz. Máthé 1988
Vărşand	Gyl	1930	204	Roska 1941; Popescu 1956b
Sarkad-Peckesi-domb	Ott, Gyl	1991-1993	127	Jankovits and Medgyesi 1991, 1992; Jankovits and Medgyesi n.d.; Medgyesi 1993
Túrkeve-Terehalom	Ott, Gyl	1985-1990	1620	Csányi and Tárnoki 1994

Table 7.1. General information on excavations used for analysis in Chapter 7. Excavations without records are excluded from the primary excavation and calculation of volume excavated. Calculations for volume excavated can be found in Appendix C.

After the measure values for each dimension are laid out, I provide a short summary of the measure's contribution to our understanding of that dimension. I synthesize these data at the end of the chapter, provide some preliminary conclusions for Bronze Age societies in the region, and indicate the research still required to make the model complete.

DIMENSION 1: PRIMARY UNIT OF FOOD PRODUCTION / CONSUMPTION

1.1. House size and productive labour

With the exception of Bóna's excavation across the meander at Várdomb, we know house dimensions almost exclusively from the center of tells. Twenty three wattle and daub houses were isolated at Békés-Várdomb, with dimensions varying between 8.2 x 23.5 m (H20) to 25x30 m (H21). Most were very fragmentary and difficult to follow (Banner 1974, Figures 10-11). House size and form were reconstructed 'connecting the dots' between postholes in what seemed by Banner to be reasonable alignments at similar depths. Although I find Banner's conclusions about densely packed housing plausible given his evidence, the particulars of house geometry he offers are unconvincing[56]. Since the 1960s many other tells have been excavated and no other trapezoidal or semi-circular wattle and daub houses have been discovered.

The five sites of the lower Körös basin with the best house information associated with the Ottomány phase are Gáborján-Csapszékpart, Berettyóújfalu-Herpály, Bakonszeg-Kádárdomb, Túrkeve-Terehalom, and Békés-Várdomb. There are nine sites total with any information on house form associated with Gyulavarsánd ceramics. They are the same sites as those indicated above, with the addition of Esztár-Fenyvesdomb, Berettyóújfalu-Szilhalom**,** Sarkad-Peckesi-domb, Vărşand . Of these house excavations, however, only three Ottomány and four Gyulavarsánd houses had enough of the walls preserved to enable a total area estimate. I provide these house size data in Table 7.2. The average for the Ottomány phase is 54.3 m^2 (*N*=3), and the average size of a Gyulavarsánd house (excluding Várdomb) is 42.5 m^2 (*N*=3).

Site	Phase	Dimensions (m)	Total area (m^2)
Bakonszeg-Kádárdomb	Ottomány	6 x 6.5	39
Berettyóújfalu-Herpály	Ottomány	5.5 x 12.5	68.75
Túrkeve-Terehalom	Ottomány	5.5 x 10	55
Békés-Várdomb	Gyulavarsánd	5x3 (on tell); 4x12 (off tell)	15 (on tell); 48 (off tell)
Berettyóújfalu-Herpály	Gyulavarsánd	4 x 6	24
Sarkad-Peckesi-domb	Gyulavarsánd	5 x 8	40
Túrkeve-Terehalom	Gyulavarsánd	5.6 x 11.2	62.72

Table 7.2. House size data for the lower Körös basin.

1.2 and 1.3 Food preparation and storage locations

The resolution of publication currently does not allow much discussion of food preparation areas at Bronze Age settlements. In artefact catalogues at the end of articles and edited volumes, grindstones and net weights are often listed but without provenience

[56] It is possible that the short treatment of the house remains was due to a lack of publication space. If this is so, the claims of wattle and daub structures might be further evaluated by considering the unpublished notes and maps of the excavation now kept at the National Museum that Banner invites the reader to peruse (Banner 1974:20).

data. It is clear that hearths occur inside houses, but additional evidence for food preparation is desirable because fire can be used for warmth as well as cooking.

The evidence suggests that all storage took place inside houses. Despite attempts to locate one, there were no exterior features at Túrkeve that could be interpreted as granaries. A 20 cm thick layer of charred grain inside a house in Level 7 suggested to the excavators that it was stored in the loft of the house (Csányi and Tárnoki 2003:160)[57]. There are multiple pits inside houses at Herpály (Sz. Máthé 1984). The excavator leaves them uninterpreted, but I believe they could have served storage functions. Charred grains in Level 6 at Bakonszeg, associated with a storage vessel (54 cm high) on a floor, also contributes to internal storage being the most likely scenario (Sz. Máthé 1988:28).

Primary unit of food production / consumption: summary

The evidence for the primary unit of food production and consumption is small but suggestive. The size range is similar between phases: in the Ottomány phase, structures range from 39-69 m^2, and in the Gyulavarsánd, 24-63 m^2. The three known from the Ottomány are more similar in dimensions, 5-6 m on one side and 6-13 on the other. Of the Gyulavarsánd houses however, two sorts have been described – the larger kind from the previous period and another structure a third of the size, floored mostly with wooden planks. It is also possible that these small "wooden floor houses" are actually only a part of a house, as they are illustrated for Level 2 at Túrkeve (Csányi and Tárnoki 1994:161, Figure 116). A similar example is found in Level 3 at Bakonszeg (Sz. Máthé 1988).

Where hearths were recorded, they are round or oval on the floor, generally not moving over time, sometimes occurring with adjacent ash pits and occasionally with sherd lining (Herpály, Várdomb). There is no indication from site descriptions that there are multiple hearth locations in these houses. This suggests that household size was small on tells. If we use the demographic estimators developed in Chapter 6, houses held 4 or 5 people. Interior storage suggests that the primary unit of production and consumption was a small nuclear household, or small stem-household.

[57] The authors also believe that the lack of granaries in the excavated area of the tell suggests that they may have been outside the fortification. I find this unconvincing.

The implication of these combined lines of evidence is that food sharing was atomized into small consumptive units, and that most decision making power could probably be found at this level. That houses clustered so tightly on the tell suggests that its residents formed part of a decent group. If this house cluster was a unit of corporate ownership, the tell itself and the built fortification around it were probably the shared property.

The absence of large houses is interesting. One can imagine all kinds of travel and exchange in the Middle Bronze Age, and therefore the potential for village leaders to accommodate and entertain travellers and traders. That no houses are much larger than others indicates that this task did not fall disproportionately on a single household. The atomization of productive groups indicated by internal storage suggests there was no particular task that might have required the very close cooperation of nuclear families, such as the productive effort required for reef netting on the Northwest Coast. It does not preclude domestic group work between houses, but individual storage inside houses indicates less emphasis on multi-house work. Small household size also suggests that there was no reason for a strong division of labour to evolve, as it did among the Huron, where a matriline kept the house going while men were off hunting. Small residences then perhaps held a nuclear family, collaborating more as a small unit than in any other kind of aggregate, such as along descent or gender lines.

DIMENSION 2: SEGMENTATION

In this section I evaluate the evidence for internal settlement organization. There are two known spatial components to tell sites of the lower Körös. The first is the tell itself, invariably fortified with a ditch. The second is the other side of this ditch, usually characterized by settlement debris on the surface extending around the tell like a halo. Any consideration of intra-settlement structure, must take into account these two components. Because Várdomb, and Sarkad-Peckesi-domb, have the broadest-reaching data, these sites will be completely presented before I summarize the remaining evidence.

2.1. Segmentation within the village

At Várdomb, the organization and density of structures on the tell itself is clouded by the complex stratigraphy, high level of bioturbation and primitive excavation methods characteristic of the 1950s (Banner and Bóna 1974). Arbitrary shovel spade depths (*ásónyom*) in a 347.5 m^2 exposure were used during excavation and a short allotment of time was given to the exposure by comparison with today's methods. Nonetheless, solid hearths and floors with wooden planks isolated by the excavation team were followed and mapped. Still, these were published as a list of features, rather than as contemporary objects related in space. We therefore do not have a very good understanding of the internal composition of the tell, and the layout between houses and other features.

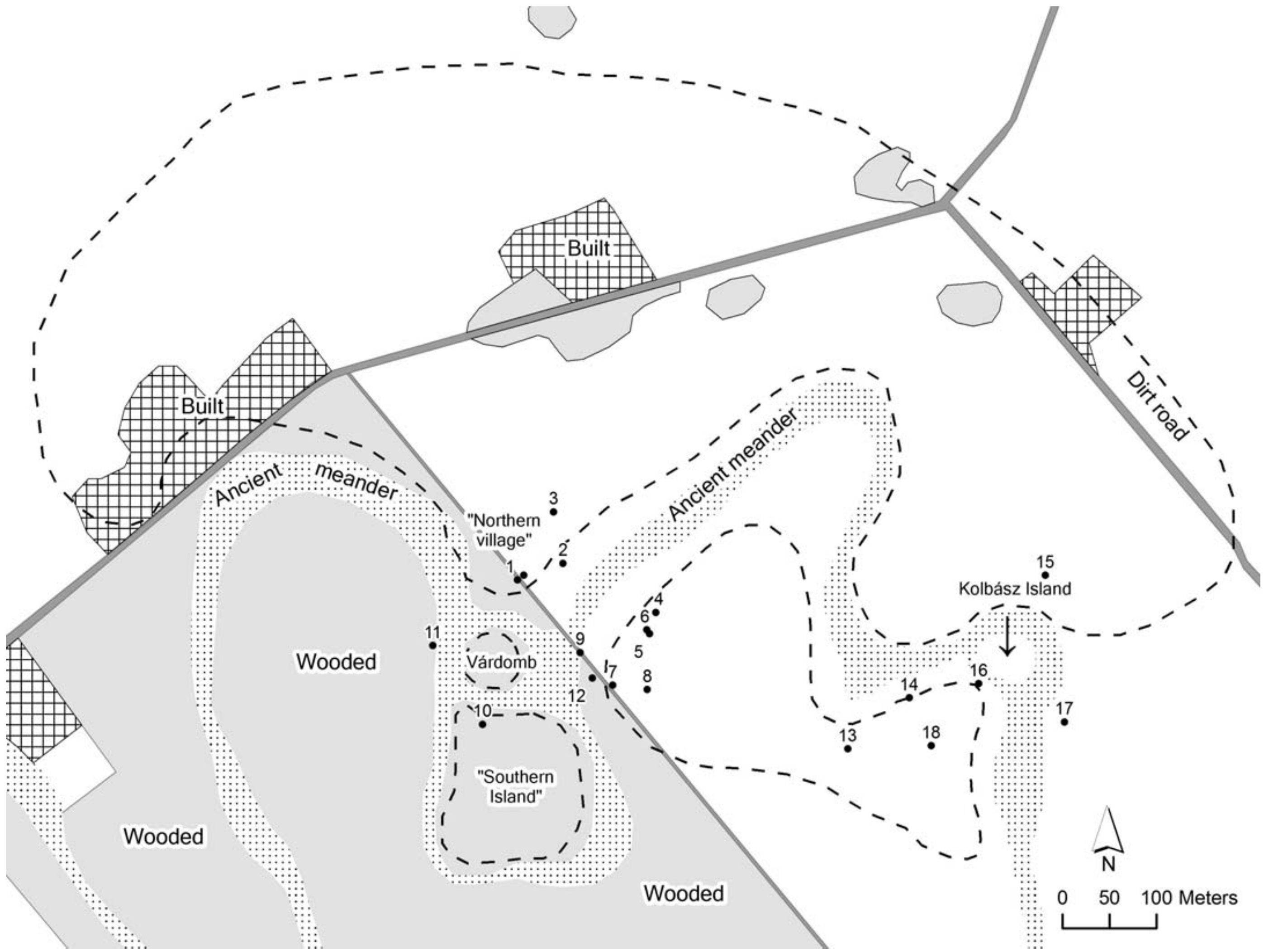


Figure 7.2. Bóna's trenches in the surrounding of the fortified Békés-Várdomb. Dimensions of the ancient meander are reconstructed using the 84.5 m topographic contour line. Dashed area is the extent of archaeological material identified by MRT surveyors (Jankovich et al. 1998).

Várdomb was originally a bank on the inside of a meander loop (Figure 7.2). Two ditches were dug perpendicular to the river, creating a round island isolated from land. Bóna sampled the surroundings of the tell by excavating eighteen trenches in his attempt to locate a Middle Bronze Age cemetery (Bóna 1974) (Table 7.3). This constitutes the only excavation off the Bronze Age mound from the lower Körös basin.

The northern bank is where Bóna put in the first three trenches. The first trench produced settlement debris and late MBA ceramics. The second, about fifty meters east of it, also turned up debris from burned structures. North of this another fifty meters was a hearth, although there was no house or floor. The fourth through ninth trenches were on the eastern bank. The fourth was perfectly empty, but Gyulavarsánd sherds and another hearth came from the fifth and sixth trench. The seventh and eight were also closer toward the river bank, and only surfaced ceramics and bone. It is in this area that Bóna suggested feasting occurred. The ninth and twelfth trenches, the closest to the river bank (5.25-5.5 m above datum), produced nothing, perhaps a sign that the river had been active at this elevation during the Bronze Age.

Excavation Unit	Dimensions (m)	Depth to sterile (cm)	Finds
Trench 1	0.8 x 5	170	Burned houses, Gyulavarsánd ceramics
Trench 2	6 x 1	170	Burned settlement layers, followed by a "sterile inundation deposit"
Trench 3	6 x 1	124	Burned areas suggesting fireplaces, but no houses or floors
Trench 4	6 x 1	60	Perfectly empty
Trench 5	6 x 1	60	Fireplaces with Füzesabony ceramics
Trench 6	6 x 1	60	Late MBA ceramics
Trench 7	6 x 1	70	Ceramic and bone
Trench 8	6 x 1	70	Ceramic and bone
Trench 9	6 x 1	70	Not a single find
Trench 10	6 x 1	120	House floors, Gyulavarsánd ceramics and bone
Trench 11	10 x 0.8	76	Nothing worth mentioning
Trench 12	12 x 0.6	44	
Trench 13-18	6x1	30-40	No finds – surface material likely from Kolbász Sziget

Table 7.3. Exploratory trenches laid in the surroundings of the fortified site of Békés-Várdomb. Find descriptions closely correspond to the descriptions in the publication (my translation).

The tenth trench was on the south island, the area that Bóna considered to be the most likely area to have the cemetery, but almost the entire island was wooded. Quite unexpectedly, this area was rich in settlement debris, house floors, and hearths. A great deal of ceramics and animal bone filled these layers. At the bottom of the deposits in the 'southern village,' as in the northern village, 'brushed' ceramics were very common, an indication that both areas were likely settled simultaneously with the tell. The eleventh trench was the only one placed on the western bank, shallow (76 cm) and "did not contain anything worth mentioning" (Bóna 1974:135, my translation).

The final area tested (trenches thirteen through eighteen), was the eastern meander bend surrounding "Kolbász Island." A great deal of settlement debris covered this small artificial island in the meander, so Bóna's team avoided it in their search for the cemetery. All of these trenches came up negative at a depth of 30-40 cm. In summary then, in addition to the tell, Bóna identified three areas of dense settlement and an area of potential feasting. Using the descriptions and the topographic map provided, an additional 4 hectares of settlement could easily be suggested. These sites now form part of the larger MRT survey, identified as Tarhos 1 (Várdomb), Tarhos 2 (inlcuding the 'northern village'), Tarhos 19 (the eastern bank and 'Kolbász Island') and Tarhos 72 (the 'southern village').

Sarkad-Peckesi-domb (Sarkad 8) is 5 km east of Várdomb on the same Bronze Age meander, and also the other tell settlement with broader settlement information (Figure 7.3). Although 150 m^2 in area on the tell were exposed between 1991-1993, six out of eight exposures were 1.5-2 m wide trenches, 7-17 m in length (Jankovits and Medgyesi n.d.). The purpose of these long trenches was to locate migration period burials, and therefore the trenches focused on the western side of the tell, with a couple of areal exposures in the middle. At least four structures (three wattle and daub and one wood planked) were isolated in close proximity to the eastern edge. A single oven was isolated in Trench 6, outside of any visible house.

Like Várdomb, the tell of Sarkad-Peckesi-domb is circular. But at 0.55 ha, it is twice Várdomb's area. Although the dimensions are somewhat different, the similarity of the structural relationship to the open settlement is striking. The tell is isolated as an artificial island with occupation evidence on both the southern island, and the northern bank. The northern bank and southern island are two of five discrete sites that were identified and described around the tell during the MRT survey (Sarkad 7, 9, 88, and 89).

This might constitute our best information for settlement surrounding the tell because surface material was extremely revealing. After fresh ploughing, large rectangular spots of wall daub (ca. 6 x 12 m) occurred in several places around the tell, and these were marked on an unpublished 1:10,000 map during survey (Jankovits and Medgyesi, n.d.). On the western bank of the meander, (Sarkad 88), there were five daub stains (Figure 7.3). On the northern bank (Sarkad 7), there were eight. Approximately 500 m to the northeast, and due east of this tell's 'northern village', another nine stains coloured the surface (Sarkad 5, not visible in Figure 7.3). In summary, three additional settlement areas occur outside the tell, minimally numbering 22 structures.

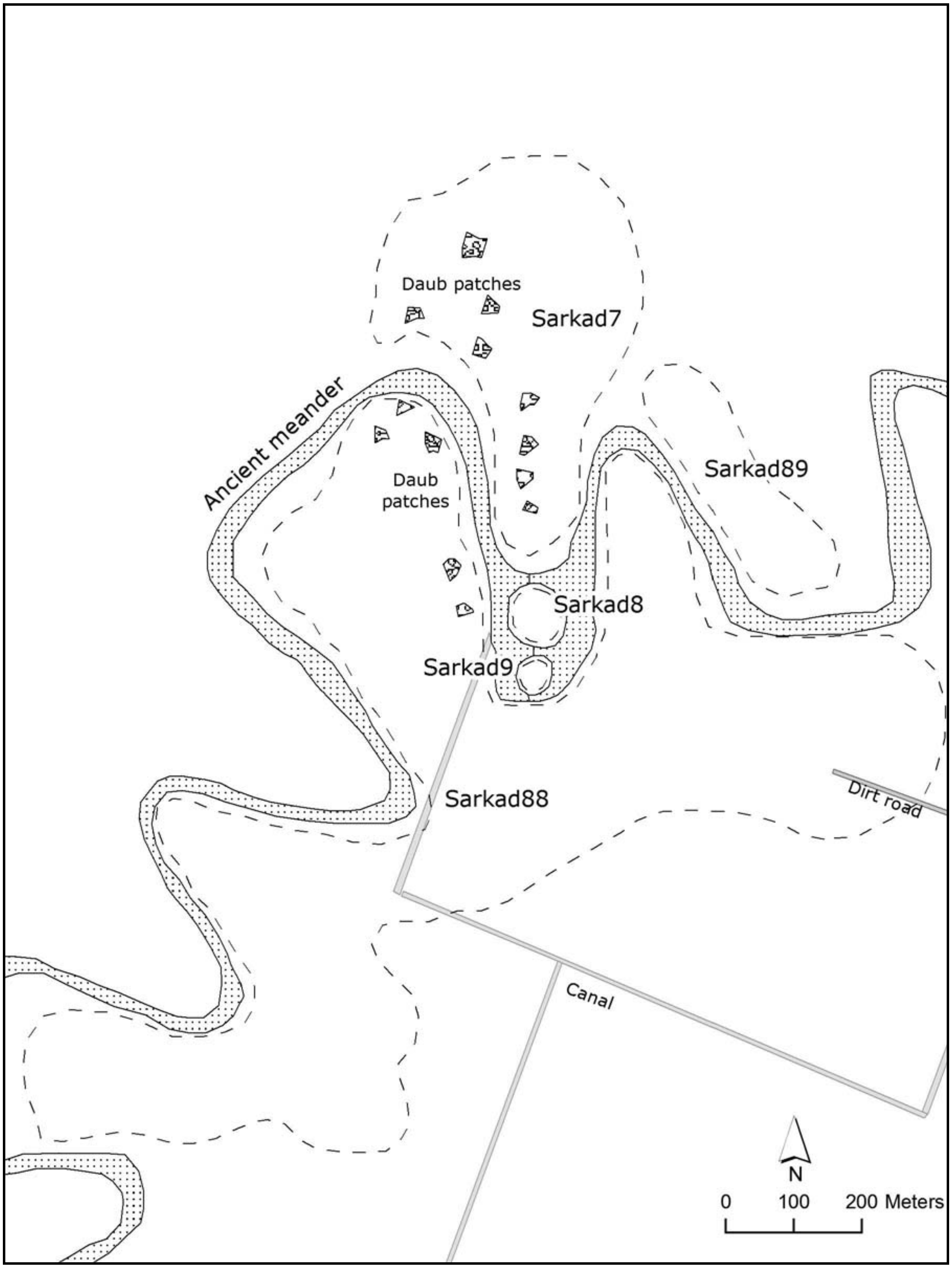


Figure 7.3. Sarkad-Peckesi-domb (Sarkad 8) and surrounding sites.

As I indicated in Chapter 6, our best information on the internal organization of the tell comes from Herpály. After Várdomb, Herpály had the largest contiguous horizontal tell exposure of the lower Körös sites. The fourth level of the excavation includes the remains of houses 8-10 and 14-16 is the most convincing plan to detail settlement density (Sz. Máthé 1984:139). Alleyways between perpendicular houses are about 1.5 m wide. The "street" between houses 8 and 9 is 5 m. Calculation in a GIS indicate that 55.1 % of the tell surface is built[58]. It is unknown to what extent some houses were uninhabited or abandoned during the use life of the tell, but as I have suggested in Chapter 6, perhaps half of area is a more reasonable assumption.

A considerable horizontal area (300 m^2) was also exposed at Túrkeve, with comparable reports. Magnetometry at this site led the excavators to estimate that 50 x 80 metres, 80% of the tell surface, to be densely built up (Csányi and Tárnoki 2003:160). The alleys are 80 cm in the earlier layers and are not larger than 1.5-2 m wide in the later layers (Csányi and Tárnoki 1994:16). Large houses were continually re-built on the same spot. The excavators say there was enough room on the tell for some twenty houses.

Segmentation: summary

In summary, the evidence for the internal organization of the tell suggests a dense concentration of houses that may (or may not) have been occupied simultaneously, with narrow streets running between them. There is no evidence for open spaces such as courtyards or for special structures such as group houses. The primary residential partition is the artificial ditch distinguishing those living inside the fortification from those who did not. A second residential partition isolates groups of houses into clusters on different sides of a meander. There is currently no evidence for feasting, although Bóna suggested a likely area off the tell at Várdomb that might have served such a purpose.

The absence of any obvious artificial construction such as courts or platforms, or other monumental architecture found in many middle-range societies, is interesting. If there were any, they left ephemeral remains and were probably not very impressive to

[58] The houses in the 350 m^2 exposure take up approximately 191 m^2 (H8, 40m^2; H10, 36m^2; H15, 50 m^2; H14, 50 m^2; H16, 15 m^2).

villagers or visitors. Consequently, it is unlikely there were opportunities for ritual specialists to align themselves with prominent parts of the artificial landscape, unless it was the tell itself. As anyone working in the lower Körös basin can attest, however, evidence for ritual even in domestic contexts is extremely elusive, let alone evidence for a ritual specialist position.

DIMENSION 3: HOUSEHOLD DISTINCTIONS

The evidence for house distinctions is fragmentary due to the fact that tells are the primary source of information and opening up large areas for horizontal excavation is very costly. Moreover, tell inhabitants destroy the archaeological record as they continue to inhabit the space, scavenging resources from collapsed houses or digging pits through them. I present the most complete examples in a simplified table of attributes for comparison, but discuss the structural details by site.

3.1. Structural or placement distinction

From the tell sites, rectangular structures of wattle and daub are the only form of dwelling known, but slight variations occur in form and orientation. Despite some superficial similarities between Bronze Age structures and ethnographic Hungarian houses, the use of *groundsels* in the Bronze Age[59], foundation timbers laid flat in a wall trench or across the floor, is a significant difference that seems to characterize most Körös houses (Sz. Máthé 1988:41). Other principle similarities and differences known to us are presented in Table 7.4 (Ottomány) and Table 7.5 (Gyulavarsánd). The idiosyncratic description of the floor by the excavator is provided in the tables. My reading, however, is that 'mud packed', 'yellow clay,' and 'plastered yellow clay' all refer to same basic surface treatment. If the total area of the structure is available, it is again included for a comparison to its relationship with other features.

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[59] *Gerendás* in Hungarian.

Site (Ottomány Phase)	Total area (m^2)	Orientation	Floor
Bakonszeg-Kádárdomb	39	NE-SW	plastered yellow clay
Békés-Várdomb[60]	(Posthole reconstruction only)	??	packed clay
Berettyóújfalu-Herpály	68.75	NW-SE, then NE-SW	packed yellow clay
Gáborján-Csapszékpart	?	?	packed clay
Túrkeve-Terehalom	55	NW-SE	packed yellow clay

Table 7.4. Dwelling size, orientation, and floor treatment in the lower Körös basin (Ottomány).

Site (Gyulavarsánd Phase)	Total area (m^2)	Orientation	Floor
Bakonszeg-Kádárdomb	?	?	yellow clay on wood timber
Békés-Várdomb	15 (on tell); 48 (off tell)	E-W off tell	planks appear on tell
Berettyóújfalu-Herpály	24	NE-SW	mud packed
Berettyóújfalu-Szilhalom	?	NE-SW	yellow clay
Esztár-Fenyvesdomb	?	?	yellow clay
Gáborján-Csapszékpart	?	?	wood planks
Vărşand	(square)	?	?
Sarkad-Peckesi-domb	40	Probably NS	planks and packed yellow clay
Túrkeve-Terehalom	62.72	NW-SE	yellow clay and wood timber

Table 7.5. Dwelling size, orientation, and floor treatment in the lower Körös basin (Gyulavarsánd). Floor descriptions are the precise words used in the publication.

A groundsel is the lowest member of a wooden framework and carries the weight of the superstructure. The best evidence for this structural form is from Kádárdomb and Szilhalom. The earliest floor at Kádárdomb (early Ottomány B) had a groundsel timber beam on the southwest side with a single posthole, but several others arranged linearly perpendicular to the long axis of the house, and others toward the center (Figure 5, Sz. Máthé 1988). Another groundsel is found in the house structure of Level 5, with a single posthole present. A line of postholes 40-60 cm apart, more likely the wall, runs southwest. The postholes arranged 40-60 cm apart suggested to the excavator that the walls were constructed with the *terre-pisé* or 'rammed earth' technique, packing earth in

[60] The wattle-and-daub structure dimensions are not included here for reasons spelled out under 'Dimension 2: Segmentation'.

between two wattlings (Sz. Máthé 1988:28). A lot of wooden planks seem to be used in Level 3 but did not criss-cross the entire flooring. Other floors with posthole arrangements include Szilhalom, with 20 cm posts 20-80 to 140-200 cm from one another (Sz. Máthé 1988:33). These might suggest forked posts running down the center of the building, supporting the roof structure.

House construction is discussed in less detail for the structures at Berryóújfalu-Herpály. There are few remains of Ottomány houses (Level 4), and those that exist suggest they are not carefully made; the walls are poorly made, and floors are only beaten earth, not plastered (Sz. Máthé 1994:171). The house 5-5.5 m by 12-12.2 m was identified on the basis of the postholes alone that presumably held wattle between them. No interpretation of the post construction is made in the original publication however (Sz. Máthé 1984).

There are construction details for other houses in the published literature, although no plans are available. At Túrkeve, the houses are described as having very similar construction techniques over time, with only minor variations (Csányi and Tárnoki 1994:164). The walls are made up of 20-30 cm postholes, situated 60-80 cm from one another, usually in a wooden groundsel. Walls were reinforced by strong beams on in the foundation or the interior section. Clay was packed on both sides in layers 5-10 cm thick. Structures had two or more sections divided by wattle-and-daub wall dividers, though a level four structure had a large beam divider, 30-40 cm, in a 44 cm trench. The earliest structure at Túrkeve (Ottomány) is also the longest, comprising two identical houses one built on to the other. An illustration of a Level 4 house ('culture' unspecified, Figure 114), implies that the house had a plastered attic floor, but no mention of it is made in the text. The latest, Gyulavarsánd house, comprised two rooms separated by a wattle screen. The front room – the 'bedroom' – had wood plank flooring, and the interior room – the 'kitchen' – was packed with stacked pottery on shelves (Figure 116, Csányi and Tárnoki 1994:161).

Structure orientation is NE-SW or NW-SE except for Békés-Várdomb and Sarkad-Peckesi-domb, which appear to have NS (or EW) orientations. Given their proximity and distance from the other sites of the sample, this may indicate a regional variation. The presence of both NW and NE oriented structures in both phases suggests that there are no significant distinctions between them, although at Herpály they changed from one to the other within the Ottomány phase.

3.2. Special treatment of exterior

Despite the lack of profound differences in house building technique in the earlier Bronze Age Körös Basin, there appear to be more small stylistic differences between houses on fortified sites. The house reconstruction from Level 4 at Túrkeve has a little window (Csányi and Tárnoki 1994), but it is unclear if this is based on excavation or artistic license. In reconstructions of a Level 2 Nagyrév house from Tiszaug-Kéménytető, 50 km west of the study region, several bands of geometric designs occur on the outer wall, and a decorated clay lintel sits above the doorway (Csányi and Stanczik 1994:116). No such marking, however, is noted for any house from the lower Körös. No trophies or religious markers, such as cattle skulls or painted exteriors differentiate one house from another.

Household distinction: summary

In summary, where there is sufficient evidence, groundsel structures are the norm and differences in orientation seem to be region specific. Stanczik suggests that groundsels maybe have been used as foundation pieces in the Bronze Age in order to counteract the instability created by building on a potentially damp, moving surface – the tell (in Sz. Máthé 1988:41). That some floors in the Gyulavarsánd period do not have any plastering suggests that these may have had wooden planks that had been removed or decayed beyond recovery. Aside from this, there are no obvious region-wide changes in architectural construction materials during the Ottomány-Gyulavarsánd sequence. The only locational distinction we are able to address is the difference in house forms during the Gyulavarsánd at Várdomb: small structures with wooden floors on the tell rather than larger structures with no obvious wood flooring outside the fortification.

Bóna suggested the lack of wooden floors outside the fortification marked a lower status household. Use of wooden floors in the Gyulavarsánd, like the groundsels in both periods, however, may have been an additional attempt to keep the floor level on an increasingly unstable tell surface. If this is set aside as unresolved, and we take the known sample to be representative, there are no meaningful differences between the construction and exterior treatment of structures on fortified sites. Cross-culturally, meaningful differences between people's affiliation with the spirit world are often marked in some way in their domestic space. It is not simply that their houses might be bigger, but they are *different*. The lack of difference between houses in the Middle Bronze Age is an indication that perhaps beyond the fortification line itself, there was no reminder in people's built space that there were important differences between one another. Of course, meaningful social distinctions are not always recorded on dwellings, but it is one more visible social medium in which the redundancy of inter-personal distinctions can be manifested.

DIMENSION 4: ACCESS TO EXOTICS

Differences in access to exotics can be identified using two basic indicators derived from the same measurement (see Chapter 6). This measurement calculates the density of exotic by the amount of dirt moved from a particular archaeological site (see Appendix C). The site in the set with the highest number of exotics is then assigned the value 100, and all others in the comparison are calculated indexes based on their relative value to this site. Base indexes are therefore scores out of 100 derived using the formula:

$$\text{Index} = \frac{100\ (\text{object/m}^3)}{\text{Highest value of object / m}^3\ \text{in set}}$$

The first measure is a presence / absence value based on the 97.5 % threshold. The second is the actual value, a more precise, but more inaccurate measure. Here I focus on three classes of evidence for exotic materials: copper/bronze, gold, and horse. Without testing, it is unknown if many of the metal pieces included here are copper or an alloy; I therefore refer to them as 'bronze' mainly for stylistic reasons. Because there is no evidence for juvenile horses in the Körös area, I assume they were imported, and I use riding accessories as my measure.

4.1. Distribution of exotics: evidence for horses

Involvement in horse rearing, riding, or trade would likely signal strong social differences given their recent entry to the lower Körös. In Chapter 5, I noted that horse bones and trappings are rarer in the lower river areas before the Tisza confluence than they are in the upper valleys and in Vattina areas in the south. Given their rarity, horse trappings, along with metal items are almost always discussed and described in the literature. Unless otherwise noted, findings date exclusively to the Gyulavarsánd phase (Table 7.6).

Site	Bridle Accessory		Horse bone (%)	Fauna NISP	Reference
	Bit	Attelle			
Bakonszeg-Kádárdomb			11.2	1074	Bökönyi 1988
Békés-Várdomb			3.6	6304	?
Berettyóújfalu-Herpály	1				Sz. Máthé 1984
Berettyóújfalu-Szilhalom	1	1	3.7	829	Bökönyi 1988; Sz. Máthé 1988:65; Csányi and Tárnoki 1994
Gáborján-Csapszékpart			3.9	687	Bökönyi 1988
Vărşand	2				Roska 1941; Personal photos from Gyula collection
Túrkeve-Terehalom	1	1			Csányi and Tárnoki 1994

Table 7.6. Summary of horse bone and accessories from sites in the lower Körös in the Gyulavarsánd phase.

There are no horse trappings from Bakonszeg, but horse bone rises from 3.9% in the Ottomány to 11.2% in the Gyulavarsánd (Bökönyi 1988). From Herpály, one possible rod shaped bit was found (Sz. Máthé 1984:155). From Szilhalom, excavators recovered both a curved rod bit and a disk shaped *attelle*, the cheekpiece that divides the bridle straps across the horse's head (Sz. Máthé 1988, Plate 28). Only 3.7 % of the Szilhalom fauna examined by Bökönyi (1988) were horse, similar to the 3.6% he reports from Várdomb. Excavators at Túrkeve identified one horse bit and 1 cheekpiece (Csányi and Tárnoki 1994:203). Finally, from Vărşand there is one antler bit published by Roska (1941:52, Figure 19,3) and another previously un-documented in the Gyula Museum collection (Duffy, personal notes).

Site	Volume (m^3) excavated	Total bridle accessories	Bridle per volume	Bridle Index
Bakonszeg-Kádárdomb	48	0	0	0.0
Békés-Várdomb	1073	0	0	0.0
Berettyóújfalu-Herpály	1105	1	0.090498	3.1
Berettyóújfalu-Szilhalom	51	2	3.921569	100.0
Esztár-Fenyvesdomb	32	0	0	0.0
Gáborján-Csapszékpart	114	0	0	0.0
Vărşand	204	2	0.980392	25.0
Sarkad-Peckesi-domb	127	0	0	0.0
Túrkeve-Terehalom	1620	2	0.123457	3.1

Table 7.7. Bridal index for the lower Körös basin.

Table 7.7 summarizes the bridle evidence in Table 7.6 by amount of excavation to produce a comparable figure. I present a horse accessory presence / absence value based on the 2.5 % threshold in Figure 7.4. I mark horse at Bakonszeg 'present' in Figure 7.4 because of the high percentage of horse bone. When the values are stretched out, a slightly different picture emerges (Figure 7.5). Comparing the bridal accessories to the horse bone and the low numbers involved suggests that we may be observing background noise in these images more than anything else, although evidence is certainly present in the northeast. Another way to look at these data, however, would be to say that people in the Körös basin had similar access to horses – very low.

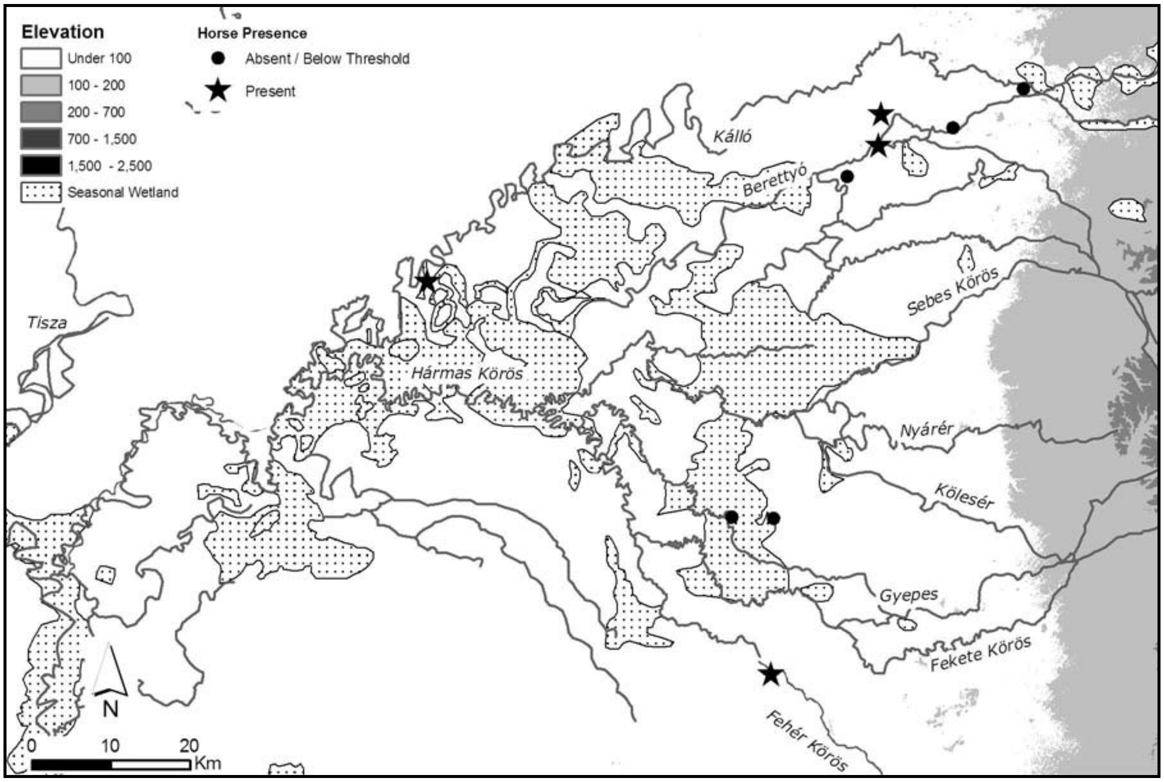

Figure 7.4. Horse presence in the lower Körös basin (including Bakonszeg).

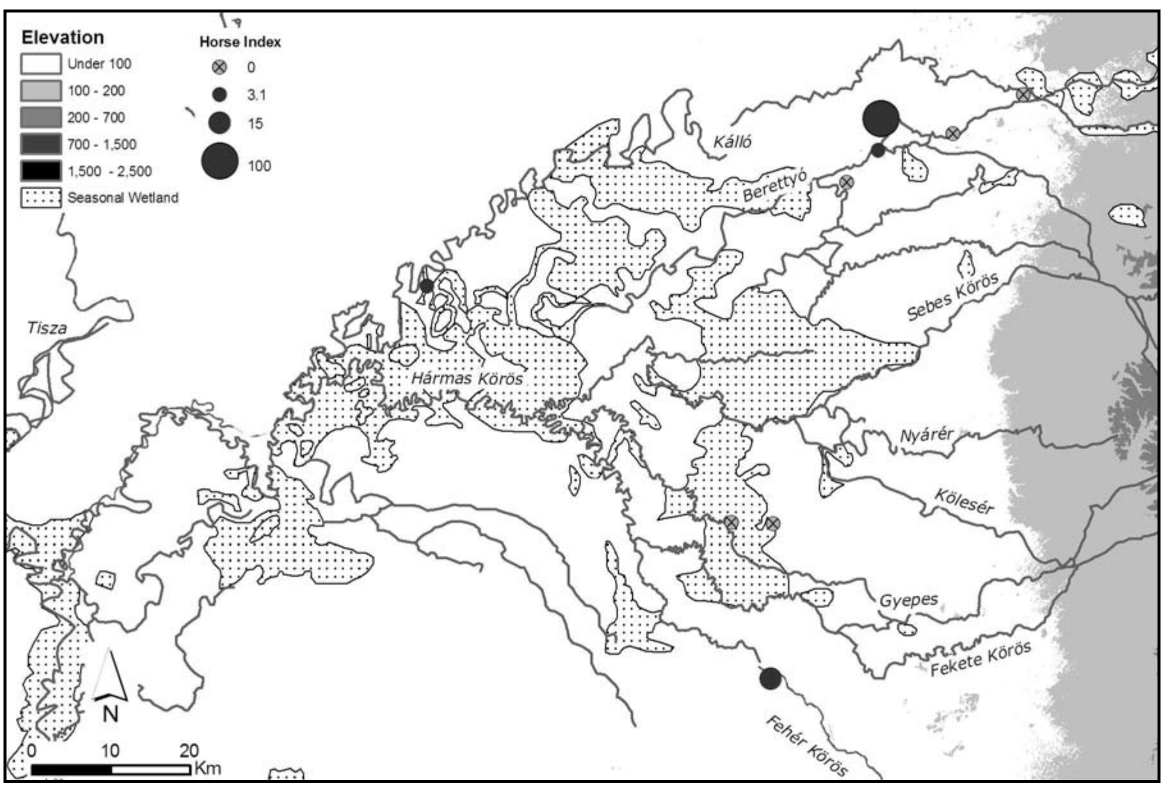

Figure 7.5. Horse index for the lower Körös basin.

4.2. Distribution of exotics: metal

Site	Finished bronze	Unidentifiable bronze frags	Finished gold
Békés-Várdomb	8	3	
Berettyóújfalu-Herpály	2	3	1
Vărşand	54	2	2
Sarkad-Peckesi-domb	2	2	
Túrkeve-Terehalom			2

Table 7.8. Summary of bronze and finished gold from sites in the lower Körös basin.

Metal has a similar distribution in the Lower Körös, a piece here and a fragment there (Table 7.8). The exception might be from Vărşand. Popescu (1956) and Bóna (1975: 134, Plate 150) report the following bronze: one spear point, two pins, one awl, two spiral arm bands and one small spiral tube. An additional series of material is unpublished but curated in the Munkácsy Mihály Múzeum in Békéscsaba: one knife, five pin or pin fragments, thirty-four tubes (for a necklace), one dagger, one cordiform pendant fragment, one ring, two unidentified conical fragments, one flat bracelet and one spiral bracelet (Duffy, personal notes). In addition, excavations at the site produced a spiral disk and a bubble ring in gold (Bóna 1975, Plate 151, 1, 6).

The spread from Herpály is more typical. Here Sz. Máthé (1984:156) reports a bronze perforator, a curved piece of sheet metal that might represent a lunula pendant, and a fragment of what seems to be a gold hair ring. There are also “a few” unidentifiable pieces from various places on the site. From Sarkad-Peckesi-domb, a bronze pendent and needle were recovered, in addition to two small fragments (Jankovits and Medgyesi n.d.). A disk and spiral tube in gold were found in the habitation layers of Túrkeve (Csányi and Tárnoki 1994:207). The metal work from the Várdomb site include a dagger blade, a dagger base and one hole tang, a lid, a heart shaped pin, a tubular moustache fragment, and two arm spirals (Banner 1974:65). Bóna also mentions a small bronze ear or burl ring (Bóna 1975:135), and the Munkácsy Mihály Múzeum curates a needle, and three bronze fragments (Duffy, personal notes). Gold and bronze are plotted in space in Figures 7.6, 7.7, 7.8, and 7.9.

Site	Volume (m^3) excavated	Total bronze	Bronze per volume	Bronze Index
Bakonszeg-Kádárdomb	48	0	0.00000	0.0
Békés-Várdomb	1073	11	0.01025	3.7
Berettyóújfalu-Herpály	1105	4	0.00362	1.3
Berettyóújfalu-Szilhalom	51	0	0.00000	0.0
Esztár-Fenyvesdomb	32	0	0.00000	0.0
Gáborján-Csapszékpart	114	0	0.00000	0.0
Vărşand	204	56	0.27451	100.0
Sarkad-Peckesi-domb	127	4	0.03150	11.5
Túrkeve-Terehalom	1620	0	0.00000	0.0

Table 7.9. Bronze index for sites in the lower Körös basin.

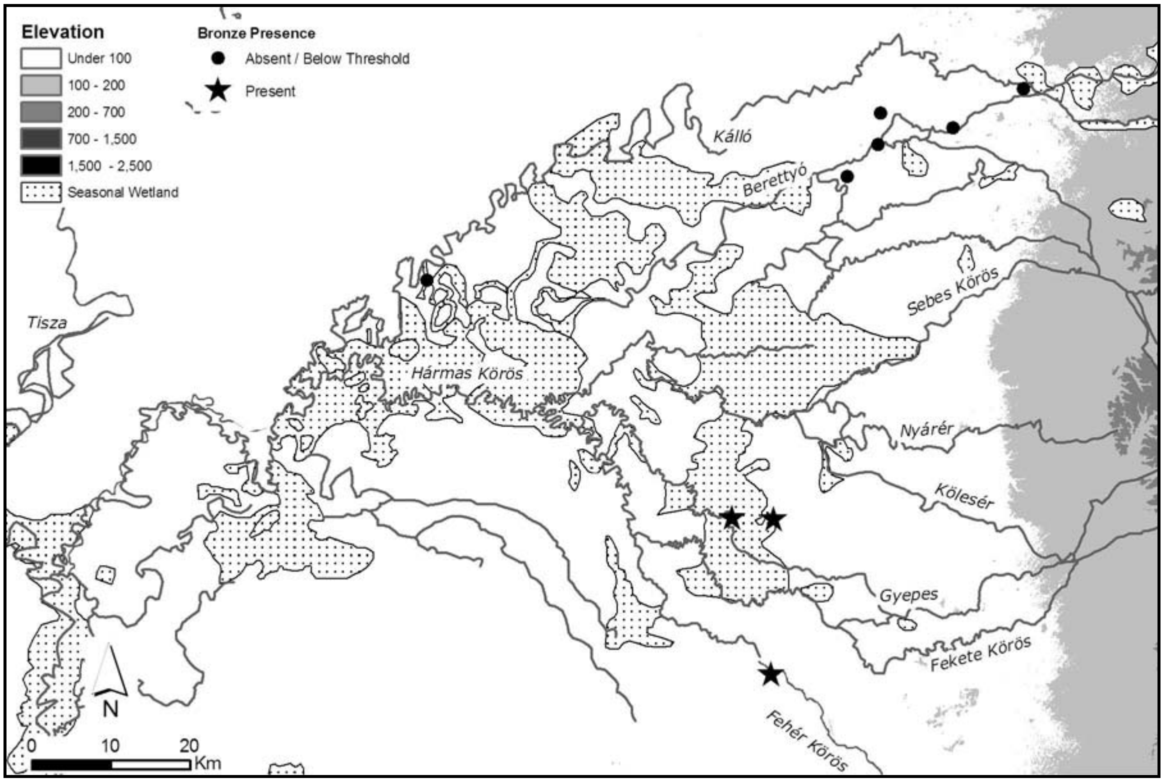

Figure 7.6. Bronze presence for sites in the lower Körös basin.

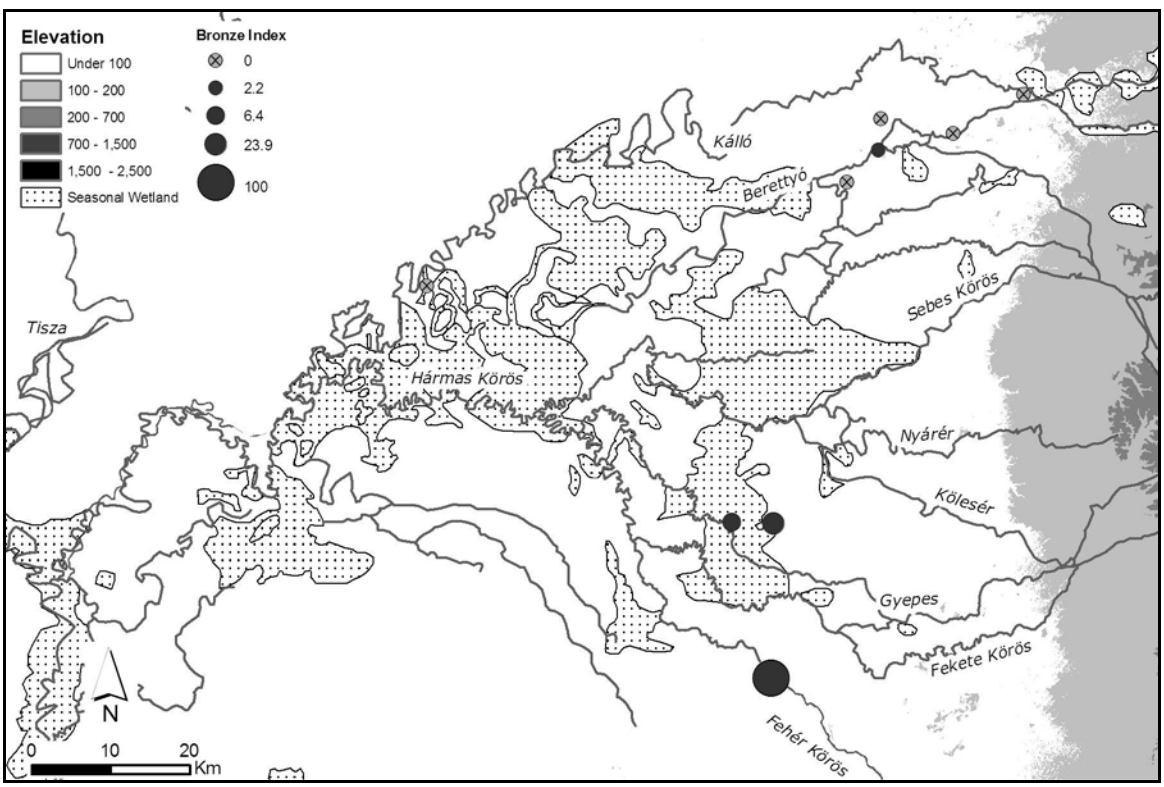

Figure 7.7. Bronze index for sites in the lower Körös basin.

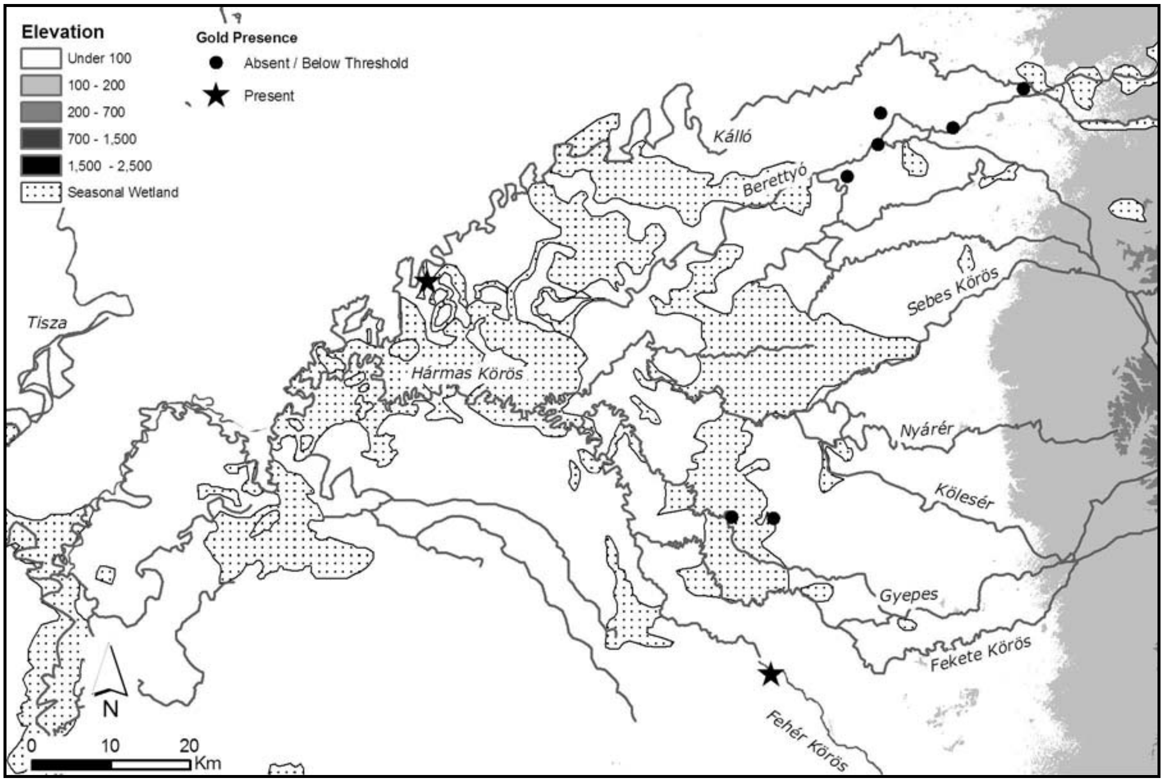

Figure 7.8. Gold presence for sites in the lower Körös basin.

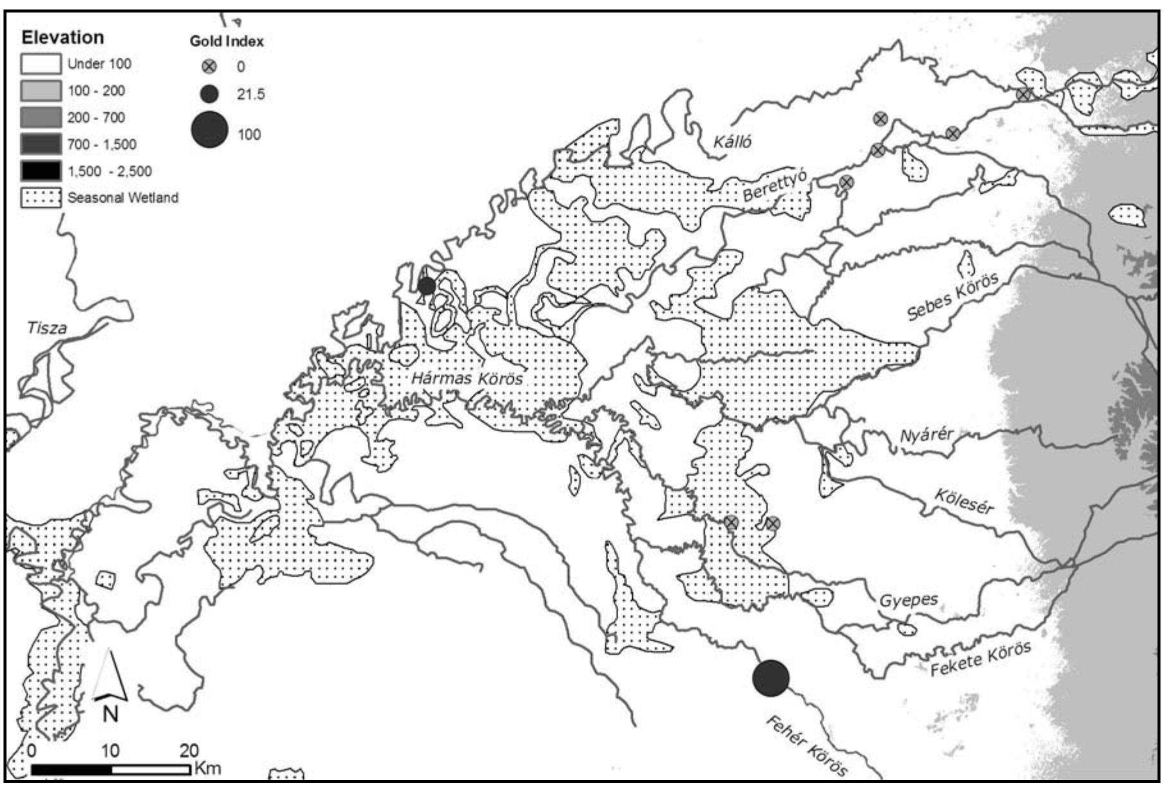

Figure 7.9. Gold index for sites in the lower Körös basin.

Access to exotics: summary

The *N* for calculating distributions is small and conclusions based on them therefore quite tentative. Nonetheless, when inventory is calculated by volume, there is the suggestion that bronze, gold and horse trappings are not equally distributed. Access to horse is more common on the northern edge of the Körös basin, although values are very low over all. Metal was disproportionately consumed in the southern part of the basin, clearly for bronze, and perhaps gold as well. For finished bronze, values at Vărşand strongly outweigh the other sites. Although a significant part of the bronze value derived from the index for Vărşand comes from a single necklace, the pattern would not diminish if this were considered a single object. As far west in the Plain as Túrkeve, the index is at 0, despite it being the most excavated out of all the tells in the lower Körös.

There are advantages and disadvantages to interpreting the consumption of exotic material by settlement in this way. On the one hand, it is difficult to observe differences within a community (or small number of communities) in consumption that might be observable in a cemetery. In other words, metal deposition at a settlement is not a public statement about what dead person was entitled to be buried with. However, if we assume comparable deposition rates at settlements (through loss, intentional interment, etc), several conclusions can be made. In general, people were extremely careful about not losing their metal objects, even at fortified sites, which are often assumed to be controlling the production and consumption of metal. Unidentifiable fragments are very small, suggesting that most broken objects were re-melted. At this scale and scarcity, it seems credible that bronze operated as tokens of value for exchange, but the scale of consumption at fortified sites does not seem *conspicuous* enough – at least, archaeologically – to be supplying outlying sites with metal from its troves.

Finally, if one assumes that the closer to the ore sources, the greater access to ores and finished metal products, the spatial patterns for bronze suggest, above anything else, "down the line" exchange in the southeast part of the basin. The presence of the occasional bronze or gold object in the northern area (the Berettyó) may just be the noise of a small *N*, not enough of anything to indicate a pattern. Because the analytical scale in this section is restricted to the lower Körös basin, not a great deal more can be said. There will be further opportunities for considering variability in exchange once patterns at both smaller and larger scales are introduced.

DIMENSION 5: CRAFT PRODUCTION

The current evidence for craft production is minimal. Any site with a considerable amount of excavation has evidence of loom weights and spindle whirls, suggesting that weaving was practiced in every community. Although detailed contextual information is usually lacking, there is no positive evidence for scales of metal production other than the household, or intensity of production above part-time (Papalas 2008). Nor is there any evidence for a degree of craft production attached to a patron. There are no measures of 'elite' status independent of metal, so at this time the proportion of finished goods by context – elite versus non-elite, cannot be established. Our only evidence for craft production comes from tell sites, so it is only possible to argue that craft production was attached if there is independent evidence for an elite at the tells.

Site	Phases	Volume (m^3) excavated	Manu-facture evidence	Metals manu-facturing Index
Bakonszeg-Kádárdomb	Ott, Gyl	48		
Békés-Várdomb	Ott, Gyl	1073	2	8.1
Berettyóújfalu-Herpály	Ott, Gyl	1105		
Berettyóújfalu-Szilhalom	Ott, Gyl	51		
Esztár-Fenyvesdomb	Ott, Gyl	32		
Gáborján-Csapszékpart	Ott, Gyl	114		
Vărşand	Gyl	204	8	100
Sarkad-Peckesi-domb	Ott,Gyl	127		
Túrkeve-Terehalom	Ott, Gyl	1620	2	5.4

Table 7.10. Evidence for bronze manufacture (moulds, crucibles, and *tuyères*).

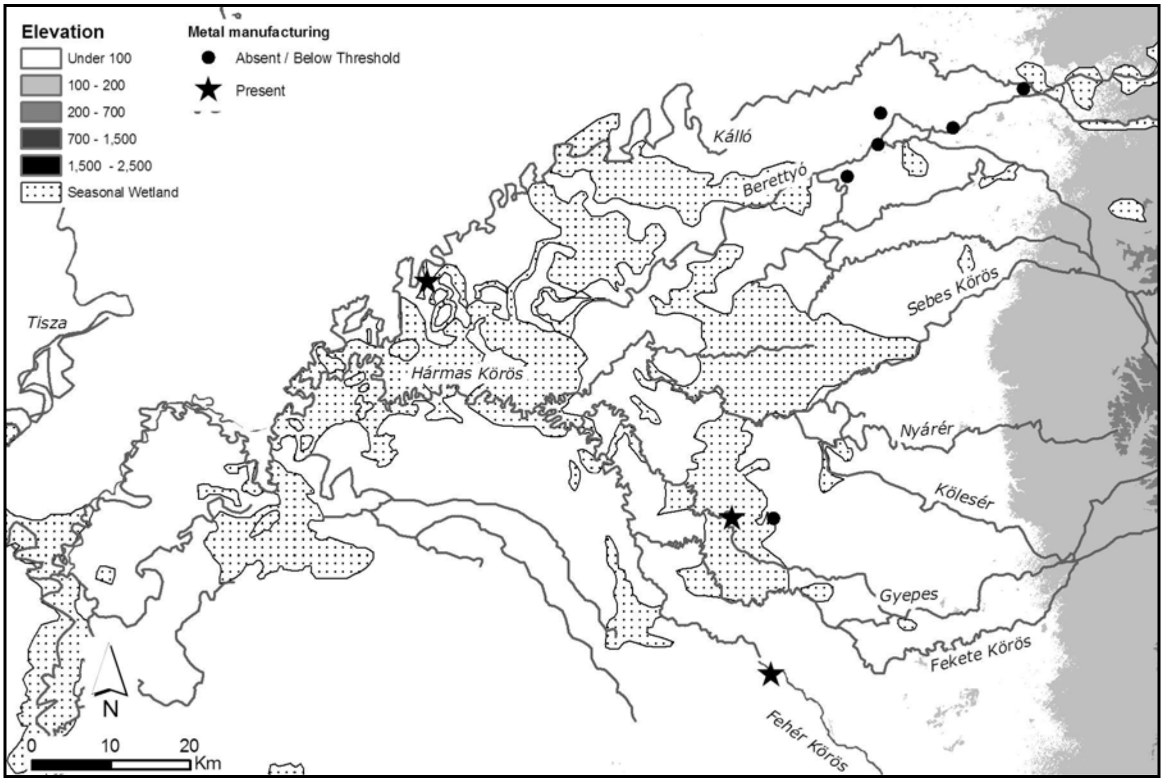

Figure 7.10. Sites in the Körös basin with evidence of metal manufacture.

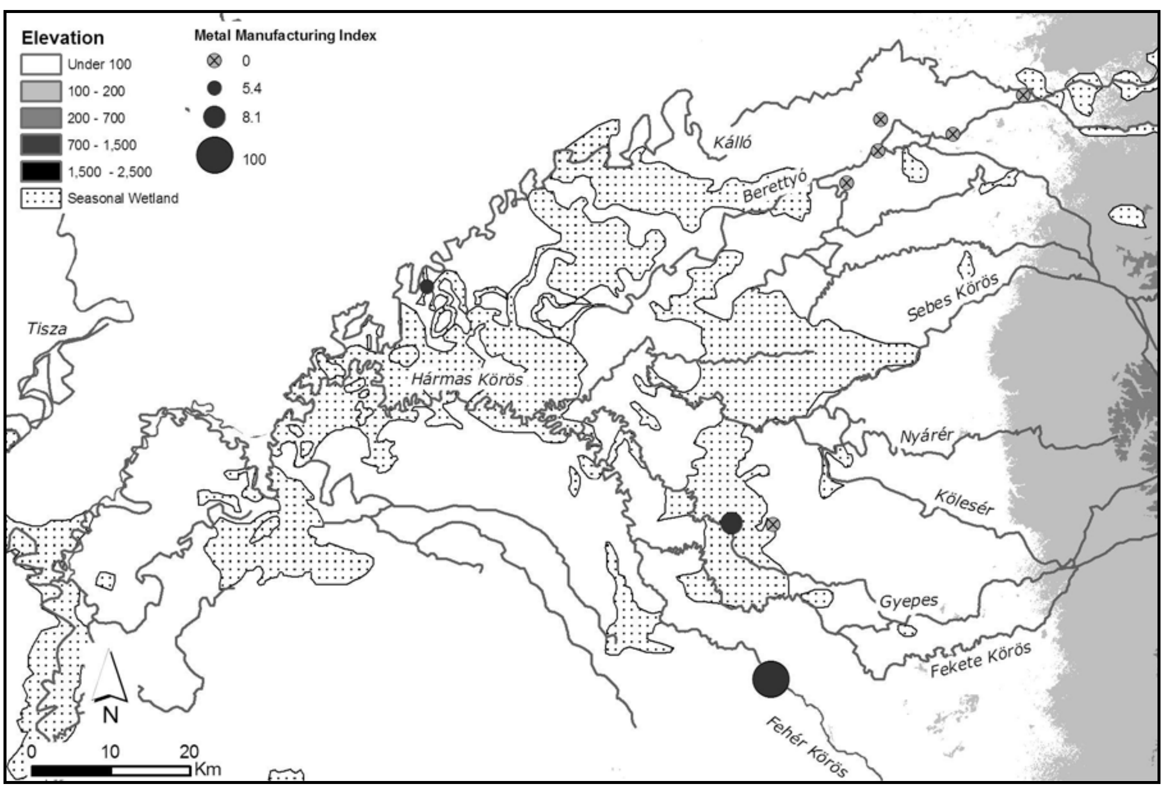

Figure 7.11. Metal manufacturing index for sites in the Körös basin.

The one strand of evidence worth perusing is the evidence of metal manufacturing debris. A bronze chisel mould fragment and seven crucible fragments come from Vărşand (Bóna 1975:134, Tafel 149, 150). A needle mould and a large crucible were identified at Békés-Várdomb (Banner 1974:64, Tafel 20). From Túrkeve no bronze has been recovered although excavators found a socketed axe mould and a clay *tuyère* (bellows) fragment (Csányi and Tárnoki 1994:204-5). This evidence for metal production is presented in Figures 7.10 and 7.11.

Craft production: summary

In summary, textile production was likely a skill present in each village, although it is unclear if this represents only particular individuals or almost someone in every household. There is no indication, however, that these represent anything but the most independent, small-scale atmospheres of production. There is otherwise little evidence for *production* in the lower Körös basin outside of finished products. The only indication of metal production available is concentrated on the Fehér Körös at Vărşand, also a major center of bronze consumption.

DIMENSION 6: DEMOGRAPHIC SCALE

In this section I provide population estimates based on the area inside the fortification enclosures of lower Körös Bronze Age sites using 220 people / ha. The description for how these multipliers are derived can be found in Chapter 6.

6.2. Fortified site population size

Sites are listed in Table 7.11, with a size estimate based on site plans. Additional settlement features such as habitation outside the fortification and specific features of placement in the landscape are included. Population estimates for all tells in the Lower Körös valley are provided using the same calculus in Table 7.12. These sites are plotted for comparison in Figure 7.12 and Figure 7.13. The average is 143 people, and the range is 55 to 352.

Site	Dimensions (m)	Area (ha)[61]	Type	Settlement Halo
Bakonszeg-Kádárdomb	120x160 [these seem wrong - check]	0.25[62]	Natural or artificial island	?
Békés-Várdomb	r=28	0.25	Artificial island	Three other clusters, perhaps 4 ha total
Berettyóújfalu-Herpály	70x30	0.3[63]	Artificial island	Likely but unpublished
Berettyóújfalu-Szilhalom	Map (Figure 11) suggests 110 x 125	1.1[64]	"Island-like" in marshland	"Smaller elevations with mostly BA sherds on their surface have also been noted nearby" (Sz. Máthé 1988:33)
Esztár-Fenyvesdomb	Map (Figure 17) suggests 150x120	1.6[65]	"Island type" surrounded by ditch	?
Gáborján-Csapszékpart	130x90m	0.36[66]	Fortified on natural alluvial cone	?
Vărşand	r=48.6	0.74	Dry moat?	?
Sarkad-Peckesi-domb	r=40	0.55	Artificial island	Minimum 22 structures, spread over approx. 6 ha
Túrkeve-Terehalom	80x100	0.68[67]	Wet moat	"Outside the fortifications we found habitation traces to the north, the east and the south" (Csányi and Tárnoki 1994:159, my translation)

Table 7.11. Summary of settlement size for tells and surrounding areas in the lower Körös basin.

Site	Area (ha)	Population estimate (220 people/ha)
Bakonszeg-Kádárdomb	0.25	55
Békés-Várdomb	0.25	55
Berettyóújfalu-Herpály	0.30	66
Berettyóújfalu-Szilhalom	1.10	242
Esztár-Fenyvesdomb	1.60	352
Gáborján-Csapszékpart	0.36	79
Sarkad-Peckesi-domb	0.55	121
Túrkeve-Terehalom	0.68	150
Vărşand	0.74	163

Table 7.12. Tell population estimates based 220 people / ha inside the enclosure.

[61] Calculated using the Spatial statistic function in ArcGIS 9.3 when tell shape was not round.
[62] Measured at the 97m contour line, as defined by dimensions in Sz. Máthé.
[63] Measured by dimensions achieved by coring the Neolithic come Bronze Age ditch. Although it is now 2600 m², it was probably 3000 before erosion (Kalicz and Raczky 1984:91).
[64] Measured from the 98 m contour line.
[65] Measured from the 94 m contour line.
[66] Measured to include the 98 m contour and Block 1.
[67] Measured from inside of ditch in Csányi and Tárnoki (2000), assuming magnetometer blocks are 20 m.

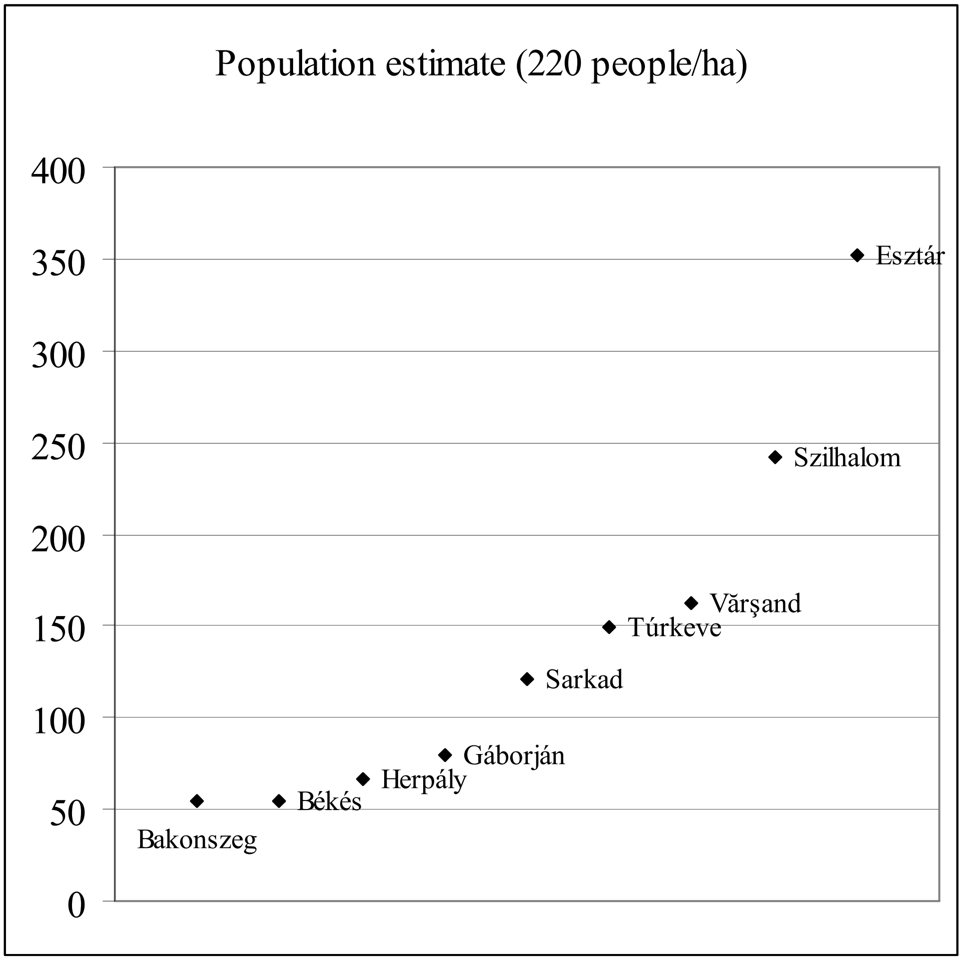

Figure 7.12. Tell population estimates for population inside the enclosure, ranked from smallest to largest.

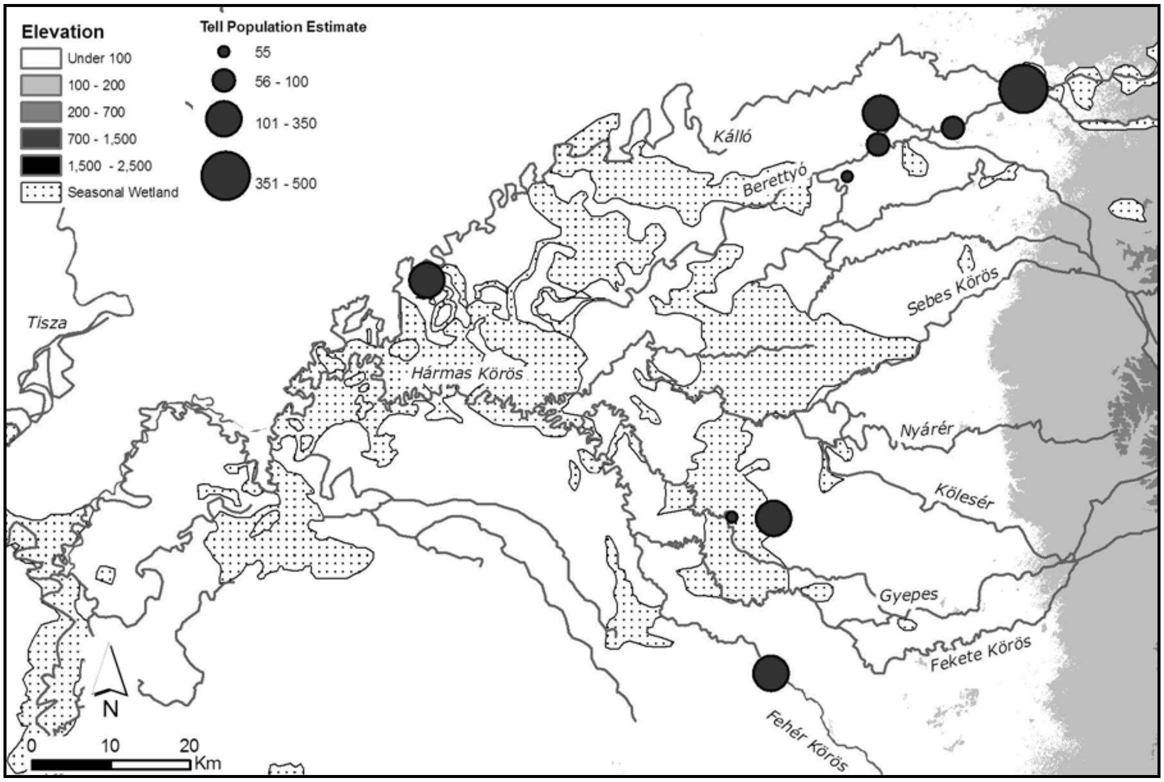

Figure 7.13. Site sizes in the lower Körös basin according to fortified area.

Dimension 6: summary

Without having even added the additional population numbers that can be derived from outside the tell enclosures, some high population numbers might emerge that would suggest that segmentary divisions probably existed on the tells, reducing interactions to manageable numbers and differing authority to segment heads when required (Johnson 1982). If the population is over 150 inside the fortification, we might expect not household heads, but lineage or clan heads as the basal units of interaction. Therefore, there may be neighbourhoods even on tells that are as yet unrecognized. Given the distribution of settlement and other debris off tell at Várdomb, Sarkad, and others, it is clear that a large part of the population is potentially being ignored from the calculation. Once the population from outside the tell enclosures is added however, the question will be raised as to whether or not such a population could even remain a single community without some form of hierarchy, given the empirical regularities observed in Chapter 3.

DIMENSION 7: INTENSIFICATION OF FOOD PRODUCTION

None of the paleobotanical evidence introduced in Chapter 6 is yet available, nor is there independent evidence for plough use. The only indication of population density in the literature is an increase in the number of sites from the Ottomány to the Gyulavarsánd (Ecsedy et al. 1982; Jankovich et al. 1998). This knowledge alone is unhelpful due to the fact that site size and phase duration have to be taken into consideration before an increase in population can be identified, and even then, this must be somehow empirically evaluated against the carrying capacity of the landscape.

DIMENSION 8: REGIONAL CONSOLIDATION

There is currently no evidence for the inter-dependence of Bronze Age Körös settlements. It is also difficult to discuss storage at this scale. The small amount of evidence for storage discussed for Dimension 1 indicates that storage is found within houses, with no differences in storage scale between houses. No comparison between different types of site in a regional system can be made (for example, fortified versus open settlements), to evaluate the possibility that smaller sites were dependent on larger sites for stored surplus. No analyses of Bronze Age settlement patterns exist for the published literature outside of a typological discussion (Bader 1978; Bóna 1994a; Németi and Molnár 2002). There are, however, some data for evaluating differences in faunal contribution to the diet.

8.3. Provisioning of meat

The published faunal data for the Lower Körös region are presented in Table 7.13. An abundance of horse at Bakonszeg is a noticeable difference between the sites, but otherwise few differences emerge. About three quarters of the assemblage falls to domestic animals over wild taxa. Minor differences characterize proportions of the domesticates. Cattle dominate at three sites but are less prevalent than pig at Szilhalom. Sheep/goat and pig fall in at around a quarter to a third of the total assemblage. Unfortunately no studies have been published comparing the body part representation at tell sites, so there is currently no way of knowing whether disproportionate amounts of upper limbs occur at tells to suggest tributary relationships.

If we compare all sites against the mean, the general similarity between settlements certainly does not suggest specialization by regional with inter-dependence in food production between regions. The only two sites that are actually very close to one another (within 10 kilometres), however, are Gáborján and Szilhalom. It is interesting that in fact, these two sites are the most different from one another, with high cattle and low pig at Gáborján, and low cattle and high pig at Szilhalom. Therefore, although an argument for regional inter-dependence may fetch little support, inter-dependence at a local level may not be unreasonable.

Site	Culture	NISP	Cattle	Pig	Sheep/ Goat	Horse	Domestic Mammal	Wild Mammal
Gáborján-Csapszékpart	Nyr	687	51.2	22.0	22.9	3.9	80.5	19.5
Békés-Várdomb	Ott, Gyl	6304	46.2	34.9	15.3	3.6	74.9	25.1
Bakonszeg-Kádárdomb	Ott, Gyl	1074	43.6	22.8	22.5	11.2	65.6	34.4
Berettyóújfalu-Szilhalom	Ott, Gyl	829	29.7	37.0	29.6	3.7	83.8	16.2
Mean			42.7	29.2	22.6	5.6	76.2	23.8

Table 7.13. Summary of faunal evidence for the lower Körös region (Bökönyi 1988).

A PRELIMINARY RECONSTRUCTION OF A BRONZE AGE SOCIETY

In this chapter I've evaluated the evidence at nine sites in the lower Körös basin with a set of archaeological indicators. With the exception of the trenches opened at Békés-Várdomb, and the surface observations from outside of Sarkad-Peckesi-domb, all of these sites are fortified tells. Nonetheless, a first approximation of society in the lower Körös basin emerges.

The evidence from houses suggests a restricted range of small domestic units, not exceeding the nuclear unit or stem-family. Storage and hearths are internal to these structures, indicating a small unit of production and consumption. Most houses seem to be made with groundsels, except those off the tell, probably indicating that it was a feature that increased the load bearing capacity of the structures on the soft tell surface.

No stylistic marking distinguishes the structures from this sample of sites. A similar range of domestic animals were consumed and no strong differences emerge between wild versus domestic ratios. Horses are not part of this overall pattern however, likely because they were treated more as a non-local good, and occur primarily on the northern edge of the basin. There is a great range of sociopolitical variability that could account for this archaeological signature.

If we assume a minimalist view, we could easily envision an egalitarian society of strongly autonomous settlements probably organized into segmented descent groups. Allocation of fields, grazing areas and other rights may have occurred in such groups. Despite any segmentation, however, these units probably didn't combine for the most critical unit of food production and consumption because households are atomized into nuclear families. Within the fortifications, we are looking at a few hundred people having to live together. Population estimates produced for these areas could have been accommodated by segmentation, although sites such as Szilhalom and Esztár approach the large end of acceptable scalar stress (ca. 500 people). At this level of resolution there doesn't seem to be anything holding these communities together except for being on the inside of an impressive enclosure. This is the minimalist view.

At this point, however, because the settlement halos around fortifications might be massive, it is possible that these settlement clusters are enormous regional centers. Until the open settlements in the region are considered, one could assume they are the top of a three tiered site hierarchy. The open settlements could be spatially clustered to them, and have no evidence for craft production, indicating a likely dependency on the fortified centers. Under these circumstances, it would be easy to conclude that indeed, the fortified sites were the top of a social hierarchy and were the economic and political engines of the region. This is the orthodox model. There is however little positive evidence to support it.

Overall, evidence for craft production and access to exotics is slim. It seems likely, however, that the production and consumption of metals is concentrated on the southern Körös tributaries. That raises the question as to why fortified sites are not more similar to one another in the basic evidence for gold and bronze, if this was the reason for their fortification and population aggregation. Moreover, why is there so little evidence for production in general, if fortified sites were the hotbeds of activity for the entire region? Because there is no evidence of community activities, such as plazas or ritual structures, it is unclear what the functional specialization of these sites could be, if they were indeed functionally specialized compared to open settlements in the countryside. In sum, there is no positive evidence for hierarchy or control, although there are enough gaps in the evidence to still envision it as a possibility. The scale of production and consumption suggests instead a network of decentralized autonomous villages. To confirm that the autonomous village model is truly the better fit requires new research.

REQUIRED RESEARCH

The greatest dissonance between the orthodox model of the Bronze Age of the Great Hungarian Plain and the minimalist view is the lack of open settlements for comparison to the fortified sites. The orthodox model sees the fortified sites controlling trade and craft production. For most specialists, open settlements were subservient to populations of the fortified sites, perhaps even lower tiers in a regional hierarchy. Without any information on these sites for comparison, however, little in effect can be concluded about the relative dominance of the tells.

It has been argued that craft production such as metallurgy was primarily off the tell, and this is the reason why evidence is so scarce. This may be true, but no one has ever looked for evidence on the surface *next to* the tells. A comparison between these spaces and open settlements in the hinterland would provide an indication of the relative dependency of open settlements on the fortified sites.

One of the underlying assumptions of why this relationship of dependency would exist is because of the general sense that there is an increase in settlements due to people migrating into the area, and that lower quality environments had to be exploited, furthering any existing local inequalities. This has never been quantified, however, so it remains only an assertion.

Finally, much has been made of the settlement hierarchy for the Bronze Age Körös. This hierarchy is based on settlement *types*, however, not size. There are currently no observations in the published literature about the spatial relationships between fortified settlement clusters and open settlements at a regional level, nor what different patterns might mean for a reconstruction of interactive patterns between village inhabitants. Regional site hierarchies are potentially a powerful indicator of political hierarchy and integration, but not in the absence of the number of tiers and spatial placement of site types in a size hierarchy.

CONCLUSION

In conclusion, my first pass at reconstructing Middle Bronze Age societies of the lower Körös basin indicates an atomized social unit of production and consumption, with the only evidence for any kind of segmentation coming from co-habitation within a fortification. A higher order of basal interaction such as household heads, clan leaders, or neighbourhood groups would have been required to alleviate the scalar stress of population aggregation. No distinctions appear in houses or diet on different sites, and exotics seem to concentrate at a regional level due to down the line trade more than anything else. Middle Bronze Age societies appear to be autonomous villages engaged in small, but different degrees of trade and exotic good consumption.

Although there is no positive evidence for a hierarchical society, it is still possible that such evidence has simply not been collected. We lack information on how these fortified sites differed from open settlements in the hinterland with respect to craft production, size, and physical relationship. It is unclear if population levels were relatively high in the MBA, and what effect, if any, this had on social circumstances and social evolution. These features, therefore, became the objects of investigation during fieldwork in 2006-2007.

Chapter 8: The Sites and Assemblages

In the previous chapter, I carried out a preliminary study of the Bronze Age in the lower Körös basin using archaeological indicators for middle-range societies developed in Chapter 6. It was discovered that two quite different models – the orthodox view, but also a minimalist view – explain the existing data. While the data favour the view that village autonomy was the rule, it is still not beyond possibility that social hierarchy characterized the Körös Bronze Age in some way. In order to establish with greater certainty what this may have been, some critical data are required. First among these is a better understanding of site size variability. We need to know if the open settlements in the region were the same size as the fortified sites. We need to know not only how big the fortified centers are, but whether they were so big that they couldn't conceivably function in the absence of social hierarchy. Second, we need to know what people were doing at the open settlements that they were not doing at the fortified sites in order to gauge the degree of co-dependence and asymmetry. Finally, we need to know what the archaeology below the surface looks like at open settlements in order to say with any confidence that important social distinctions were made in the Bronze Age between people at these settlements and the people behind the fortifications.

In this chapter, I provide a summary of collection results for sites visited during fieldwork in 2006 and 2007[68]. The first part of the chapter describes the MRT survey, my process of site selection and digitization, and the definition of a micro-region. The second part provides a summary of open and fortified sites in the micro-region that were revisited and collected. The third part describes magnetometry survey at two sites and excavation at one. The final part of the chapter describes the three fortified sites outside the micro-region that were surveyed for establishing site sizes. The data in this chapter primarily serve to address topics in Chapter 9.

[68] This fieldwork was locally referred to as the *Bronze Age Körös Off-Tell Archaeology* (BAKOTA) project.

PART I: THE *MAGYARORSZÁG RÉGÉSZETI TOPOGRÁFIÁJA* PROJECT

The Archaeological Institute of the Hungarian National Academy in affiliation with the Békés County museums conducted a systematic, extensive archaeological survey in the northern part of present day Békés County, Hungary (Ecsedy *et al.,* 1982; Jankovich *et al.,* 1989; Jankovich *et al.,* 1998; Szatmári, n.d.). This project, the *Magyarország Régészeti Topográfiája* (henceforth MRT) started in the late 1960s in several areas of the country. The survey focused on locating archaeological sites from earliest prehistory to the end of the 17th century. Two thirds of the surveyed territory in Békés County are located on the Hungarian side of the Körös basin (Figure 8.1). The southernmost third falls on the alluvial fan of the Pleistocene Maros. The 'micro-region' is the area in which most fieldwork took place, and is discussed further below.

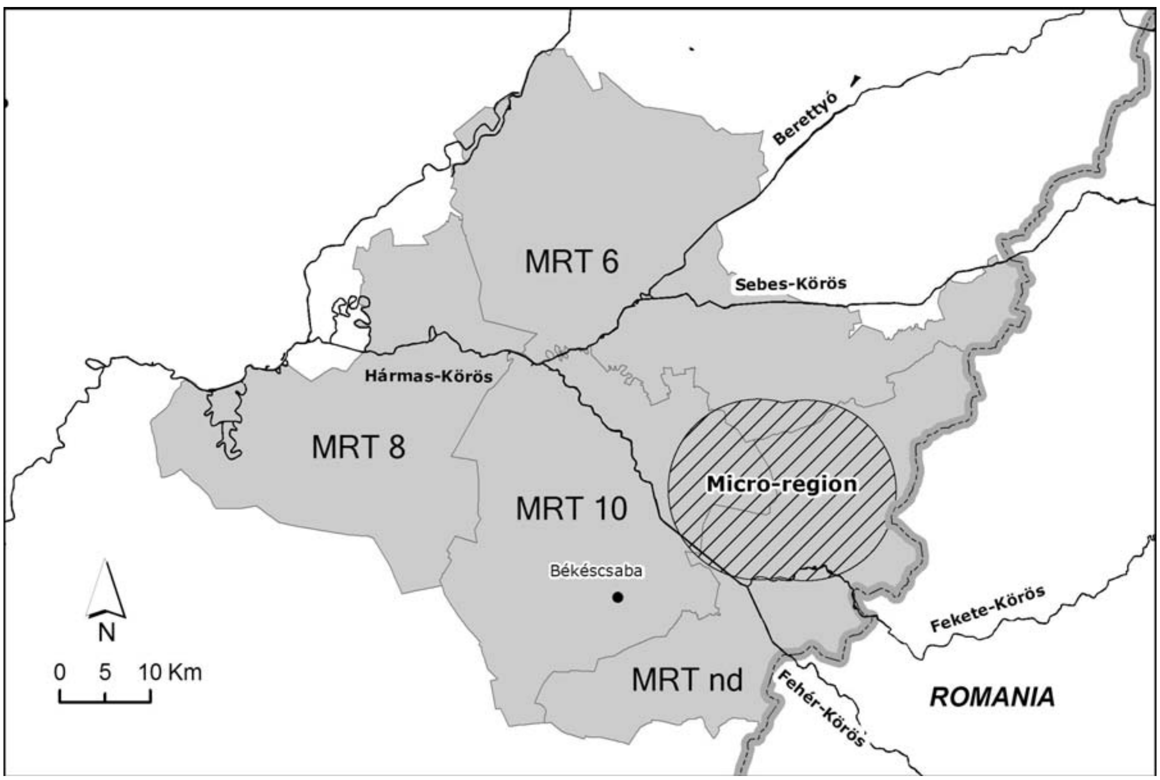

Figure 8.1. MRT area with the location of each volume and the micro-region.

The volumes are organized by parish, whose boundaries largely date to the nineteenth century or earlier[69]. In this dissertation, I generally refer to sites by their parish name followed by the site number (a convention used by most people working with the survey). The project yielded altogether 6,173 archaeological sites within an area of 3,799 km^2. Most of the sites, especially those before the Late Bronze Age (ca. 1400 BC), are located within the Körös river network. Although these sites are now located on a changed landscape due to regulation works, field surveyors recorded not only the characteristics of the archaeological sites but also their impressions of local geomorphological features.

The landscape was field walked with teams of three to six people. Ploughed fields and artificial mounds were the primary source of site identification. Several trips were made to the same site if field conditions prevented inspection. A representative, if unsystematic, collection of diagnostics was made from each site. Each site description in the published volumes includes location, a description of the diagnostic ceramics, their place in the local chronology, and sometimes drawings or photographs of artefacts. The boundaries of site extents are usually palimpsests of different periods, although more specific notes of period concentrations in space are sometimes to be found in the site descriptions, in published map illustrations or on the original field maps. Boundaries were drawn on 1:10,000 topographic maps in a stereographic military projection, except during the initial phase of the project when access to this scale was restricted and 1:100,000 maps were used instead[70]. I traced these site boundaries in ArcGIS 9 to produce site polygons. Polygons were chosen over points in order to efficiently produce maximal site sizes based on MRT survey characterization. Details of the digitization and re-projection process are provided in Appendix D.

Although a large number of sites were identified, it is clear that we are failing to recognize MBA sites in this region for at least five reasons. The first reason is because they are now destroyed due to modern developments or industrial agriculture. The MRT notes that some such sites (e.g. mounds) are present on early maps or that the county museum has early collections the surveyors were unable to relocate the actual site. The

[69] One exception is a small area of Gyoma in the Szarvas volume, which was amalgamated with the modern Jász-Nagykun-Szolnok County in 1973. The change is relevant mostly because this area includes Túrkeve-Terehalom (Gyoma 34), whose excavated material is curated at the Szolnok County Museum.
[70] These maps are now declassified, and photocopies of the originals are curated by county museums.

second reason is because there were not enough diagnostics on the surface to assign it to a specific period, so it remains listed in the survey publication only as ‘prehistoric.’ The third is because they are on land now forested or in pasture. Although surveyors made multiple trips to the same site in order to evaluate it during different field conditions, some areas were consistently unploughed. The fourth reason for site loss is the slow movement of meanders on top of them (Frolking, *forthcoming*; see also Chapter 4). The last reason is the likely aggrading of the landscape. In the Dévaványa survey, Sherratt (1983) identified a Neolithic site with 75 cm of meadow clay overlying it. Given the results of the geomorphological work in the Körös bas, Frolking (*forthcoming*), believes this is related to aggrading of the levee elements rather than overbank deposition (see also Chapter 4).

My assessment of these factors is that perhaps one in five significant occupations has been lost. The prehistoric sites without enough diagnostics to assign them to a period are fairly ephemeral, and were probably fairly short occupations. The Békés county landscape is mostly agricultural, so urban sprawl and forested areas rarely inhibit visibility. Sites occur on both sides of paleo-channels, so the sedimentation on top of sites may have been restricted to the faster moving water and particular meander geometries. Finally, the existing evidence suggests that standing water may have been common off of the meander banks during some parts of the year (Dóka 2006), so it is unlikely many people would have settled there (see also Chapter 4).

Chronological placement by MRT researchers

After the ceramics were collected from the sites, a team of ceramic experts agreed upon how they fit into the local chronology. The survey and identification process took place over 25 years, and each volume differs slightly in the Bronze Age ‘cultures’ identified in the surveyed area. Most of this is because the different areas have different ‘cultural’ representation. For example, the Szeghalom (6) and Sarvas (8) volumes identify ‘Hatvan’ sites (although the Szeghalom volume describes them as ‘imports’), while the Békés volume (10) does not. The Szeghalom and Békés volumes identify ‘Hajdúbagos’ sites, while the Szarvas volume does not. The identification is therefore consistent with the published literature and chronology described by Bóna (1975), Kalicz (1968), Sz. Máthé (1988) and others. Few changes in the overall cultural chronology occurred during this time[71].

Using the MRT survey to new ends

The goal of the MRT survey was to locate sites, establish how big they were and describe the diagnostics found there. Site sizes can only be generated from these data if the site is single component – a fairly rare occurrence. Establishing site sizes therefore requires re-visiting these sites and focusing specifically on the distribution of Middle Bronze Age material. Comparing material from surface scatters at Bronze Age sites requires establishing that the material is plausibly attributable to the Bronze Age. To this end, I now describe the process of selecting the sites to be revisited.

Coding site polygons

Site polygons were created only for sites with recognizable or probable Early and Middle Bronze Age components (Tables 8.1 and 8.2). Sites with 'sporadic' (*szórvány*) sherds of specific recognizable components were not included, nor were sites considered 'possible but doubtful finds' (*bizonytalan jellegű*). I also excluded sites listed as 'Bronze Age?' from these counts, but included sites that were certainly Bronze Age, but 'Early?' or 'Middle?' Bronze Age. Overall there were few such cases, however. Because the unpublished volume was not organized in columns by period in an appendix as it was in the published volumes, there is occasionally ambiguity as to how a site would be classified in the final version. In these cases I used the language of the descriptions to place them in a similar manner to the coding for the published volumes. In the unpublished volume, if the overall characterization of a site component was 'Bronze Age', with qualifiers of sherds such as 'possibly Nyírség' or 'maybe Gyulavarsánd', they were included in this more specific component rather than remaining in 'general bronze

[71] A rare exception would be Bóna's (1994a) introduction of the 'Gyula-Roşia' culture into the Early Bronze Age, but with only one possible site identification in the Békés volume and the term's subsequent abandonment (Tóth 2003), such incongruence is insignificant. Also, Hajdubagos is considered to be the end of the MBA in vol 10, but the beginning of the LBA in vol 6. I follow the volume 10 convention.

age' category. The same went for several sites listed in both general and more specific categories, such as 'Nyírség´ and 'Early Bronze Age'. In addition, all volumes had collections from sites whose precise locations were unknown. These were not included[72].

Typologically, Hungarians place the beginning of the Ottomány phase at the end of the Early Bronze Age (Tables 8.1 and 8.2). Although I arrange them in this order in the MRT data tables that follow, I refer to the Ottomány as Middle Bronze Age (MBA) because the radiocarbon data place it in the middle of the Bronze Age sequence (Chapter 5).

[72] Moreover, for consistency sake, additional sites in the unpublished volume attributed by Irén Juhász's previous survey, were not included.

				EBA						MBA				
VOL 6 (SZEGHALOM PARISH)	Area (ha)	All sites	GBA	EBA	Makó	Gyula-Rosia	Nyírség	Ottomány	Hatvan	MBA	Gyulavarsánd	Hajdúsámson	Koszider	Hajdúbagos
Biharugra	5289	57	0	0	0	0	0	1	0	1	7	0	0	2
Bucsa	5579	27	0	0	0	0	0	1	0	1	1	0	0	0
Dévaványa	21683	205	7	2	0	0	0	1	0	1	1	0	0	0
Ecsegfalva	7869	30	0	0	0	0	0	0	0	0	0	0	0	0
Füzesgyarmat	12743	111	1	3	0	0	2	3	0	2	3	0	0	1
Kertészsziget	3914	17	1	0	0	0	0	2	0	0	2	0	0	0
Körösladány	12392	116	3	3	0	0	0	4	0	2	1	0	0	0
Körösnagy-harsány	1993	19	1	0	0	0	0	1	0	1	1	0	0	0
Körösújfalu	2531	41	1	3	1	0	0	0	0	0	2	0	0	0
Okány	7066	50	3	3	0	0	0	2	0	0	2	0	0	0
Szeghalom	21711	234	11	12	1	0	0	4	0	0	2	1	0	1
Vésztő	12583	149	8	6	2	0	1	3	0	0	4	0	0	1
Zsadány	6586	64	2	3	0	0	0	1	0	0	3	0	1	3
	121939	***1120***	***38***	***35***	***4***	***0***	***3***	***23***	***0***	***8***	***29***	***1***	***1***	***8***
VOL 8 (SZARVAS PARISH)														
Békésszent-andrás	7744	90	0	1	1	0	0	0	5	0	0	0	0	0
Csabacsűd	6692	83	0	0	0	0	0	0	0	0	0	0	0	0
Endrőd	11568	196	1	0	6	0	0	0	0	0	1	0	0	0
Gyoma	22500	300	2	0	3	0	1	0	0	3	5	0	0	0
Hunya	3256	46	0	0	0	0	0	0	0	0	0	0	0	0
Kondoros	8193	203	0	0	1	0	0	0	0	0	0	0	0	0
Örménykút	9734	143	1	0	2	0	0	0	0	0	0	0	0	0
Szarvas	16162	201	6	5	3	0	0	1	2	2	1	0	0	0
	85849	***1262***	***10***	***6***	***16***	***0***	***1***	***1***	***7***	***5***	***7***	***0***	***0***	***0***

Table 8.1. Counts of Early and Middle Bronze Age sites by parish for volumes 6 and 8. Parish area calculations are derived from the MRT volumes.

				EBA						MBA				
VOL 10 (BÉKÉS-BÉKÉSCSABA PARISH)	Area (ha)	All sites	GBA	EBA	Makó	Gyula-Rosia	Nyírség	Ottomány	Hatvan	MBA	Gyulavarsánd	Hajdúsámson	Koszider	Hajdúbagos
Békés	12732	235	24	9	7	0	0	10	0	0	15	0	1	2
Békéscsaba	19710	517	29	0	1	1	0	1	0	0	4	0	0	0
Bélmegyer	6292	96	16	3	3	0	1	4	0	0	6	0	0	1
Csárda-szállás	5417	68	8	0	1	0	0	0	0	0	0	0	0	0
Gerla	2962	82	12	2	1	0	1	1	0	0	7	0	0	1
Kamut	6047	137	4	0	0	0	0	0	0	0	0	0	0	0
Kétsoprony	5124	119	2	0	0	0	0	0	0	0	0	0	0	0
Köröstarcsa	6283	76	13	0	0	0	0	1	0	0	1	0	0	0
Mezőberény	11865	146	15	1	1	0	0	2	0	0	1	0	0	0
Murony	3571	73	7	0	0	0	0	0	0	0	1	0	0	0
Tarhos	5744	72	22	1	1	0	0	10	0	0	12	0	0	1
Telek-gerendás	7242	185	14	1	0	0	0	1	0	0	1	0	0	0
	92989	***1806***	***166***	***17***	***15***	***1***	***2***	***30***	***0***	***0***	***48***	***0***	***1***	***5***
VOL ND (SARKAD-GYULA PARISH)														
Doboz	5443	82	5	0	0	0	0	0	0	0	0	0	0	0
Geszt	5135	133	2	0	0	0	0	0	0	0	2	0	0	4
Gyula	25561	601	9	59	0	0	0	0	0	0	2	0	0	0
Kötegyán	4292	118	1	1	0	0	0	0	0	0	2	0	0	1
Méhkerék	2583	67	0	1	0	0	0	0	0	0	1	0	0	1
Mezőgyán	5982	90	3	3	0	0	0	0	0	1	6	0	0	0
Sarkad	12548	287	36	2	0	0	0	0	1	0	15	0	0	0
Sarkad-keresztúr	3528	124	3	3	0	0	0	0	0	0	4	0	0	0
Szabad-kígyós	4552	157	3	1	1	0	0	0	0	0	0	0	0	0
Újkígyós	5488	278	0	0	1	0	0	0	0	0	0	0	0	0
Újszalonta	2081	48	0	0	0	0	0	0	0	0	0	0	0	0
	77193	***1985***	***62***	***70***	***2***	***0***	***0***	***0***	***1***	***1***	***32***	***0***	***0***	***6***

Table 8.2. Counts of Early and Middle Bronze Age sites by parish for volumes 10 and unpublished. Area for volume 10 parishes are those given. Areas for the unpublished volume were calculated in ArcGIS 9.

The micro-region

The orthodox model for Bronze Age societies in eastern Hungary and many other parts in Europe includes a social hierarchy with an elite class living at fortified centre controlling metal production, trade and open settlements in the countryside (Roska 1941; Banner and Bóna 1974; Németi and Molnár 2002). The primary interests guiding fieldwork involved gaining a better understanding of the interaction between open and fortified settlements in order to evaluate evidence for this idea.

In defining a study region, I was interested in focusing in the area around two central sites: Tarhos 1 (Békés-Várdomb) and Sarkad 8 (Peckesi-domb). Both have known Ottomány and Gyulavarsánd phase components. As the only excavated tell site in the lower Körös basin published as a monograph, Békés-Várdomb is a natural point of comparison with any other work in the lower Körös basin. The latter site, Peckesi-domb, 5 km to the east of Várdomb, was excavated in the early 1990s though never analyzed or published (see Chapter 7). It was contemporary with Várdomb for at least some of the sequence, and similarly has a sprawl of habitation around a central fortified settlement mound. The proximity and contemporaneity of the two sites suggested that I would have to include them both in defining a study region.

The closest contemporary (Ottomány or Gyulavarsánd phase) fortifications to these two sites are Vésztő-Mágor 15 kilometres north by northwest, and Vărşand (Gyulavarsánd-Laposhalom) twenty kilometres south by southeast. A third fortified site, Belső-Szőlők, is found 6 kilometres down river from Sarkad-Peckesi-domb, but the ceramics here were very late Gyulavarsánd phase, and if contemporary with the other two sites, only so for a short period of time. The issues raised by this site are interesting, but because it was so late, it was not included as being a central defining feature in the definition of a micro-region.

The logic of the orthodox model was instructive in defining the size of the micro-region. If there were strong dependencies between fortified sites and open settlements, open settlements would arguably have been aligned with the closest fortified site, or cluster of sites. Assuming this to be true, a ten kilometre radius around Várdomb and

Peckesi-domb would include the dependent open settlements around. Field impressions during reconnaissance also suggested that concentrating in a smaller area, and providing a more controlled collection environment, might be required for recognizing patterns in ceramics and other material culture.

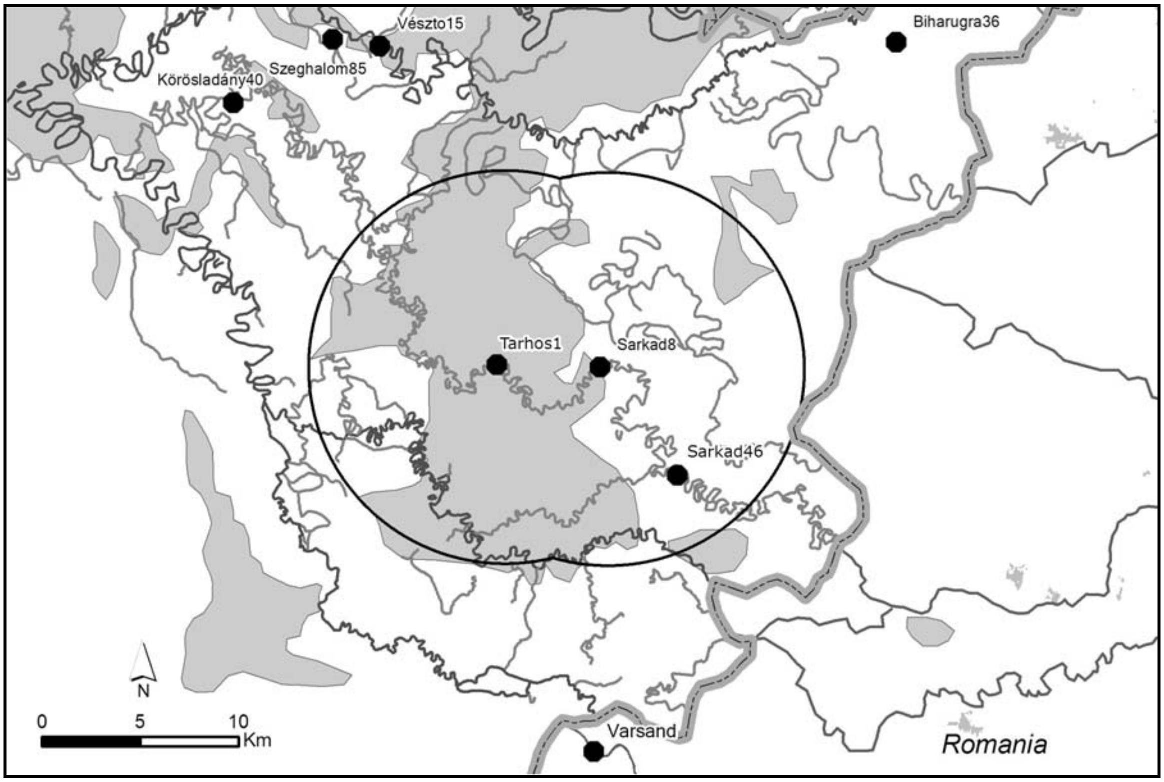

Figure 8.2. Fortified sites with Middle Bronze Age components south of the Sebes Körös overlaid with a ten kilometre buffer around Tarhos 1 and Sarkad 8.

To define the micro-regional boundary, each fortified settlement polygon was first converted into an X/Y coordinate. Using these points, a merged polygon with a ten kilometre buffer was created. The result is a single region with the two closely spaced fortified sites in the center[73]. It provides sufficient area around the two long lasting sites to consider open sites around them as a possible social unit and observe changes over time (Figure 8.2). It was in this region that most site-revisits and surface collection for

[73] Analysis Tools / Proximity / Buffer in the ArcToolbox. With the buffer created, the sites within this area could be selected using the Clip tool (Data Management Tools / Raster), producing an output layer of only those sites within the buffer.

this dissertation took place. The micro-region intersects parishes from three volumes: Vol 8 (Vésztő, Okány), Vol 10 (Békés, Bélmegyer, Tarhos), and the unpublished volume to which I was granted access (Doboz, Méhkerék, Sarkad, Sarkadkeresztúr, Gyula, and Kotegyán) (Figure 8.3).

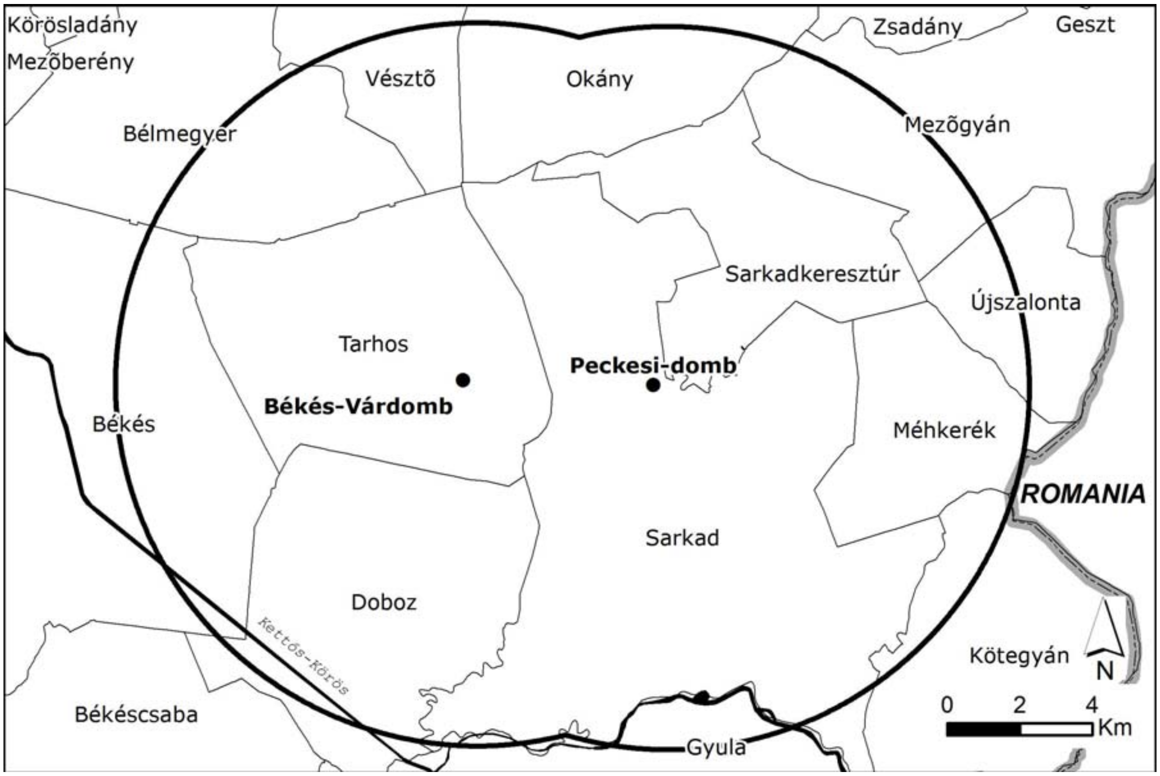

Figure 8.3. Parishes, modern hydrology and location the two fortified sites defining the micro-regional boundary.

Given the time constraints of fieldwork, only a handful of MRT sites could be revisited and collected. As I outlined in Chapter 5, the beginning of the Bronze Age (ca. 2800-2150 BC) is not very well understood. There are low numbers of EBA sites (Makó, Nyírség) in the micro-region, so I did not visit any of these in order to focus on the 'classical' phases of the Bronze Age, the Ottomány and Gyulavarsánd. Although some MRT sites were also listed specifically by the late horizonas of the MBA (Hajdúsámson, Koszider, and Hajdúbagos), these also occurred in small numbers and depended on a very narrow range of rare ceramic types for identification. I excluded these from site visits in order to build a better characterization of Ottomány and Gyulavarsánd components that are well represented in the excavated fortified sites.

Previous visits to MRT sites in the region indicated that in many cases, there were too few diagnostics on the surface to assign it to a phase as the MRT surveyors had done[74]. My research goals included describing site sizes and activities at a coarse level, so it was decided to ignore very ephemeral scatters described in the MRT, and focus on Bronze Age sites with the highest density in order to get a first approximation.

Creating this high density sample involved first coding sites identified as 'Ottomány' or 'Gyulavarsánd' on the amount of Middle Bronze Age material identified during the MRT survey. These sites were also coded on the material from other periods that would impact the benefits of collection or excavation for a sample of Bronze Age material. That is, even if Middle Bronze Age features seem high at one site, the benefits of surface collection and excavation are compromised if they are under a medieval church or were pitted by Sarmatians (both common occurrences in Békés County). Both codes employed a 'Low-Moderate-High' scale for estimating these amounts based on written descriptions.

I revisited all sites, whether fortified or not, that fell into my four highest ranked categories[75]. These combinations are presented in Table 8.3. The first ranked were those sites with 'High BA' with no other components present. Second ranked was 'High BA/Low Non-BA.' The third ranked were those sites with 'Moderate BA' with 'Low' or 'No Non-BA' and the fourth ranked were those coded 'High or Moderate BA/Mod Non-BA.'

Rank	MBA Density	Non-MBA Density
1	H	None
2	H	L
3	M	L or None
4	H/M	M

Table 8.3. Ranking of sites for priority collection.

[74] This is likely due to a combination of their having collected many of the diagnostics, the greater time and resources they had for survey, and site degradation.
[75] Only two sites, Okány 15 and Veszto 47 could not be visited due to surface conditions in Spring 2006.

We occasionally visited less highly ranked sites (such as 'Low BA/Low Non-BA') when they were located close by to higher ranked sites. Although raw site descriptions (in *Word* documents) were available for the unpublished volume at the time of field survey, the detailed ceramic analyses specifying periods were not. Consequently, sites in the unpublished area were visited and collected based primarily on museum personnel's knowledge of sites with a strong representation of MBA material[76]. These sites are illustrated in the following section.

Although it is not a random sample, I believe it is fairly representative as it constitutes 58% of sites in the micro-region with any Ottomány or Gyulavarsánd diagnostics (*N*=50, 38 open, 12 in fortified clusters). Only a couple sites outside the 'priority' strategy were visited: not enough to create a bias in auto-correlation. It is therefore a reasonable sample, even if the southeastern area is less well represented because of the lack of data availability at the time. Moreover, because of the small samples of artefacts presented for comparison in Chapter 9, no spatial statistics were employed that might be impacted due to the greater weighting to the western half of the micro-region.

PART II: SURFACE COLLECTION IN THE MICRO-REGION

The two primary limiting factors during site visits in May-June of 2006 were surface visibility and the ability to get our field vehicle to get to sites sometimes treacherously far away from the main roads. I generated GOTO points for the site polygons in ArcGIS and uploaded them to the GPS each day. These and other points were used alongside topographic maps to relocate the sites. The survey team typically ranged between two to four people. Upon re-location of the site, we walked back and forth on survey lines 15-20 m apart. We dropped pin flags in areas of high concentration or diagnostics to visually assess the locations of densities of material. Based on this assessment, an approximate center point was chosen, and transects radiated out from it to capture the distribution. Each transect was composed of collections in a 2 x 2 m 'rolling frame:' a square of

[76] The sites visited include primarily the two fortified sites and the open sites surrounding them. Sites coded later in the unpublished area that would have been visited had the data been available are Sarkad 251, Sarkadkeresztúr 73, Sarkadkeresztúr 90, Sarkadkeresztúr 102, and Kötegyán 14.

wooden posts assembled with iron fixtures (Figure 8.4). The square was placed over a measuring tape for collection, and moved in increments of 1-6 meters between units, depending on the sites of the site (Whallon 1979). The site surface was collected in all directions until units included between 0 and 2 ceramics. We collected all material, including bone, daub, lithics, and slag, but due to storage constraints and find processing time, undiagnostic body sherds were counted but left in the field.

The discussion of Bronze Age ceramics follows the conventions and chronological associations outlined in Chapter 7. I indicated that surface brushing of ceramics occurs disproportionately in the Ottomány phase, and that certain features – such as geometric incised lines and bossed spirals – occur in one phase but not the other. All diagnostic Bronze Age, or otherwise undiagnostic but decorated prehistoric and plausibly MBA ceramics were coded based on surface treatment: rubbed, burnished, brushed, or brushed on one side and burnished on the other. The percentage of surface treatment classes is used in addition to chronologically diagnostic sherds in the site descriptions to assign sites to Bronze Age phases. All sites are presented in summary tables below, but described in detail in Appendix E.

Figure 8.4. Collection in the 2 x 2 m ‘rolling frame’ at Tarhos 19.

In Appendix E, I provide a map and an overview of the unit collection material for each site. When appropriate I make reference to the Hapsburg maps or aerial photos (see discussion in Gyucha et al. *forthcoming*). I provide a site size estimate (or range) for each site or site cluster, which are reproduced in the summary tables below. When no other factors interfered with the calculation, I used the method outlined in Chapter 6: minimal site boundary is *over* 1 sherd per m^2, and maximal site boundary is 0.25 sherds per m^2 in collection units. All maps use the same ceramic distribution legend, so ceramic density can be visually compared between them using a common reference point. Where the site boundary could not be easily produced using transect data, I use the data from MRT descriptions, waypoints and field notes to make an estimate I think is commensurate with my quantitative definition. Two site boundaries, the minimum and maximum, are illustrated on the maps and discussed in Appendix E. Some kinds of artefacts, such as lithics and slag, occurred on sites in low densities but were collected using GPS waypoints. In Chapter 9, I calculate densities for different artefact classes outside of transect collections, so I include the 'waypoint collection area' in the Appendix as well. The value is based on a polygon created in ArcGIS 9 (not shown) covering the area that was field walked and visible during survey and for which waypoints were taken.

Open settlements

As with the preliminary study of Békés-Várdomb and Sarkad-Peckesi-domb, tell sites often have settlement outside the fortification. The MRT identified these settlements with their own number and description even if they occurred only several metres from a tell. In this section, I only discuss open settlements not associated with fortifications, and discuss open settlements outside of fortifications as 'settlement clusters' in another section below[77]. All sites in the micro-region visited or collected are located in Figure 8.5.

Twenty open settlements registered in the MRT were visited during fieldwork and considered for systematic surface collection (Table 8.4). Due to poor visibility or inadequate surface material, only six sites were collected during April-May 2006. The field conditions of these sites are presented in Table 8.5 and 8.6.

[77] Sites are either clearly associated with a tell (within 30 m) or not directly associated with it (the next closest site in any cluster, Tarhos 9, is 700 m away from Tarhos 1).

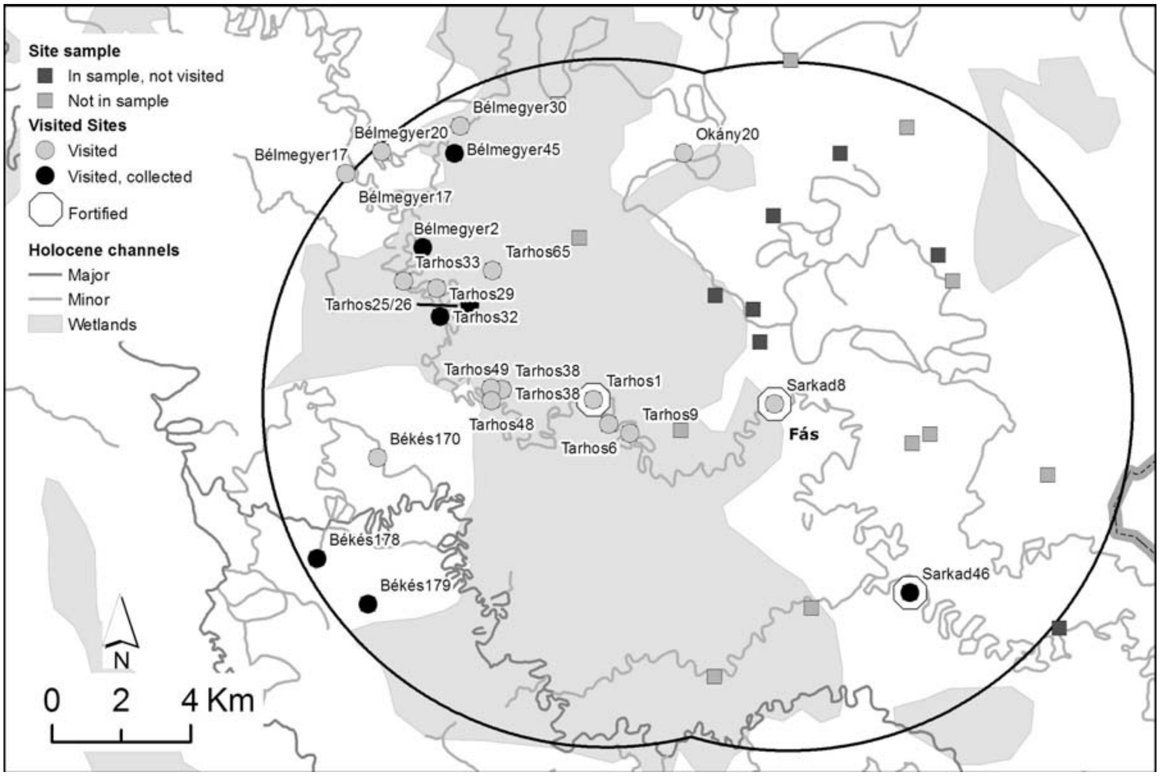

Figure 8.5. Sites in the micro-region visited or collected during fieldwork. Sites visited within site clusters are not shown at this scale.

Parish	Site	Name	MRT polygon area (ha)	Neolithic	Copper Age	Ottomány	Gyulavarsánd	Hajdúbagos	LBA	Later	DENSITY	
											MBA	Non MBA
Okány	20	*Palos*	4.08		*	*			*	*	M	M
Békés	170	*Hosszú-sziget, volt Birkatelep*	3.21		*	*				*	L	L
Békés	178	*Lápos-domb*	0.51	*	*	*					M	L
Békés	179	*Maksári I*	5.73			*				*	M	L
Bélmegyer	2	*Gereblyés, Zsilip*	12.99		*	*	*		*	*	M	M
Bélmegyer	17	*Mogyorósi domb*	21.22			*	*			*	H	H
Bélmegyer	20	*Kárász-Megyer, Lantos-tanya*	12.02	*			*			*	M	L
Bélmegyer	30	*Vadas-megyer, Füzes*	4.13	*	*	*			*	*	L	L
Bélmegyer	45	*Vadas-megyer, Kun-tanya*	7.02				*				M	
Tarhos	6	*Békési-Erdő I*	0.68			*				*	M	L
Tarhos	9	*Kocsor-tanya*	8.60			*				*	L	M
Tarhos	25	*Tarhosi Gátőrház*	0.15			*	*			*	H	L
Tarhos	26	*Gyepesi Átkelő*	2.72			*	*			*	H	L
Tarhos	29	*Csík-Ér, Gyarmati-Tanya*	3.34				*			*	L	H
Tarhos	32	*Temető*	5.50	*			*		*	*	M	M
Tarhos	33	*Csík-Ér, Nyugati Part*	7.81				*	*	*	*	M	M
Tarhos	38	*Törsökös-Ér Partja*	56.06	*		*	*		*	*	H	H
Tarhos	48	*Törsökös I*	8.29	*		*				*	M	L
Tarhos	49	*Törsökös II*	1.93			*					H	
Tarhos	65	*Végtő*	10.69				*			*	M	L

Table 8.4. MRT characteristics of sites revisited during fieldwork.

Parish	Site	Vegetation	Status of most accessible landcover	Visibility of most accessible landcover	Material	Collected?
Okány	20	None (85%) / Grassy (15%)	Recently ploughed but very muddy and difficult to get to	100%	High density of single component Ottomány material extending across c. 3 ha, LBA circumscribed to southwest	No
Békés	170	None (100%)	Recently ploughed	100%	Almost nothing - only one MA sherd identifiable	No
Békés	178	Corn (100%)	10 cm	100%	Dense concentration of Ottomány ceramics. Dense lithic material and animal bone. Occasional CA, Sarmatian, Árpád.	Yes
Békés	179	Corn (100%)	< 5 cm	100%	Moderate amount of prehistoric material, but diagnostics are rare. High number of lithics on surface.	Yes
Bélmegyer	2	None (95%) / Forest-Grass (5%)	Northern section was recently ploughed, although a grassy strip ran through site	100%	Some Baden, LBA and Sarmatian material, but a heavy concentration of MBA ceramics in the northern edge	Yes
Bélmegyer	17	Wheat (100%)	40-50 cm	<10%	Dense concentration of Árpád, MA and some prehistoric sherds in a small area of possibly re-deposited material.	No
Bélmegyer	20	Wheat (100%)	20 cm	50%	A few daub and prehistoric sherd concentrations, but mostly Neolithic. Very few MBA diagnostics.	No
Bélmegyer	30	Wheat (100%)	30-40 cm	10-20%	A couple of sherds seen on the surface, but visibility is prohibitive	No
Bélmegyer	45	Corn (100%)	5 cm	100%	Very dense single component Gyulavarsánd. Only a few isolated Sarmatian and Árpád period ceramics.	Yes

Table 8.5. Field conditions of open settlement sites revisited during fieldwork (Okány, Békés, and Bélmegyer parishes).

Parish	Site	Vegetation	Status of most accessible landcover	Visibility of most accessible landcover	Material	Collected?
Tarhos	6	Forest (100%)	None accessible	0%	Couldn't be evaluated	No
Tarhos	9	None (100%)	Recently ploughed	100%	Extremely sparse. Middle Age sherds, and a few prehistoric sherds, but only Iron Age was identifiable.	No
Tarhos	25	Mixed vegetables (50%) / Grass-Trees (35%)	Recently disked	50%	Couldn't be evaluated	No
Tarhos	26	None (30%) / Wheat (50%) / Built (20%)	Recently ploughed	100%	Very dense concentration of Ottomány diagnostics and some Gyulavarsánd.	Yes
Tarhos	29	None (100%)	Recently ploughed	100%	Moderately dense Sarmatian but only a single possible MBA sherd.	No
Tarhos	32	Wheat (60%) / Built (20%) / None (20%)	Recently ploughed	100%	MBA concentration in SE, moderately high Neolithic, Sarmatian and migration period throughout.	Yes
Tarhos	33	None (100%)	Recently ploughed	100%	Sarmatian and handmade sherds spread out at low density over the entire site, but MBA only at very low density on highest elevation in northern half of site	No
Tarhos	38	Mostly agricultural crops	Small areas recently ploughed	100% where ploughed	Very large multi-component site with only a small area of MBA material located by the MRT survey. Only prehistoric sherds identifiable in ploughed fields when surveyed, though some areas in pasture.	No
Tarhos	48	Corn (100%)	20-30 cm	30%	Visibility was good enough in areas to reveal that most of the site was actually Neolithic and Sarmatian. A couple of Árpád, Middle Ages were also found, with very few likely candidates for MBA sherds.	No
Tarhos	49	Wheat (100%)	30 cm	<20%	Couldn't be evaluated	No
Tarhos	65	Wheat (80%) / None (20%)	10-15 cm wheat, recently ploughed in north	100%	Very little material in area recently ploughed, and in south where low amounts of diagnostic MBA material visible, vegetation prevented systematic collection	No

Table 8.6. Field conditions for sites revisited during fieldwork (Tarhos parish).

Open settlements: summary

Table 8.7 lists the open settlements revisited during fieldwork, along with the polygon size and cultural components listed in the MRT description. For sites I systematically collected, I list the minimum and maximum size estimates established during fieldwork. In addition, I offer size estimates of sites that I visited but did not systematically collect, usually due to a paucity of material on the surface. The values I offer are conservative upper limits and I believe if anything overestimate size as it would be defined by systematic collection. Question marks remain only where the vegetation prohibited evaluation.

SiteID	MRT Area (ha)	Neolithic	Copper Age	Ottomány	Gyulavarsánd	Hajdúbagos	LBA	Later	MBA	Non MBA	Collected?	Min Size (ha)	Max Size (ha)	Collection-free estimate (ha)
Okány20	4.08		*	*			*	*	M	M	No			2-4
Békés170	3.21		*	*				*	L	L	No			< 1
Békés178	0.51	*	*	*					M	L	Yes	0.3	0.8	
Békés179	5.73			*				*	M	L	Yes	0.1	2.2	
Bélmegyer2	12.99		*	*	*		*	*	M	M	Yes	1.4	2.3	
Bélmegyer17	21.22			*	*			*	H	H	No			?
Bélmegyer20	12.02	*			*			*	M	L	No			?
Bélmegyer30	4.13	*	*	*			*	*	L	L	No			?
Bélmegyer45	7.02				*				M		Yes	2	6	
Tarhos6	0.68			*				*	M	L	No			?
Tarhos9	8.60			*				*	L	M	No			< 1
Tarhos25	0.15			*	*			*	H	L	No			< 1
Tarhos26	2.72			*	*			*	H	L	Yes	2.4	3.3	
Tarhos29	3.34				*			*	L	H	No			< 1
Tarhos32	5.50	*			*		*	*	M	M	Yes	1	4	
Tarhos33	7.81				*	*	*	*	M	M	No			< 3
Tarhos38	56.06	*		*	*		*	*	H	H	No			?
Tarhos48	8.29	*		*				*	M	L	No			< 1
Tarhos49	1.93			*					H		No			?
Tarhos65	10.69				*			*	M	L	No			< 5

Table 8.7. Open settlements visited during fieldwork with summary size estimates for BA components. Collection-free estimates are given for sites that were visited but for which systematic collection did not occur.

Two important conclusions can be drawn from these data. The first is that MRT polygon estimates are not reliably used for estimating the area of BA components on most open settlement sites. Even when there is a moderate or high amount of MBA material at a site, it can be extremely localized and the MRT polygon size is unhelpful when other components are moderate or highly represented (e.g. Bélmegyer 2, Tarhos 33, Tarhos 65). Thus, MRT area will almost always over-represent the extent of a BA occupation when multi-component.

Second, where Ottomány and Gyulavarsánd components are clearly recognizable on the surface, they tend to be between 0.5 and 5 ha in size. Since the MRT sites in this area are virtually always multi-component, however, even this size estimate is probably inflated. In the rare circumstances of single component sites (e.g. Bélmegyer 45), systematic surface collection and MRT size descriptions are in broad agreement, if somewhat larger in the latter case.

The third observation concerns the distribution of ceramics by phase (see Appendix E for details). Somewhat unexpectedly, the traditional sets of motifs associated with the Ottomány and Gyulavarsánd styles tend not to co-occur. That is, despite a set of shared material culture (such as ribbon appliqué on storage vessels), the more chronologically specific stylistic attributes are not really found on the same sites. Brushed surface treatments, characteristic of the Ottomány, are rarely found when Gyulavarsánd motifs such as channelled spirals are present. This is not the case for burnishing, however, which occurs in different amounts regardless of stylistic motifs[78].

This was unexpected because the MRT lists many sites in the MRT that have both Ottomány and Gyulavarsánd components. The MRT survey, however, focused on describing all site components in broad brush strokes. Less attention was given to the proportion of these Bronze Age phases, and no attempt was made to quantify their relative representation. The lack of continuation from one phase into the next in a single location observed in my survey results is interesting because it contrasts with the *continuity* demonstrated from excavations at the fortified tell sites, despite Bóna's

[78] Although burnishing occurs commonly in Gyulavarsánd assemblages from excavated contexts, however, it is not uncommon in Ottomány assemblages either.

simultaneous insistence that new people migrated into the area at the beginning of the Gyulavarsánd. I take up this topic again at the end of the chapter.

Fortified settlements and surroundings

In the last chapter I introduced the published data on the Békés-Várdomb (Tarhos 1) tell and surrounding settlement, and the unpublished data for Sarkad-Peckesi-domb (Sarkad 8). In Appendix E, I provide more detailed descriptions based on surface collection for both these and Belső-Szőlők (Sarkad 46), an unexcavated enclosed site in the unpublished MRT volume. Surface collecting the open area next to fortified sites not only allows us to provide better estimates of site size, but also generates a dataset of material culture that can be compared to the open settlements away from the tells. The settlement components and the size of the MRT polygons for enclosed sites are provided in Table 8.8. The field conditions of these sites during collection are presented in Table 8.9.

Parish	Site	Name	Area (ha)	Neolithic	Copper Age	Makó	Ottomány	Gyulavar.	LBA	Later	DENSITY	
											MBA	Non MBA
Tarhos	1	*Békés-Várdomb (enclosed)*	0.27			*	*	*		*	H	M
Tarhos	2	*Városerdő-dűlő*	47.65				*	*	*	*	M	H
Tarhos	19	*Váralja*	6.67					*		*	H	L
Tarhos	72	*Békési-Erdő III (enclosed)*	2.01				*	*			H	
Sarkad	7	*Peckes I*	13.4					*	*	*	H	M
Sarkad	8	*Peckes II (Peckesi-domb, enclosed)*	0.46				*	*		*	H	L
Sarkad	9	*Peckes III (enclosed)*	0.33					*			H	
Sarkad	88	*Peckes, Sajti-tanya*	51.43					*		*	H	M
Sarkad	89	*Peckes, Háló-tanya*	3.99					*		*	L	L
Sarkad	24	*Keverőüzem*	21.85				*	*	*	*	H	M
Sarkad	30	*Polyánd*	67.48					*	*	*	H	H
Sarkad	46	*Belső-Szőlők (enclosed)*	7.08					*	*	*	H	M

Table 8.8. MRT descriptions of enclosed site clusters revisited during fieldwork.

SiteID	Vegetation	Status of most accessible landcover	Visibility of most accessible landcover	Material	Collected?
Tarhos1 (enclosed)	Forested (100%)	Shovel tested	Not applicable	Very dense single component Gyulavarsánd	No
Tarhos2	None (80%) / Built or forested (20%)	Shovel tested	Not applicable	Dense Gyulavarsánd in southwest, lower density in north, no MBA diagnostics in east. Sporadic Sarmatian, Árpád and LBA throughout.	No
Tarhos19	None (50%) / Wheat (50%)	Recently ploughed or disked	100% or 60%	Gyulavarsánd in small area in west, and MBA ceramics in northeast around Kolbász Island. Low density away from meander.	Yes
Tarhos72 (enclosed)	Forested (100%)	Shovel tested	Not applicable	Very dense single component Gyulavarsánd in north, little in south	No
Sarkad7	Wheat (90%) / Hay and grasses (10%)	None accessible	Not applicable	Couldn't be evaluated	No
Sarkad8 (enclosed)	Wooded (60%) / None (40%)	Recently ploughed	100%	Dense single component Gyulavarsánd	No
Sarkad9 (enclosed)	None (100%)	Recently ploughed	100%	Single component Gyulavarsánd	No
Sarkad88	Wheat/corn (70%) / Hay (10%) / None (15%)	Recently ploughed	100%	Dense Gyulavarsánd towards meander, Sarmatian away from meander	Yes
Sarkad89	Hay and grasses (100%)	None accessible	Not applicable	Couldn't be evaluated	No
Sarkad24	Gardens, orchards or built (90%) / None (10%)	Recently ploughed	100%	Dense MBA on higher ground, sporadic LBA and Sarmatian throughout	Yes
Sarkad30	Agricultural land, not evaluated	Not evaluated	Not evaluated	Not evaluated	No
Sarkad46 (enclosed)	Gardens and orchards	Shovel tested	Not evaluated	Not evaluated	No

Table 8.9. Field conditions for enclosed sites during re-visitation.

Fortified settlements: summary

Table 8.10 lists the enclosed site and cluster settlements in the micro-region. Field visits indicate that the material culture outside the enclosure is similar to the material inside the enclosure. The idea must therefore be entertained that there was settlement outside of the fortifications while the tell was inhabited, and that this constituted an operational social unit or community.

SiteID	Surveyed?	Name	MRT polygon (ha)	Makó	Ottomány	Gyulavar.	LBA	Later	MBA	Non MBA	Min Size (ha)	Max Size (ha)
Tarhos1	*	*Békés-Várdomb (enclosed)*	0.27	*	*	*		*	H	M		0.27
Tarhos2	*	*Városerdő-dűlő*	47.65		*	*	*	*	M	H		17.56
Tarhos19	*	*Váralja*	6.67			*		*	H	L		2.23
Tarhos72	*	*Békési-Erdő III (enclosed)*	2.01		*	*			H			2.01
										TOTAL		**22.07**
Sarkad7		*Peckes I*	13.4			*	*	*	H	M		7
Sarkad8	*	*Peckes II (enclosed)*	0.46		*	*		*	H	L		0.46
Sarkad9	*	*Peckes III (enclosed)*	0.33			*			H			0.33
Sarkad88	*	*Peckes, Sajti-tanya*	51.43			*		*	H	M	14.8	17.2
Sarkad89		*Peckes, Háló-tanya*	3.99			*		*	L	L		2
										TOTAL	**24.59**	**26.99**
Sarkad24	*	*Keverőüzem*	21.85		*	*	*	*	H	M	3.5	5.5
Sarkad30		*Polyánd*	67.48			*	*	*	H	H	10	15
Sarkad46	*	*Belső-Szőlők (enclosed)*	7.08			*	*	*	H	M		2.83
										TOTAL	**16.33**	**23.33**

Table 8.10. Enclosed settlements and surrounding sites visited during fieldwork with summary size estimates for BA components.

As with the open settlements away from the fortifications, the sites clustering to the tell are multi-component. If we ignore this and sum the MRT polygons, the site clusters are between 50 and 90 ha. As with the open settlements, site re-visits indicate that these figures cannot be used to estimate the Bronze Age occupation. Of the three fortified sites in the micro-region, only Békés-Várdomb could be entirely shovel tested during fieldwork. The size estimate for Várdomb based on shovel testing is 22.07 ha. The shovel test intervals were 100 metres apart, however, so even this estimate is probably high.

The Sarkad 8 Cluster (Sarkad-Peckesi-domb and surrounding sites) and Sarkad 46 Cluster (Belső-Szőlők and surrouding sites) could not be shovel tested (except for one component of Belső-Szőlők), so I used MRT site descriptions, transect data and field observations from site visits to provide a range of occupation I think is reasonable. The Sarkad 8 Cluster is between 25 and 27 ha, and the Sarkad 46 Cluster is between 16 and 23 ha.

This site size category, approximately 20-25 ha, is four times the size of my most conservative size estimate for the open settlements away from the fortifications (5 ha). As such, these sites are rightly considered regional population centers, in addition to the typological distinction 'fortified.'

Two interesting observations can be made with respect to the chronological phasing of these settlement clusters. First, as indicated in Chapter 7, the tell deposits of both Békés-Várdomb and Sarkad-Peckesi-domb both have Ottomány and Gyulavarsánd components. This contrasts with the open settlements in surface collected in the region, which appear to have only one phase or the other represented.

Second, although Bóna's test trench immediately outside of the fortification yielded early phase ceramics, they were not observed in any of the trenches further away from the fortification. This is also my conclusion based on the ceramic forms observable at these large site clusters. Few, if any, Ottomány phase ceramics occur in the large settlement halos around the fortifications. This is interesting because the Gyulavarsánd is the shorter and later phase of the two (1750-1400 BC). The settlement halos are therefore not palimpsests resulting from six hundred years of occupation, although they may represent up to 350 years. Nonetheless, the possibility that the settlement debris around the fortifications during the Gyulavarsánd phase was produced from simultaneous habitation, rather than horizontal movement, should be taken seriously.

If these settlements were population centers, however, it remains to be seen what proportion of the regional population they did have, and what the social consequences might have been. Moreover, until the measures developed in Chapter 6 are deployed, it is unclear how many people might this represent, and whether or not they could have all been supported by the immediate productive catchment. Finally, despite a better understanding of site sizes, the spatial relationship of the open settlements to these fortified clusters cannot be addressed until these data are built into a more explicit model and considered across the landscape. I pursue these topics in Chapter 9, and now turn to finer resolution investigation of open settlements in the micro-region.

PART III: MAGNETOMETRY AND EXCAVATION AT OPEN SETTLEMENTS

Surface collection provides a useful window into poorly understood open settlements in the micro-region, but it is not a substitute for excavation. Excavation is required for contrasting social distinctions observable in the daily habits and behaviours of individuals who lived at different types of settlements. An independent measure of settlement longevity is required to tie the ceramic phases of the region to a better radiocarbon chronology.

Nonetheless, identifying profitable places to excavate is often only trial and error when surface signatures are the only indicators used. Therefore, once single component sites in the micro-region were identified, my next task was to isolate areas on open settlements for excavation. I chose magnetometer survey to accomplish this goal.

Magnetometry

Magnetometry was first profitably used for archaeology in the 1960s and 1970s and has become a standard feature of non-intrusive survey (Sarris, et al. 2004; Weymouth 1986). Magnetic surveying is a so-called *passive* technique, relying on the magnetic field of the Earth and contrasts in magnetic susceptibility. The susceptibility of soils depends on naturally occurring iron compounds. The strength of the magnetic field is measured in nanoteslas (nT), and although changes occur naturally, contrasts between magnetic values over an area enable recognition of anthropogenic features. Heating soils to high temperatures can result in an intense *thermoremnant* magnetization, and is distinguishable due to magnetic susceptibility contrasts.

The Great Hungarian Plain is an ideal environment for magnetometry, as the terrain is very flat and there are no naturally occurring magnetic rocks that can make the interpretation of the results difficult. The proton gradiometer used for survey was the GEM Systems GSM19 Series instrument, with a 3-10 second cycle time per reading, and a 0.2 nT accuracy (though field experimentation suggests closer to 0.8-1.0 nT), and a microprocessor for storing data (GEM 2003). Gradiometers consist of two magnetometers aligned one above the other, measuring the vertical change, or gradient, of the magnetic field. During polarization, a current is passed through the sensors creating polarization of a proton rich fluid. The protons orient to this field and then proceed to orient with the local field when the current is de-energized. The precession of the protons is measured and converted into magnetic field units.

The gradiometer records the X and Y coordinates of each point, the total magnetic field, the vertical gradient between the sensors, the quality of the point and the time of the reading. Magnetic survey was conducted using 1 meter intervals on a grid oriented north-south. The data were downloaded and saved as a .txt file, but opened in Microsoft Excel for processing. Low quality readings were deleted[79]. A grid of the data was then created in Surfer 8.0 using krieging interpolation. A grayscale image map was made of the raw data grid and the pixels were interpolated. Data were then clipped in order to enhance the inspection of values of interest. Magnetic features in the ground produce anomalies which are added to the background signature of the Earth's magnetic field. Positive values indicate areas of enhanced magnetic susceptibility, such as ditches or pits. The highest values usually indicate areas where burning occurred, such as fired daub walls, fireplaces, or kilns on account of a thermoremnant magnetization.

Due to the difficulty of discriminating between magnetic anomalies of different periods, two strongly single component sites – neither part of fortified clusters – were chosen for magnetometry survey. The first, Bélmegyer 45, is a Gyulavarsánd site, and the second, Tarhos 26, is Ottomány.

[79] The machine had a predictable range of quality, based on two digits (xy) indicating duration quality of measurement (x) and conditions of signal amplitude (y): 99, 79, 45, and 00 (GEM 2003). I decided to omit anything below 79.

Bélmegyer 45

Ceramics are common household trash and daub is often a bi-product of house burning or hearths. Both are therefore good proxies for habitation. The range of values for total ceramics in collection units from Bélmegyer 45 is 0 to 32, but the distribution is bimodal, with a break at about eight. The daub range is from 0 to 33, but has a single mode. The units of densest habitation debris are therefore well represented by selecting units with both eight or more sherds and eight or more pieces of daub (Figure 8.6). It was over this area that a location for magnetometry was chosen and set up using GPS points (Table 8.11)

A 40 x 40 m area was surveyed over the course of two days. Figure 8.7 is a composite of these sessions measuring the difference between values. A range of -25 to 25 nT is shown although four values of over 100 were recorded. These are due to an iron tractor part that we were unable to remove from the ground, producing an anomaly around 8 meters in diameter near the center of the grid. The vertical striping in the grid is noise created by walking in opposite directions. Most of the other anomalies are likely modern bits of iron (Figure 8.8). One large, but subtle bipolar anomaly just west of center might represent a prehistoric feature such as a pit or area of burning. More interestingly, there is a large subtle rectangular anomaly around the tractor iron. The orientation of these linear anomalies are at an angle offset from the magnetometry grid and therefore not background noise.

Grid Corner	Easting	Northing
Northwest	517770	5189470
Northeast	517820	5189470
Southwest	517770	5189420
Southeast	517820	5189420

Table 8.11. Corners of the magnetometry grid at Bélmegyer 45 (UTM, 34N).

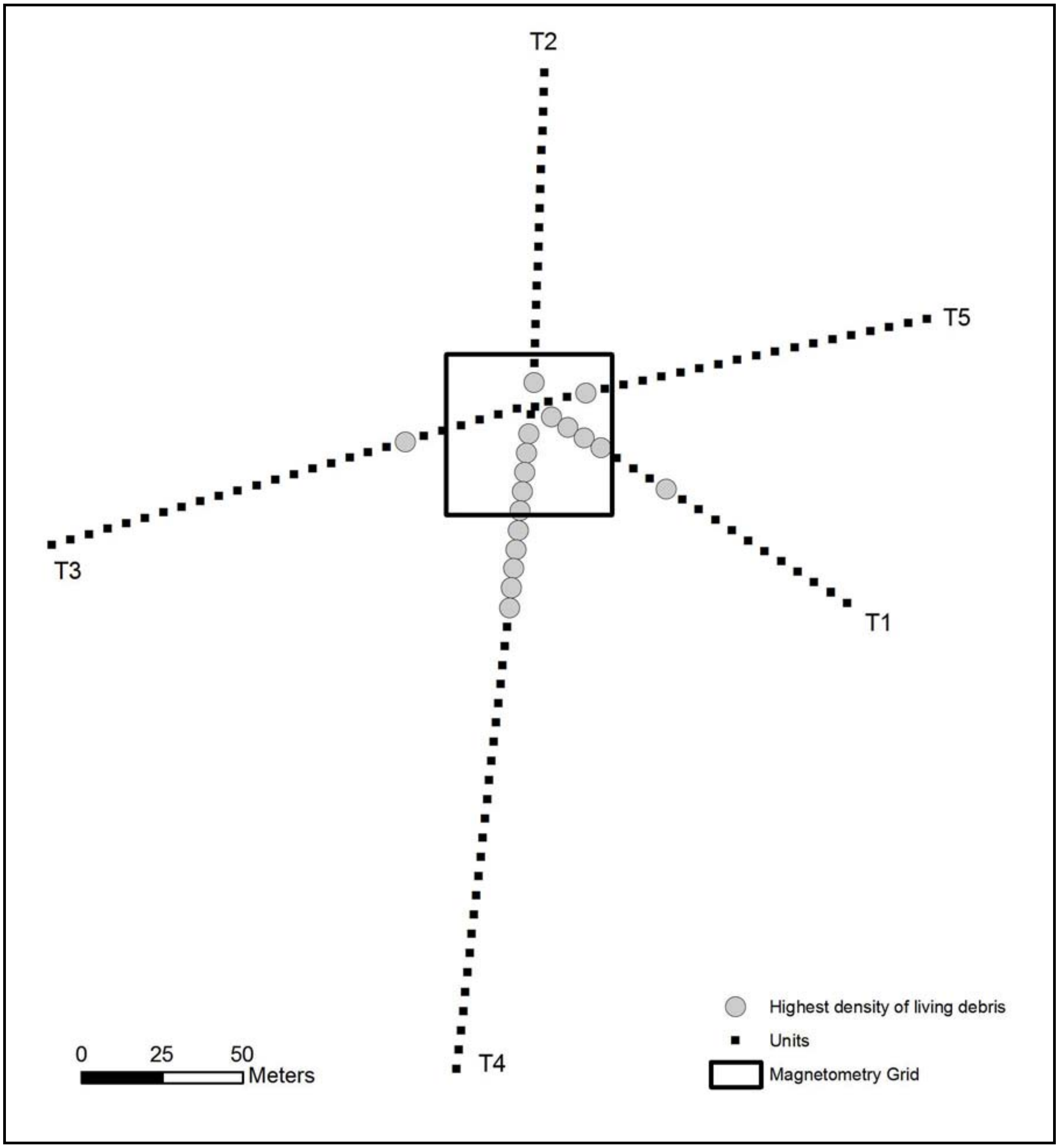

Figure 8.6. Daub and ceramic distribution at Bélmegyer 45.

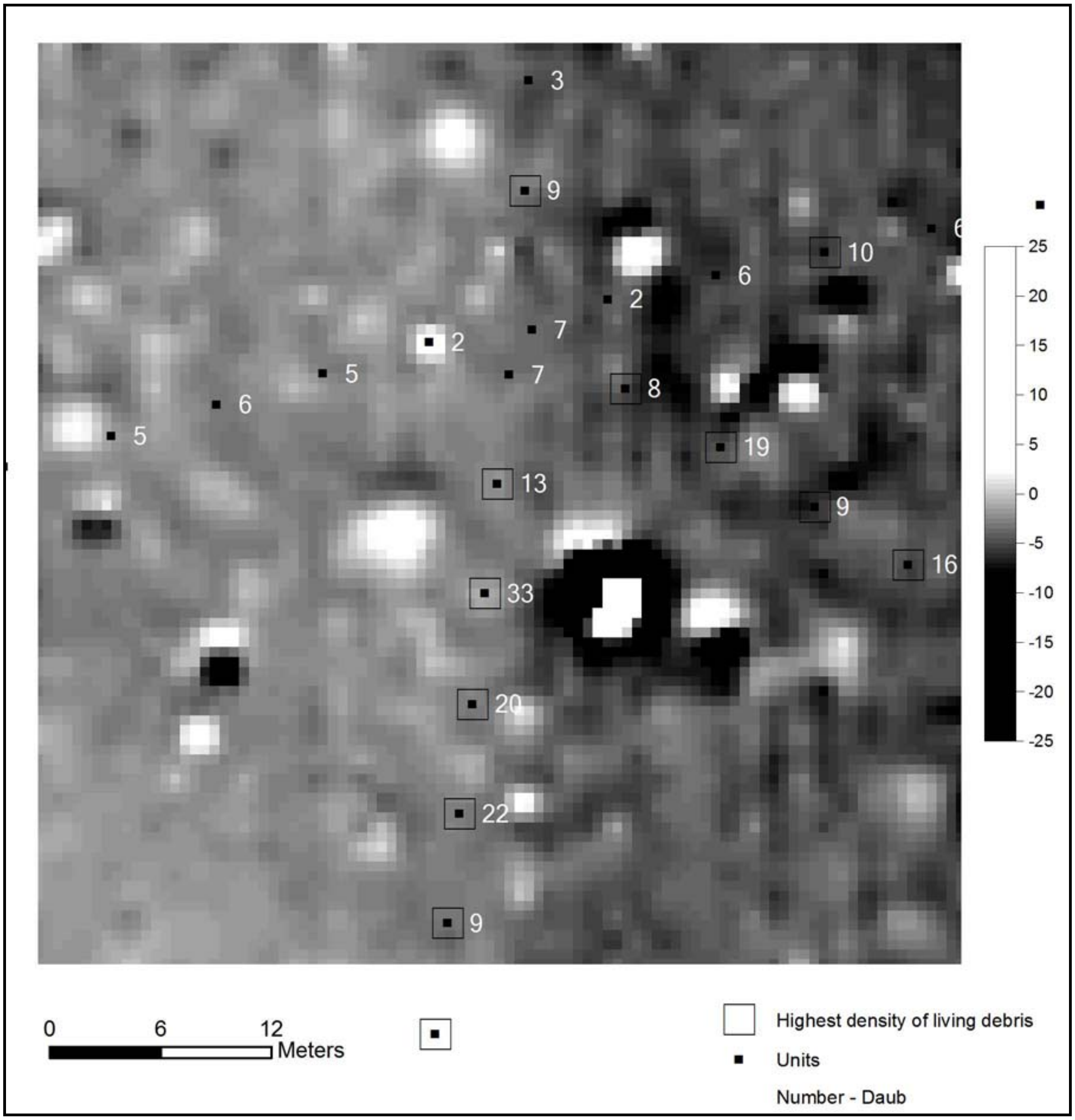

Figure 8.7. Magnetometry grid at Bélmegyer 45.

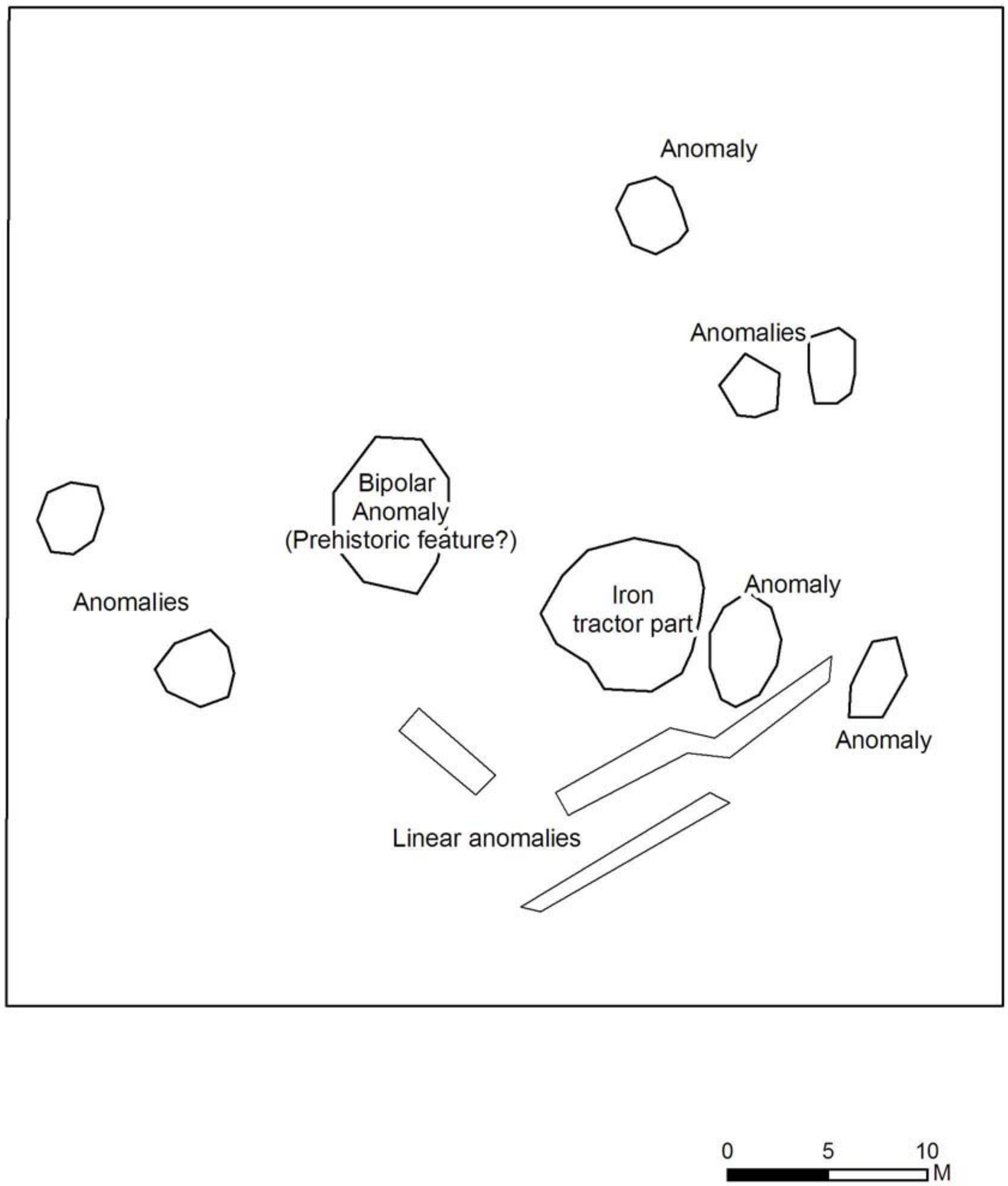

Figure 8.8. Interpretation of magnetometry data.

However, a series of 9 Oakfield cores over the survey area yielded discouraging results. Deep ploughzone, up to 60 cm in some places had destroyed most of the site, and although some cores had stratigraphy, none of it could be interpreted as intact archaeological deposits. A core into the rectangular anomaly returned 40 cm of ploughzone with large daub inclusions but a single homogenous layer with no archaeological material in it up to sterile subsoil at 74 cm. Either the magnetometry figure was misread or only wall trenches cut into the subsoil remained, with most of the archaeology ploughed out.

Tarhos 26

The cultural material at Tarhos 26 is denser than at Bélmegyer, and so locating the area of highest habitation debris relied on higher values from the collection units. Figure 8.9 shows the three transects highlighting units with both 12 sherds or more and 12 pieces of daub or more. The magnetometry grid was placed over this area of highest density using GPS points and a sighting compass. The precise location of the grid was later measured from a survey datum (Table 8.12).

The magnetometer survey took place in three sessions: the western half one day, the eastern half the next day, and an additional block on the northern edge several weeks later. Figure 8.10 is a composite. The east and western halves are shown as a single grid, but the northern segment is added as its own grid with its own greyscale. The sensors were at a lower height for the northern grid and the resulting values are therefore higher than those for the main grid. The two could therefore not be added to produce a single image because distinctions become lost when represented with a unified scale[80].

Compared to Bélmegyer 45, far fewer objects of obvious modern origins are found in the magnetometry data (an iron ring identified on the surface in the northern block accounts for the bipolar anomaly). Several interesting anomalies emerge (Figure 8.11). There is a subtle bipole 7 m across in the southeast of the main grid. A series of

[80] The main grid at Tarhos was surveyed with a 57 cm rod between gradiometers, the lowest sensor 1.5 m from the ground. Upon the recommendation of Apostolis Sarris, I lowered the sensors to 40 cm above the ground for the northern grid at Tarhos and for Bélmegyer 45, but the distance between them remained the same.

small anomalies in a rectangular pattern suggest maybe postholes of an unburned structure. A long linear anomaly running east-west goes against the grain of the background noise. This is probably too faint of a line to be a modern feature. A comparison with similar anomalies and ground-testing at the Copper Age site Vésztő-Bikeri 20 km to the northeast (Sarris et al 2004) suggests that it might be due to a ditch. If so, the orientation would contradict Nándor Kalicz's notion that a ditch separated Tarhos 25 from Tarhos 26. Perhaps most interesting of all is in the northernmost area of the main grid, a strong 5 x 10 metre rectangular anomaly oriented NW-SE. A wattle and daub structure was considered a strong candidate for producing this anomaly. The northern grid was added on specifically to identify the extent of this feature, although a row of trees prevented the northwestern corner from being surveyed. A series of 9 Oakfield cores over the magnetometry grid identified intact archaeological deposits averaging around 40 cm to 80 cm below the surface.

Grid Corner	Easting	Northing
Northwest	518170	5185140
Northeast	518210	5185138
Southwest	528168	5285100
Southeast	518208	5185098

Table 8.12. Corners of the main magnetometry grid at Tarhos 26 (UTM, 34N).

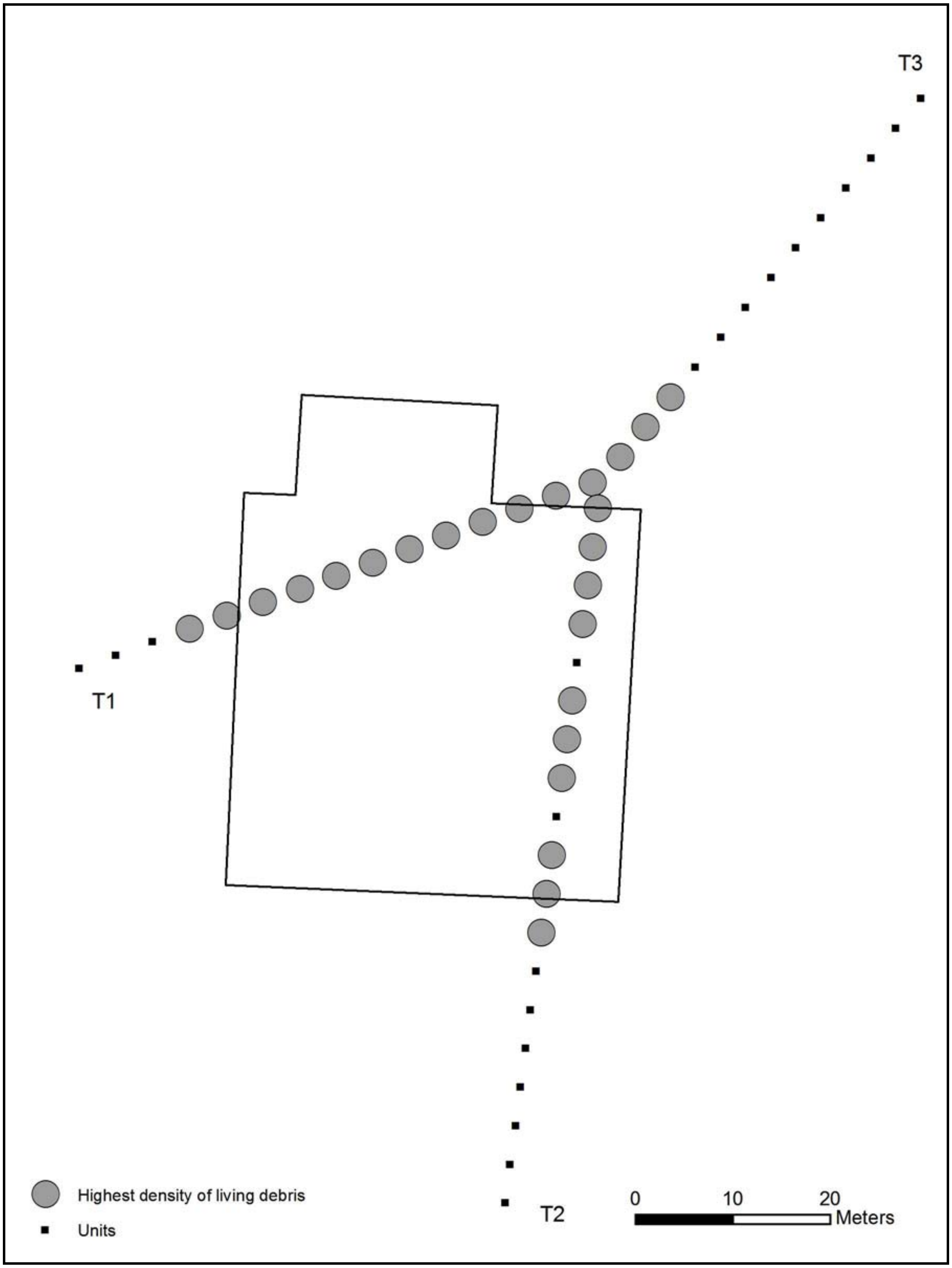

Figure 8.9. Location of magnetometry grid at Tarhos 26. Ceramic and daub numbers are overlaid.

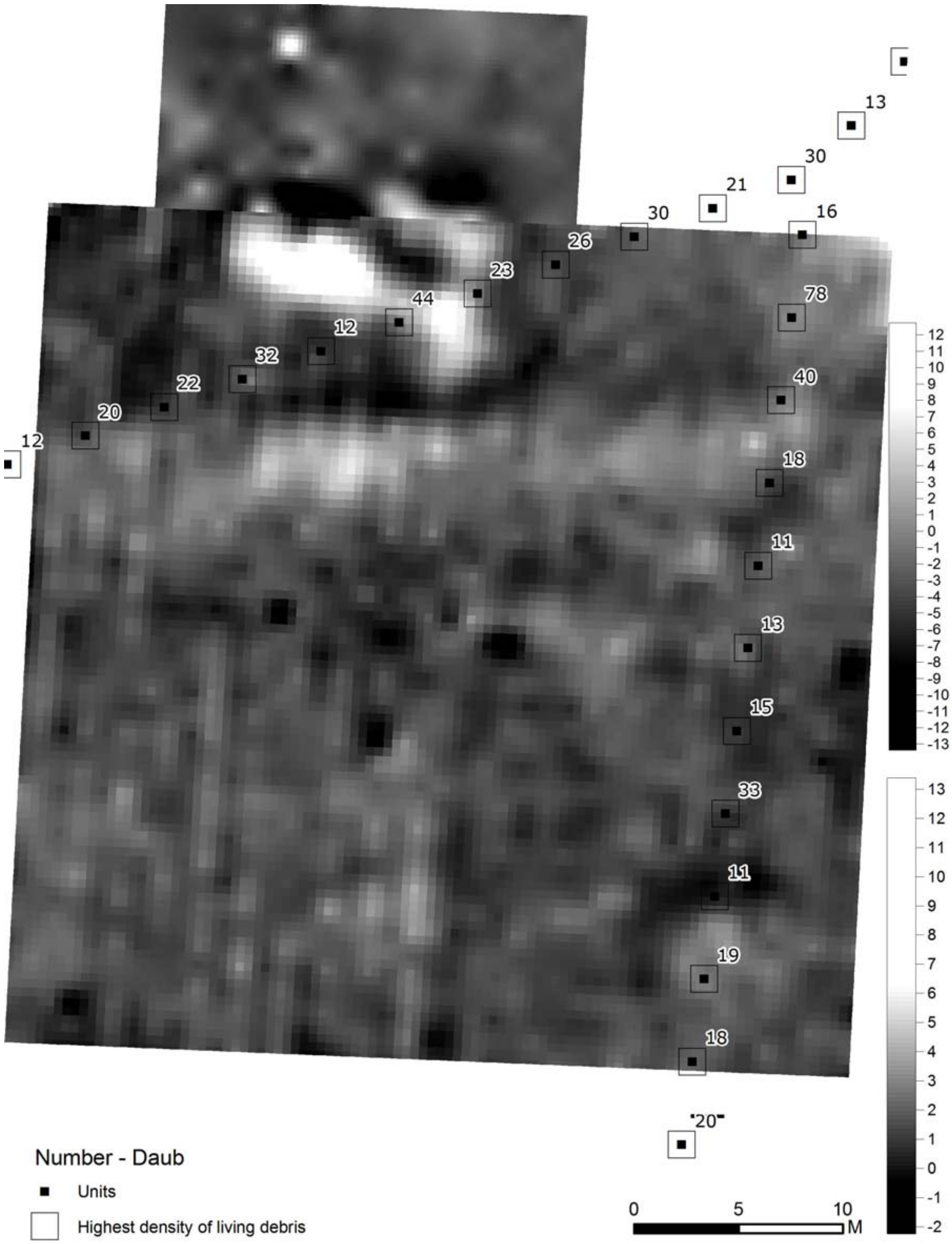

Figure 8.10. Magnetometry grid at Tarhos 26.

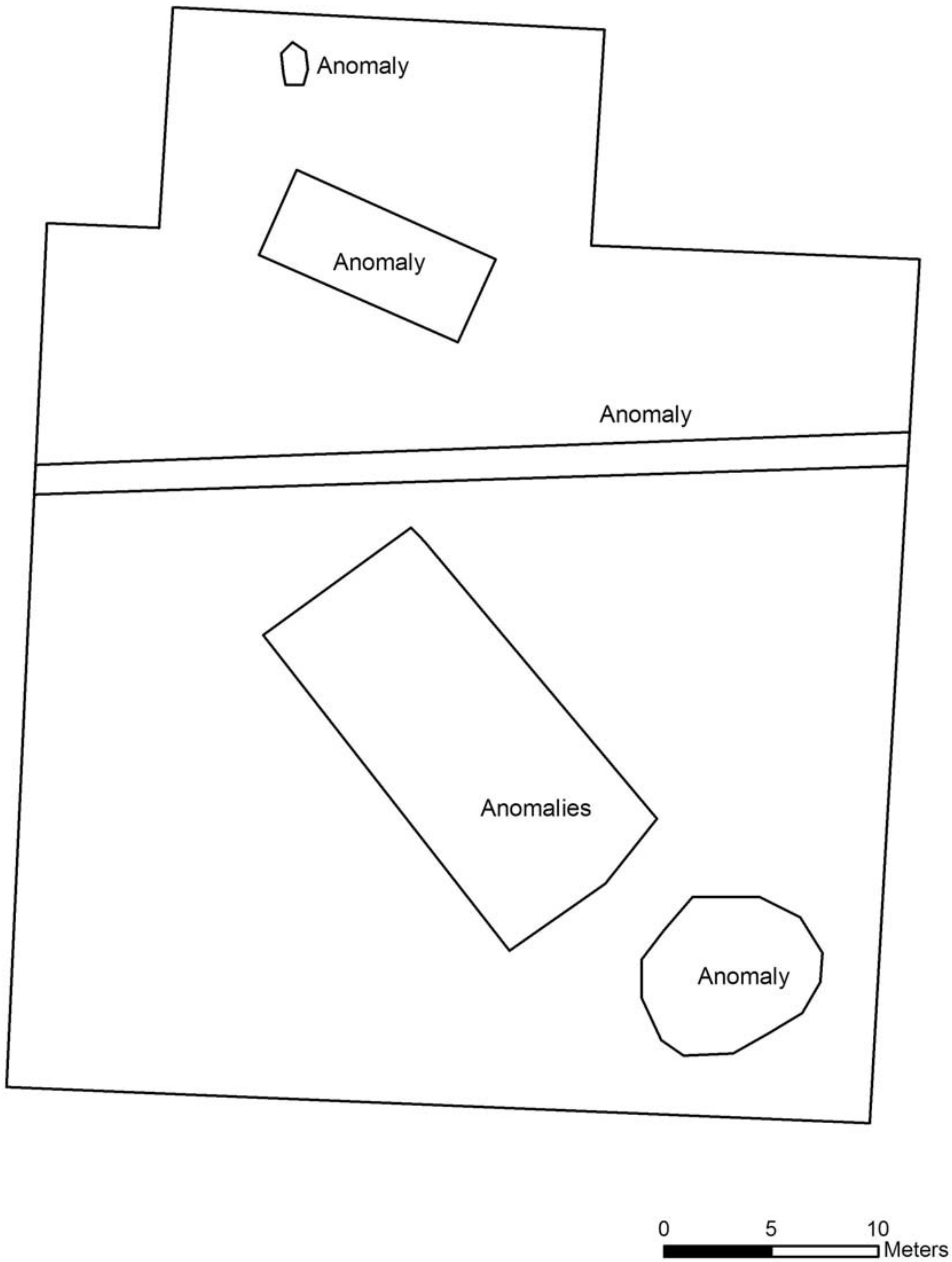

Figure 8.11. Interpretation of magnetic anomalies at Tarhos 26.

Excavation at Tarhos 26

An excavation block of 6 x 6 m was opened over a corner of the northern rectangular anomaly identified as a structure (figures follow in the next chapter). The intention was to capture an archaeological sample of domestic refuse from within the structure and some settlement debris outside of it, in case it was swept clean before it was abandoned.

Investigations over two seasons (2006-2007) demonstrate that the site was occupied for three hundred years, culminating in the burning of a Middle Bronze Age house. The site was probably abandoned at that time. Excavations revealed three sets of primary stratigraphic deposits, calibrated by radiocarbon samples in Table 8.13 and Figure 8.12. The earliest set, Layer C, consists of a series of thin deposits of similar texture and color, all with household rubbish, potsherds and animal bones. At one sigma, a radiocarbon date from within these deposits (1970-1890 BC) places them within what is generally identified as the earlier part of Ottomány (see Chapter 5). Several pits (event horizon B9) are intrusive into this deposit, and were not in use during the final occupation of the site. A single radiocarbon date from one of these pits provides the range of 1750-1680 BC, the end of the Ottomány phase, and transitional where the Gyulavarsánd ceramic style appears elsewhere. Finally, an additional date comes from a burned post in the west wall of the structure (1690-1510 BC).

Several complete pots and tools were within the house when it burned down, suggesting that it was not intentionally burned down by its owners. The lack of Gyulavarsánd ceramics from the site's deposits (including the ploughzone) suggests that the house was not long lasting. The rarity of late style ceramics overall at the site raises the possibility that the settlement was abandoned at this time, perhaps at the end of the Transition Phase, circa 1650-1600 BC. A calcarious deposit (Layer A) on top of the debris from the burning event separates the bulk of the intact deposits from a horizon of several pits (Level 3). At the time of excavation it was unclear how much later these might have been in time, but the dating of one of the pits (200 +/- 40 BC) indicates that they all might be relatively recent. Nonetheless, the contents of these pits are almost exclusively Middle Bronze Age. More details on the excavated material are provided thematically in the next chapter, but detailed treatment of this excavation will not be provided at this time.

STRATA	Description	Date	1 sigma	Sub-strata	EU #	Context
Level 1-2	Plough zone	-	-	-	-	-
Level 3	Intrusive animal burrows and pits	Beta-240762	200+/-40 BP uncal.	Feature 1	20	Pit
Layer A	Calcareous deposit on rubble from house burning	-	-	-	-	-
Layer B (house)	House living debris, stratigraphically contemporaneous features, and rubble from house burning	Beta-240763	1690-1510 BC	Feature 5	54	Carbonized post in post hole of west wall
Layer B (pre-house)	Pits cut into Layer C, capped by house building episode	Beta-240764	1750-1680 BC	Feature 9	135	Pit covered by plaster of final house floor
Layer C	Series of rubbish and fill layers	Beta-240765	1970-1890 BC	C5	174	Localized rubbish and fill deposit
Layer D	Subsoil	-	-	-	-	-

Table 8.13. Description of major stratigraphic breaks and associated radiocarbon data by sub-context.

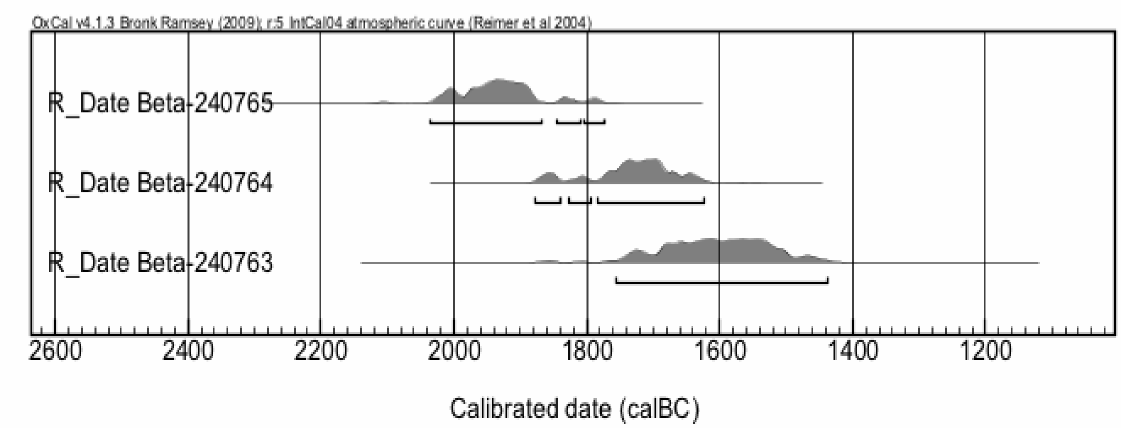

Figure 8.12. Calibrated radiocarbon dates from Tarhos 26.

PART IV: FORTIFIED SETTLEMENTS OUTSIDE THE MICRO-REGION

Two questions led the investigation of fortified sites outside of the micro-region. First is an interest in knowing how big these sites were compared to those in the micro-region. This is relevant primarily for determining whether they were so large that they would have required food surplus from other villages to sustain themselves, a sure sign of regional political hierarchy. The second was to get an impression of the material culture, and any strong similarities or differences observable between the micro-region and northern areas of the Körös basin.

Three additional fortified settlements outside the micro-region were shovel tested in order to establish their size. Since catchments rather than comparison of ceramics and other material was the purpose of the investigation, no systematic unit collection was undertaken. Nonetheless, ceramic data as they appear in waypoints and shovel test probes are provided in the descriptions as a general indication of site character. These sites, as well as the other fortified sites in the MRT area, are located in Figure 8.13[81].

[81] There are two 'tells' in the National Site Registry and MRT – Dübögő (Köröstarcsa 7) and Kónya-domb (Biharugra 1) – that are not known to have fortifications. They are not included here.

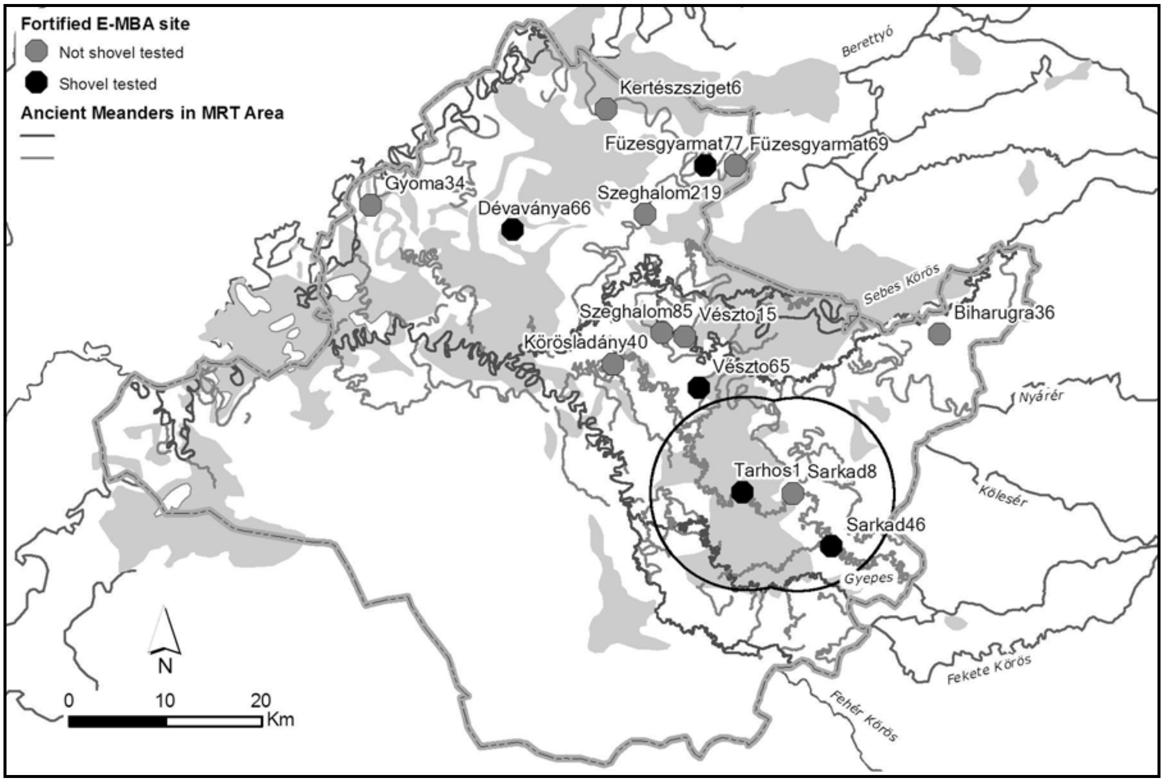

Figure 8.13. Fortified Early and Middle Bronze Age sites in the MRT region.

Fortified sites outside of the micro-region: summary

MRT site size, internal components, shovel test area, and representation by ceramic phase are listed in Table 8.14. There are both similarities and differences between the fortified site clusters in the micro-region and the fortified sites in the northern part of the lower Körös basin.The first is the overall dissimilarity with Vésztő 65. At 3.76 ha, it is a much smaller site than any of those seen in the micro-region, and barely has any settlement outside of the fortification to speak of. This likely has to do with the sites' exclusively early occupation in the Nyírség phase (ca. 2500-2100 BC). This cultural complex predates the Ottomány although many of the formal and stylistic elements of the material culture, such as surface brushing, are later reproduced in the Ottomány phase.

The other two fortified sites share the same chronological phases as Békés-Várdomb, Sarkad-Peckesi-domb and Belső-Szőlők. The areas within the enclosure are similar in size to those in the micro-region. Presumably, they had a similar density of population living inside the enclosures. The area outside the fortification, however, is half the size of the settlements in the micro-region. This suggests that population numbers in the north never reached the heights observed at the fortified sites in the micro-region.

SiteID	Name	MRT Polygon Area (ha)	Component	Inter-polated area (ha)	Nyírség	Ottomány	Gyulavar.
Vésztő 65	*Vadas*	0.44	Fortified mound	2.58	*		
			Unfortified settlement	1.18	*		
			TOTAL	**3.76**			
Füzesgyarmat 77	*Szőke-tanya*	4.32	Fortified mound	0.48		*	*
			Unfortified settlement	9.01		*	*
			TOTAL	**9.49**			
Dévaványa 66	*Tó-kert*	17.58	Fortified mound	0.75		*?	*
			Unfortified settlement	10.75		*?	*
			TOTAL	**11.50**			

Table 8.14. Summary of site sizes for fortified settlements outside the micro-region.

The final noteworthy feature is the overall impression gained from the sherd representation of the Ottomány and the Gyulavarsánd phases on the site surfaces. The two excavated sites in the micro-region have both Ottomány and Gyulavarsánd components, but the settlement halo around them is almost exclusively Gyulavarsánd, indicating that the population living at these centers must have grown fairly quickly, only in the final phase of the Middle Bronze Age.

No systematic transect collection was undertaken at these sites and quantifying the proportion of occupation phase is more impressionistic. Still, there seems to be a much greater mix of both Ottomány and Gyulavarsánd diagnostics at the sites of the Dévaványa Plain, especially at Füzesgyarmat 77. Moreover, the earlier phase does not seem to be circumscribed to fortified center as it is in the micro-region. These settlement halos in the north are half the size of those in the south, and the sum of both phases more than doubles the occupation span. All else being equal, the populations could have been one quarter of the size of those occurring in the micro-region during the Gyulavarsánd phase.

Site occupation and chronology

The site collections for the fortified sites outside the micro-region are small and only suggestive. Yet the possibility that Ottomány components at Füzesgyarmat 77 and Dévaványa 66 are more strongly represented, in contrast to open settlements surrounding fortifications in the micro-region, is interesting. The co-occurrence of styles not seen in the micro-region suggests that northern communities may have been part of broader exchange networks participating in the stylistic evolution of the Gyulavarsánd material culture. Because there is a ceramic continuity in the occupation within the enclosures of the tell sites, one might argue that these communities continued to be part of this same social network in the north, assuming that a migration (from the north) did in fact occur some time around 2000 BC as Bóna (1974, 1994a) and Banner (1974) have suggested. At any rate, the topic certainly deserves to be further investigated.

CONCLUSION

With a survey team, I visited twenty open sites with Middle Bronze Age ceramics, 52% of the 32 total. Of these, we systematically surface collected six. It became clear that the MRT polygon boundaries were not reliable estimates for Middle Bronze Age components. They almost always over-represent site size because they are usually multi-component or sometimes very low density. Where collection was effective or sites were single component, Ottomány and Gyulavarsánd sites fall between 0.5 and 5 ha.

The three fortified sites in the micro-region have open settlements clustered around them. The survey team visited all three site clusters and surface collected an area in each one. When these site clusters are considered as a single settlement, they are much larger than the open sites. Shovel testing is the only reliable way to estimate site size, but only the Tarhos 1 Cluster could be investigated in this way. Site size estimates of the Sarkad 8 and Sarkad 46 clusters are much more tentative, and based largely on an interpretation of the MRT site descriptions. Nonetheless, all three settlement clusters are very likely in the 20-25 ha range. The open settlements around all three fortified sites are almost exclusively Gyulavarsánd, the later Middle Bronze Age phase.

The survey team visited three additional fortified sites outside of the micro-region, but still in the MRT area. Each one was shovel tested to establish its likely size. One of these is Early Bronze Age site and about 3.5 ha in size. The other two are in the Dévaványa Plain, with both Ottomány and Gyulavarsánd ceramics present. Each is about 10 ha. Interestingly, in the micro-region there is much less mixing of diagnostic ceramics from the two phases on a single site than there is in the Dévaványa Plain.

Magnetometry and excavation at an Ottomány site 5 kilometres northwest of the Tarhos 1 Cluster identified a burned house. The ceramics from the excavated sequences do not include Gyulavarsánd style, and radiocarbon dating puts the occupation between 1900-1600 BC.

In the next two chapters I take these data and build them into frameworks useable for the archaeological indicators provided in Chapter 6. Chapter 9 focuses exclusively on data for the micro-region, using social dimensions 1-7. Chapter 10 will consider the evidence for regional consolidation at all regional scales.

Chapter 9: Bronze Age Society in the Körös Region

In Chapter 6, I defined a set of archaeological measures for better assessing the character of Bronze Age societies. Chapter 7 turned to the existing literature and extracted relevant social information using these measures. While the available evidence currently suggests a model of decentralized, autonomous villages, there is sufficient ambiguity in the data to still entertain the possibility of regional hierarchy. I argued that establishing site size variation and site function for different types of sites was required to definitively decide the issue. Chapter 8 provided background on the Hungarian MRT survey and summarized the information on open and fortified site size obtained through fieldwork. The chapter also introduced the excavation of an open settlement only four kilometres away from Békés-Várdomb. In this chapter, again using the archaeological measures defined in Chapter 6, I draw on these new site data to complete the model of middle-range societies for the Bronze Age Körös.

Presentation of the data pays particular attention to 1) potential changes observable over time, and 2) a possible bias toward site specializations which would be expected under a model of regional hierarchy. With only a single excavation and a sample of surface collected material from twelve sites in the micro-region, however, the numbers involved are small and the conclusions tentative. Nonetheless, a better model results suggesting interesting directions for research.

This chapter is organized according to the social dimensions as they were introduced in Chapter 3 and revisited in chapters 6 and 7. As in Chapter 7, I summarize what has been learned for each dimension having evaluated the data provided by new fieldwork or new analyses. Discussion moves back and forth between scales as the resolution of the evidence for particular dimensions dictates. The end of the chapter includes a provisional model for the evolution of Bronze Age societies in the micro-region. The chapter following this one considers the evidence for regional consolidation in the lower Körös basin, and sketches how the micro-region may have been tied into the larger geographical system.

DIMENSION 1: PRIMARY UNIT OF FOOD PRODUCTION / CONSUMPTION

Excavation was required to assess the primary unit of production and consumption in settlements away from the fortified clusters. Tarhos 26 (*Gyepesi Átkelő*) was identified as an excellent candidate for excavation based on surface collection, magnetometry and coring (Chapter 8). The site is about 3 hectares in size and located four kilometres downstream from the Tarhos 1 Cluster. According to radiocarbon samples, it was occupied between ca. 1900-1600 BC, contains only Ottomány phase ceramics, but falls within the Gyulavarsánd transition (1750-1650 BC) (Figure 9.1)

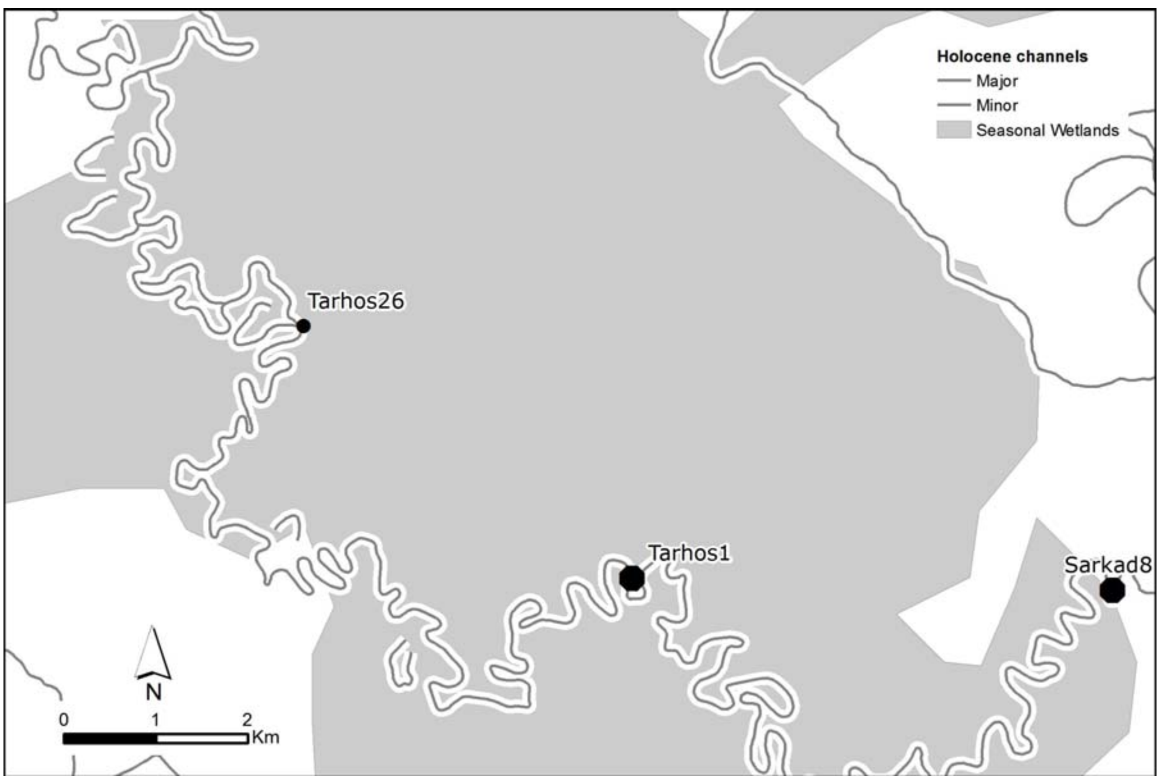

Figure 9.1. Location of Tarhos 26 with respect to the Tarhos 1 Cluster.

Uncovering house size at Tarhos 26

Magnetometry can suggest structure size, but ground testing is required for any degree of certainty. Magnetometry survey at Tarhos 26 suggested roughly a 5 by 10 m structure oriented NW-SE. The anomaly had particularly high values (nT) on three of the corners. Excavation over this area suggests that these were produced by an enormous amount of daub created during the burning of the wattle-and-daub structure. Though contemporary, the daub produced by this event lent itself to excavation in two passes with hand tools: an upper stratum of collapse on the interior and exterior, and the lower stratum – only within the structure – that fused with many parts of the floor inside. A drawing after the removal of the top strata, overlaid with the magnetometry anomaly, is provided in Figure 9.2.

It was not possible to excavate most of the objects on the plastered floor separately from the structural collapse from the fire, as crashing daub pushed through the final floor (and into the fill below) in many places. During the 2006 excavation season, this was not clear until we had removed almost 6 m^2 of daub and floor mash. The many artefacts that we had pedestalled were one clue to the fact that most of the final floor was destroyed. Many pots were broken but complete and resting on a soft white plaster. Where there were no large artefacts in place however, soft plaster rarely remained. In some places if the white plaster survived, we did not recognize the stratigraphic interface. The result is that in the north-eastern section of the interior structure, we have intact floor for only small islands preserved for one reason or another during the collapse (Figure 9.3). We became very sensitive to this interface during the 2007 season however, and were able to preserve it as we moved south in 1 x 1 units.

Figure 9.3 also shows the location of postholes and a pit. These features did not have any evidence of floors stratigraphically above them. This suggests that they were in use during the life of the structure. This is also indicated by their configuration, and the sloping wall trenches in which the outer postholes occur. When these posthole placements are oriented in a rectangular structure that corresponds to the magnetic anomaly, the outermost dimensions are 10 m by 4.5 m. There is possibly an entrance on the west side, as intact vessels were found on a hard surface between postholes. The size of the house comes to 45 m^2.

The range of house structures known from the Middle Bronze Age of the lower Körös basin was presented in Chapter 8. When Tarhos 26 is added, the average size of an Ottomány structure becomes 51.9 m^2 (N=4), and the average size of a Gyulavarsánd house is 42.2 m^2 (N=3). The house at Tarhos 26 comfortably fits into the Ottomány range, with the house at Bakonszeg smaller, but those from Túrkeve and Herpály somewhat larger.

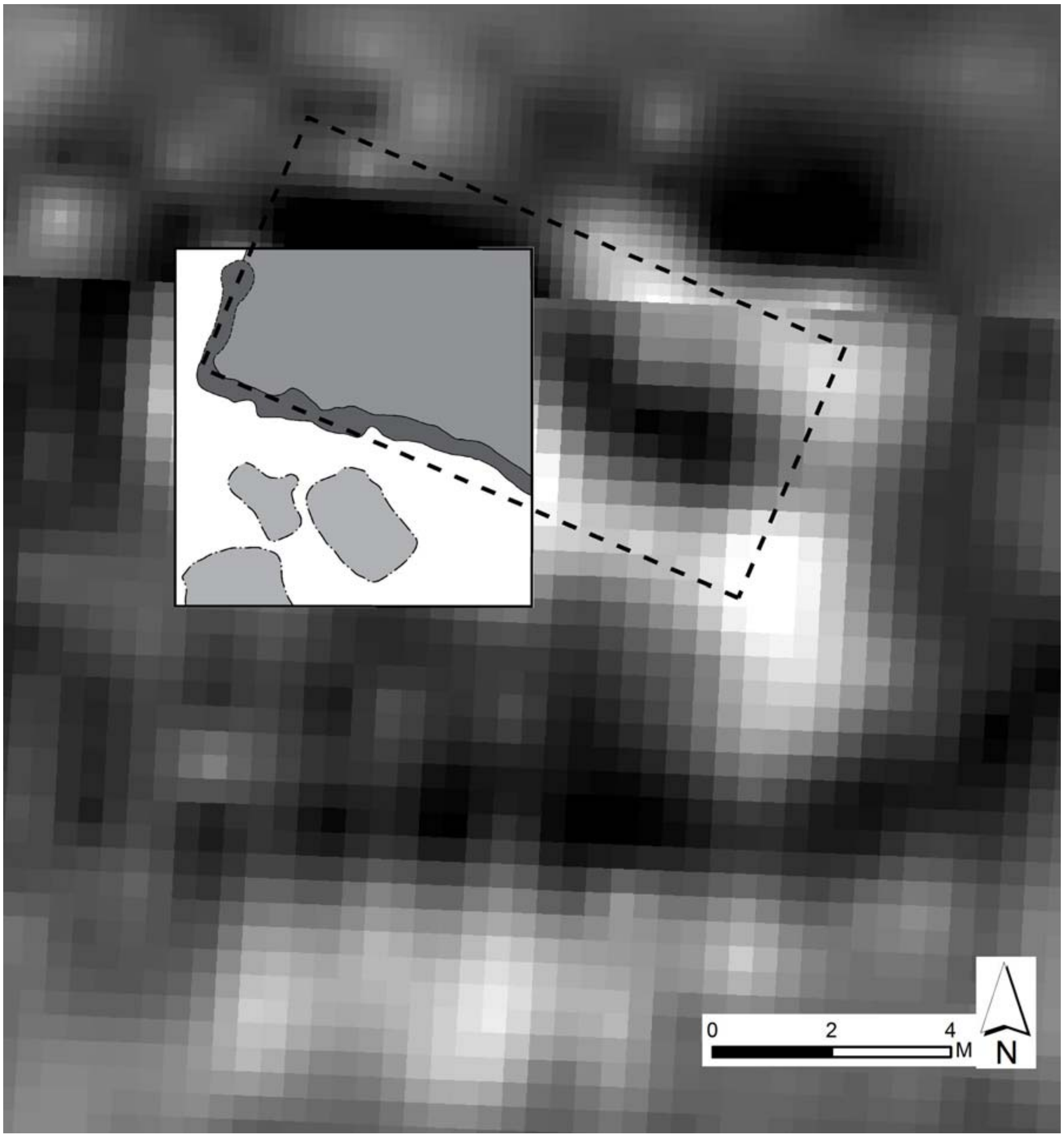

Figure 9.2. Magnetometry data overlaid with excavation block, season 2006. The structure outline is a simplification of the rubble drawn at the base of Layer B2; the intrusive pits (Level 3) are just south of it.

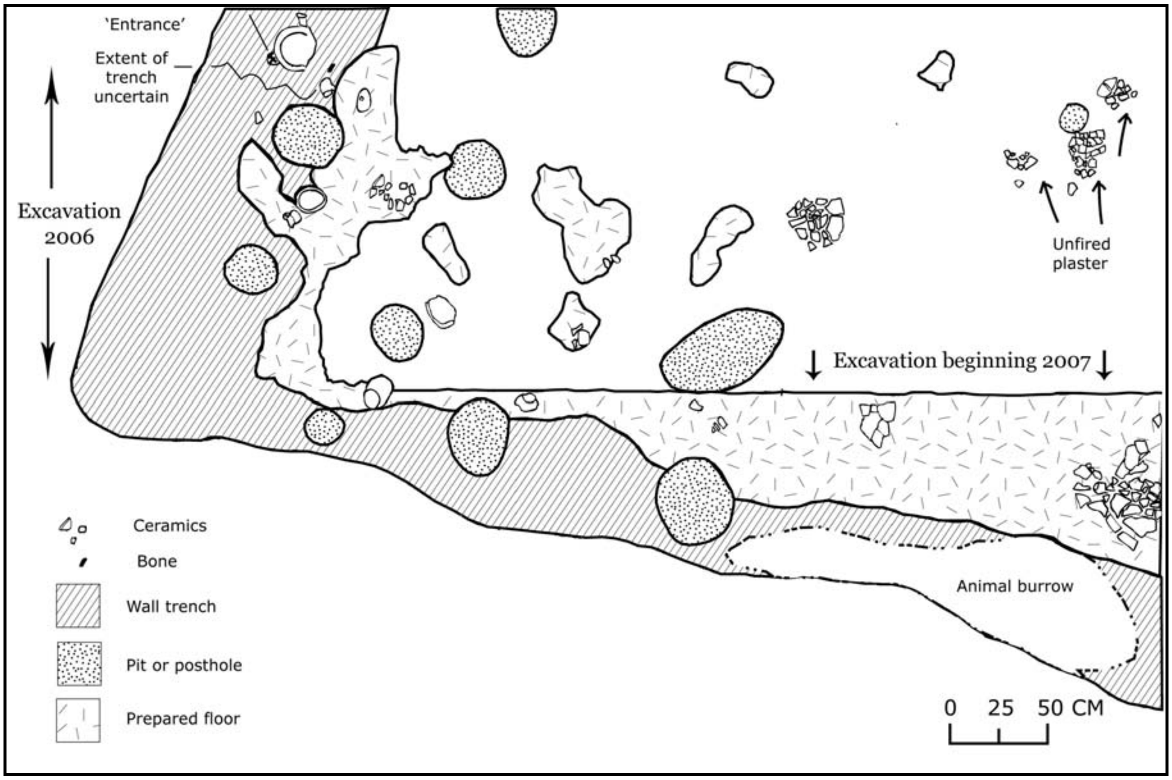

Figure 9.3. Composite map of Layers B3A and B6. B3A consists of the pedestalled artefacts remaining on the floor. B6 is the posthole and pit horizon in use during the life of the structure. The base of the wall trench is also shown.

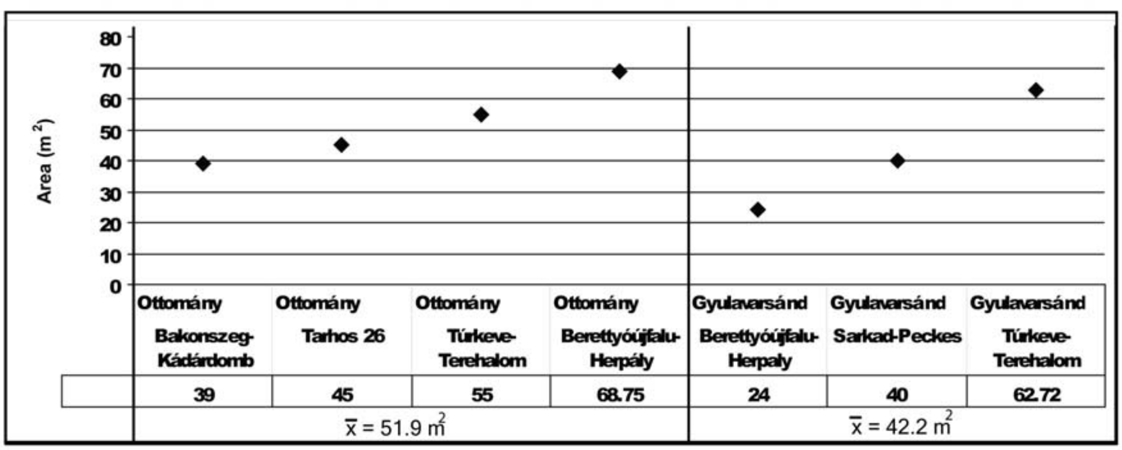

Figure 9.4. Comparison of Ottomány and Gyulavarsánd house areas sorted by phase and size.

Storage and food preparation areas

There is only one candidate for a pit in use during the life of the structure. It is unlikely to be a posthole because it is larger and oblong in shape. The other pits in the structure have the weight of evidence suggesting the final white plastered floor postdates them. Although it is possible that they were in use and filled up during the life of the structure, there is no compelling reason to believe this.

No external pits were identified contemporaneous with the structure[82]. One posthole was identified but the surface was an otherwise hard 'walking level' (*járószint*) without any discolorations suggesting intrusive features. Of course, only one side of four around the house was exposed, so there is no way to know for sure whether or not storage features did occur close to it outside without excavating the other three sides. Remains of several butchered animals outside the west wall were also stratigraphically contemporary with the final occupation.

One small pit was identified in the structure, but there are additional reasons to believe that food storage and preparation took place within the house (see also under 'Intensification,' below). The flotation of ten sediment samples from Tarhos 26, and the identification of the botanical remains, took place in Százhalombatta in 2007 (Berzsényi n.d.). The paleobotanical sample indicates only a very small amount of spikelet forks and glume bases, indicating that the stored grain was almost ready for food preparation (Table 9.1)[83]. The storage conditions therefore suggest the final cleaning of the grains happened inside or close to the house (Figure 9.5) (Berzsényi, n.d.).

A great deal of emmer wheat was found in a secondary context inside the house. No one feature or vessel shares a principal association, but charred seeds were especially abundant in the middle of the house floor. The most likely explanation for the distribution of charred seed is that a storage pot spilled during the blaze that consumed the house.

Food preparation tools were found inside the house, although nothing precludes transporting them outside for work. These include two hand grinder fragments (SS#54, SS#83), the latter dimpled perhaps for cracking nuts (though no nuts were found). Both rested on the prepared floor at the time of the collapse. Although over 25 m^2 of

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[82] The pits shown in Figure 9.2 are intrusive.
[83] I discuss specific aspects of the crops in this table in the 'Intensification of food production' section below.

contemporary 'walking level' (*jároszint*) were identified to the south outside the house, no hearths were identified.

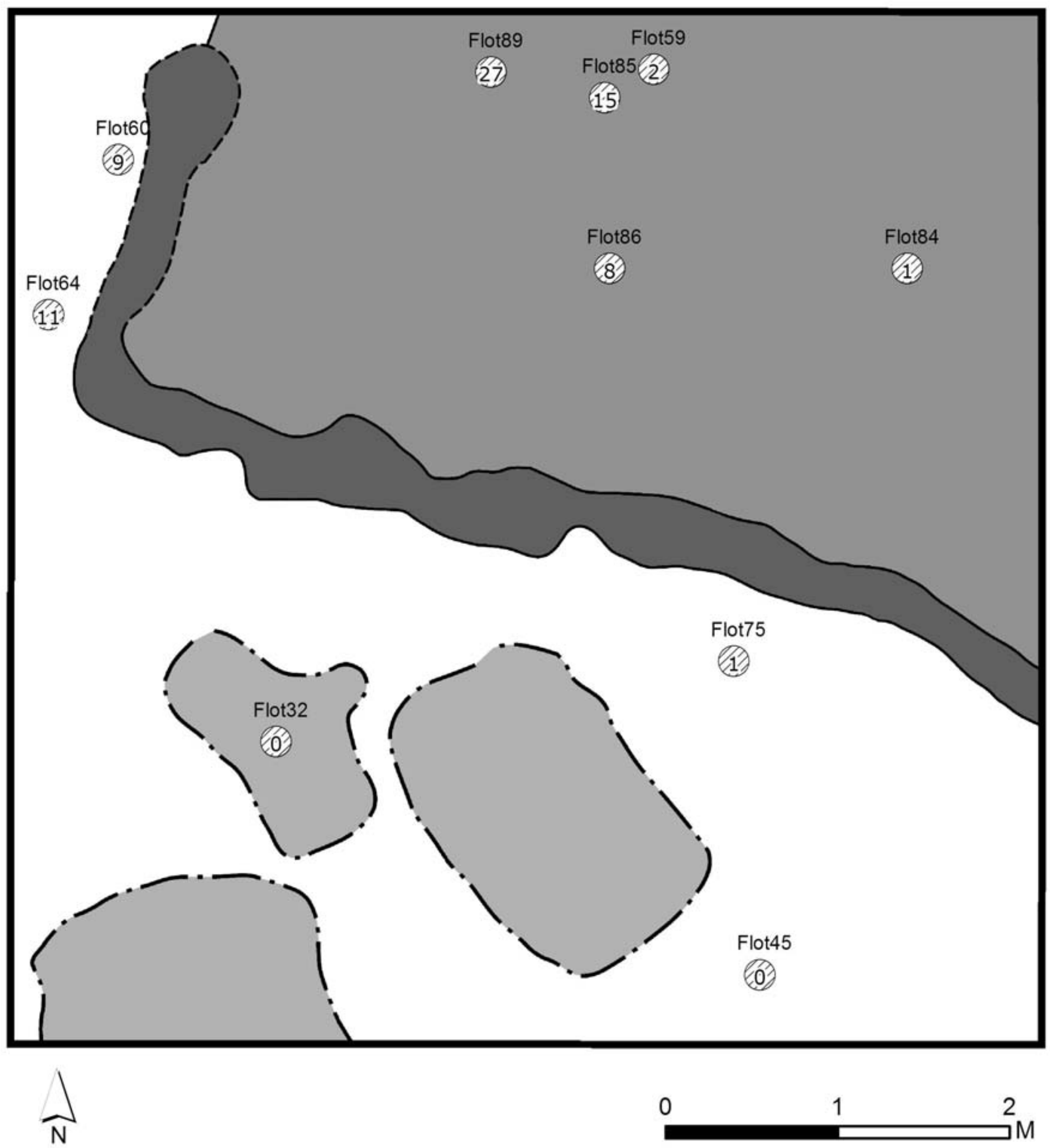

Figure 9.5. Distribution of emmer wheat at Tarhos 26 (Table 9.1). Flots shown are the only analyzed to date.

Flot ID	89	84	86	85	59	64	75	45	32	60
Volume (litres)	7	8	10	9	9	7	10	8	8	8
Context	RUBBLE	RUBBLE	RUBBLE	RUBBLE	RUBBLE	MIDDEN	MIDDEN	MIDDEN	PIT (INTRUSIVE)	MIDDEN
Cereal grain										
Triticum dicoccum (emmer)	27	1	2	15	8	11	1			9
Triticum cf. *dicoccum* (emmer type)		2	1			12				
Triticum spelta (spelt)	5					5				2
Triticum cf. *spelta* (spelt type)	5	1	1		6	4				
Triticum sp.	10			10	4	4			x	
Hordeum vulgare subsp. *vulgare* (hulled barley)	1					1				
Cereal fragments	50		15	30	15	25				24
Cereal chaff										
Wild taxa										
Chenopodium album (white goosefoot)			3	1						
Chenopodium cf. *hybridum (mapleleaf goosefoot)*	1			1	1			x		
Fruit										
Cornus mas (cornelian cherry)	1	1								

Table 9.1. Preliminary results of seed remains identified from flotation at Tarhos 26. The rubble deposits were on the house floor, and the midden deposits are from outside the house (from Berzsényi, n.d.)

Primary unit of production and consumption: summary

Tarhos 26 is the only excavated Middle Bronze Age settlement in the micro-region away from the fortified site clusters. Both food preparation and storage seems to be internal to the residential structure, which is a small wattle and daub house. The internal storage, architecture of the house and evidence for food production suggest it was occupied year-round. According to the floor space estimates I developed in Chapter 6, this 45 m^2 house was home to 4-5 people. Given the high density of settlement debris on the surface, and the possible indications of additional structures in the magnetometry data, this site may have been a hamlet of four or five such houses. A greater exposure would be required to eliminate the possibility of additional communal storage or food preparation areas, but the signature is very much like the one observed inside the fortified walls of the regional centers: an atomized unit of food production and consumption.

Such a household size, if the norm in the Middle Bronze Age, is common in decentralized societies. In an evolutionary perspective, the problem of free-riders associated with group storage has been eliminated, but no large households have emerged as obvious leaders in the community. Therefore, food production continued to be household work for all, with few opportunities for increasing household size. At least in terms of physical incorporation into houses, there were no opportunities for, or perhaps great interest in, increasing the labour unit when it came to basic food production.

There is even no compelling evidence for a descent group at this small site, and Tarhos 26 was the dominant site size in the Middle Bronze Age (0.5-5 ha). If the inhabitants of the hamlet formed a corporate group, it is unclear what the ownership would be for. Both the possibility of corporate ownership and group labour will nonetheless be revisited under 'Regional Consolidation,' when more specific data become available for discussing land availability and population density.

DIMENSION 2: SEGMENTATION

Before leaving the notion of descent group, I revisit the segmentation observable in the micro-region through spatial segregation. No natural features break the distribution of archaeological material on the surface at the small sites. It is possible that there are intra-settlement distinctions in the small settlements, but the surface collection techniques employed here do not have the resolution to capture them. A radial transect approach privileges the center of the site and provides less definition away from the center. Identifying neighbourhoods at small sites may therefore require stratified random sampling at higher frequency intervals; a strategy beyond the modest goals of the fieldwork undertaken here. Even with a high resolution sampling strategy, however, there may be too much movement of material on the surface – or socially meaningful clusters located too close together – to recognize them without remote sensing or excavation.

Nonetheless, the patterns of settlement recognizable due to the ditches or natural internal divisions at the large (20-25 ha) fortified clusters introduced in Chapter 7 can be further refined based on the surface collection undertaken in the micro-region (Chapter 8). Each fortified cluster was given a total area estimate (or range), based on the sum of its internal spatial components. If a range was offered for a site, these area values are averaged to produce a single number. The areas by component and their sum are presented in Table 9.2.

The 'tell' population multiplier 220/ha is only applied to Tarhos 1 and Sarkad 8, both fortified sites demonstrated to have stratified deposits in a densely inhabited enclosure. Although Tarhos 72 has stratified deposits in the north (Bóna 1974), the shovel test data indicate a rapid fall off towards the south. I therefore use half the value of an enclosed settlement population multiplier (110 people/ha). The same is assumed to hold for Sarkad 9, its formal equivalent. Although Sarkad 46 is fortified, no excavations have taken place to demonstrate stratified deposits, and shovel testing suggests high concentrations in only a small area (see Appendix E). Therefore, I use the population multiplier of an open settlement.

The basic population multiplier for a given site is modified by an additional multiplier based on a '100 year rule.' The duration of the Gyulavarsánd phase is 350 years. When the open components of these sites are allowed to shift horizontally in time, the population estimate is divided by 3.5 to account for archaeological palimpsests created by time.

	Mean size (ha)	Fortified	POPULATION ESTIMATE		
			Multiplier	(entire area occupied)	(100 year rule)
Tarhos 1 Cluster					
Tarhos1	0.27	*	*220*	59	59
Tarhos2	17.56		*40*	702	201
Tarhos19	2.23		*40*	89	25
Tarhos72	2.01		*110*	221	221
	22.07			**1072**	**507**
Sarkad 8 Cluster					
Sarkad7	7		*40*	280	80
Sarkad8	0.46	*	*220*	101	101
Sarkad9	0.33	*	*110*	36	36
Sarkad88	16		*40*	640	183
Sarkad89	2		*40*	80	23
	25.79			**1138**	**423**
Sarkad 46 Cluster					
Sarkad24	9		*40*	360	103
Sarkad30	12.5		*40*	500	143
Sarkad46	2.83	*	*40*	113	113
	24.33			**973**	**359**

Table 9.2. Enclosed settlements and surrounding sites as population segments with population estimates.

I believe that these numbers provide realistic population estimates for these settlement clusters. If I am correct, the population distribution in space might look something like the diagrams provided in Figure 9.6. These sites are re-produced to scale in Figure 9.7 for comparison. For each cluster there is a fortified site at its core with the population of a hamlet. This fortified population is then surrounded by other residential neighbourhoods separated by natural river barriers.

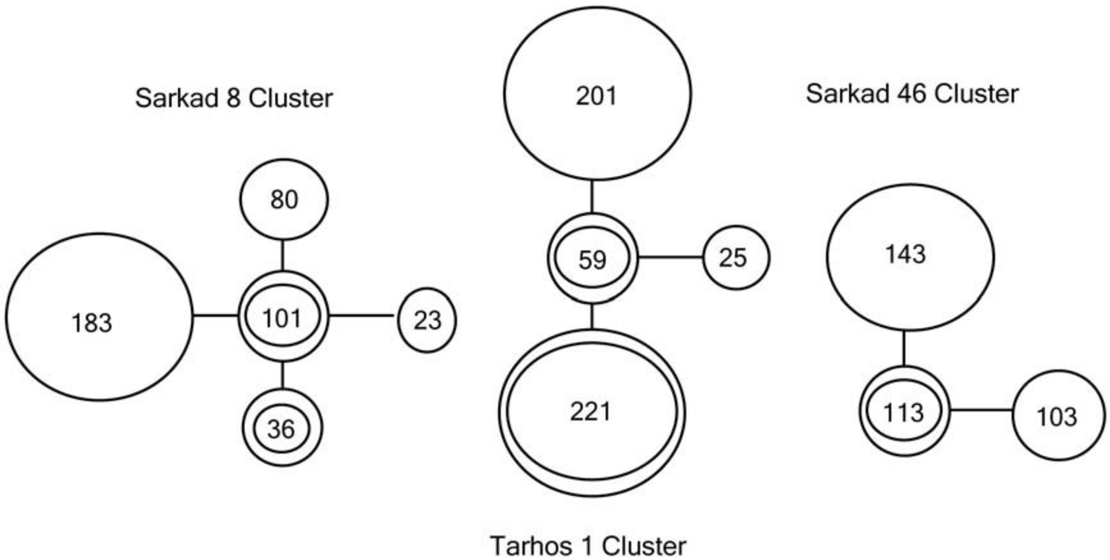

Figure 9.6. Schematic of segmentation in space. Values in circles are population estimates in Table 9.2, modified according to the ‘100 year’ rule. Double lines are enclosed sites.

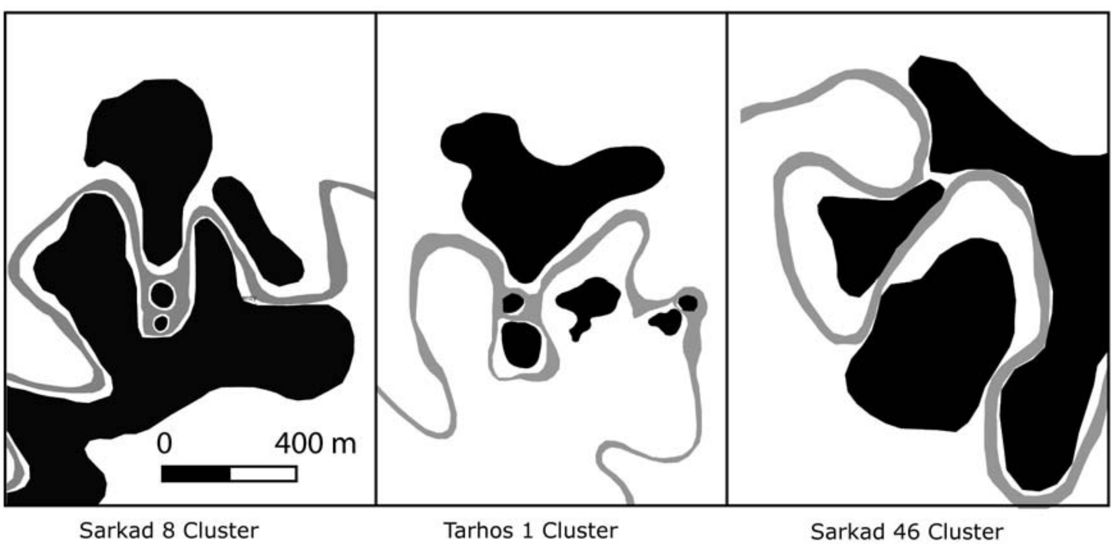

Figure 9.7. Fortified clusters in the micro-region to scale. Only the Tarhos 1 Cluster is has MBA boundaries based on shovel testing. The others have site boundaries from the MRT survey.

Segmentation: summary

Ethnographically, descent groups can occur singularly in space or at multiple villages across a landscape. Regardless of what may be the case for the villagers of the Körös region, the segmentation identifiable in space at the fortified clusters would effectively limit the extent of interaction. Alternative settlement patterns, such as lateral, shoulder to shoulder occupation on the bank of a river would have been possible, but the aggregated locus of habitation marked by internal spatial boundaries indicates a clear cultural preference, reproduced at Várdomb, Sarkad-Peckesi-domb, and Belső-Szőlők.

It is likely that only certain events or occasions would require a structural pose involving the participation of all members in the settlement. There is nothing – such as platforms, ritual structures, or ball courts – that readily suggests such unification was particularly common. The only archaeologically observable feature of these settlements that suggests what such a structural pose might be, is the fortification around the central mound. Archaeologists in the past have claimed that the fortified area could have kept other group members safe during an attack, and this is certainly possible. I might add that the populations at these centers greatly exceed those at other settlements in the micro-region (see below). If warfare involved the confrontation of similarly sized groups, we may be looking at attacks by groups outside the micro-region, or from the unification of people from multiple smaller settlements found locally.

By the logic of scalar stress, if these settlements did not have a permanent hierarchy, we might envision several segments operating in this space interacting under conditions of sequential hierarchy. There are between three and five archaeological scatters at these sites, roughly scaling with overall population size. Each settlement cluster has at least one large settlement area that might easily be divided into smaller residential areas identifiable with a more precise surface collection interval or remote sensing technique. The overarching conclusion that can be drawn, however, is that village clusters do not exceed around 500 people, the ceiling on population aggregation for segmented, unstratified societies observed ethnographically (Forge 1972; Johnson 1982; Naroll 1956; Upham 1990:12; Brumann 2000: Feinman and Netizel 1984:67; Keene 1991). It is nonetheless interesting that for the Sarkad 8 and Tarhos 1 clusters, my population estimates are pressing right against this upper limit.

DIMENSION 3: HOUSEHOLD DISTINCTIONS

Leaving the resolution of the village, I return to the distinction between houses. There are only a few variations in Ottomány-Gyulavarsánd architectural patterns. The placement of full wood planked floors is only known from the Gyulavarsánd phase. Postholes and wall construction at Tarhos 26 are similar to those known from fortified sites in the rest of the Körös basin, although no groundsels were identified. Instead, shallow postholes (ca. 20 cm in diameter, 20-25 cm from the floor level) arranged less than a meter apart lined the walls of the structure (Figure 9.8). As suggested in Chapter 7, groundsel construction may have to do with the surface conditions on a tell. No distinctive treatment of the house exterior differentiates the Tarhos 26 structure from any other known house from the lower Körös basin.

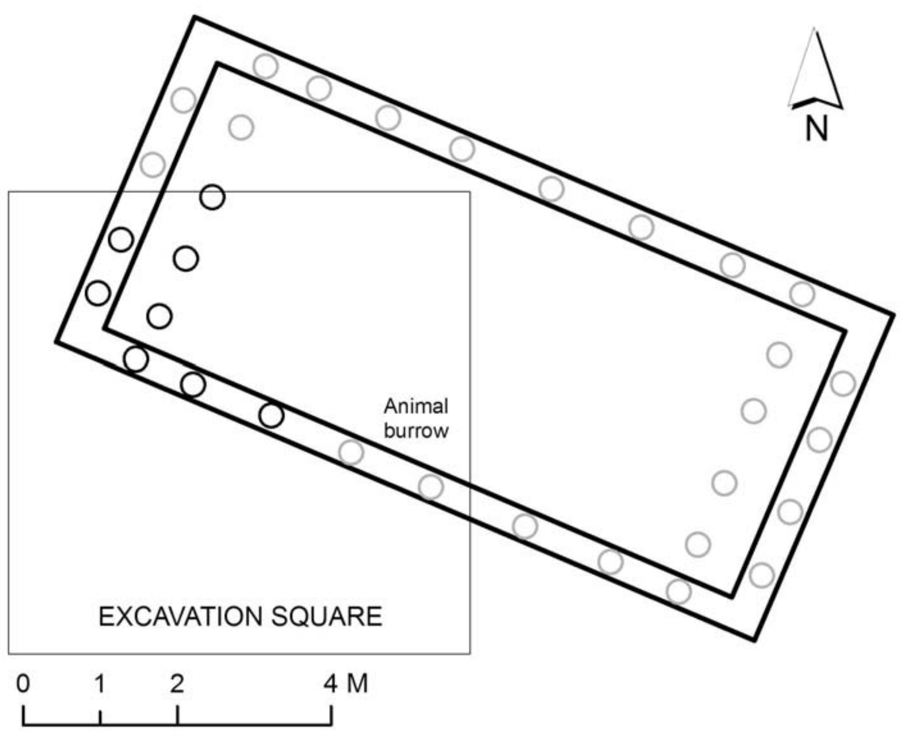

Figure 9.8. Reconstruction of house dimensions and architecture based on excavated sample. Dimensions and the exact position of postholes are idealized to fit the entire structure suggested by the magnetometry data, but post hole size represented (cs. 25 cm) is the average size observed during excavation.

Household distinctions: summary

The identification of an architectural grammar requires multiple examples to separate the pattern from the noise. There are very few examples of structures from the Körös area, so making strong conclusions at this point is certainly premature. Nonetheless, the narrow range of variation observable in the small sample available is instructive. To date, there is no evidence for anything but domestic structures. Nothing like the 'sanctuary' identified at Sălacea in the Ier valley has been found in the Körös region. With the exception of groundsels on tells, the house structures on and off tells employ the same wattle and daub techniques and floor plastering. There are likely variations within structures that contrast in accessibility of house back rooms, but the current lack of detailed publication precludes any discussion of it (but see opposing house builds for Túrkeve in Csányi and Tárnoki [1994: 160-161]).

There is no evidence from the built environment that some people, either within or across settlements, shared a closer link to the supernatural or spirit world. The lack of distinction outside of simple structural considerations at open settlements reinforces my suspicion that social marking in interactions between people living in open and fortified sites was weak. It does not mean that these distinctions did not exist in speech, clothing, or attitude. It simply means it was not redundantly marked in ways that we can currently capture archaeologically. Redundancy in cultural marking, however (i.e. the unnecessary additional inclusion of distinctive attributes), is a significant measure of a cultural signal of uniqueness (Saxe 1970:56-58). That such redundancy does not exist in the built environment in the Körös Bronze Age suggests that if such cultural distinction between people living within the fortifications and outside of the fortifications did exist, it was not very strong.

DIMENSION 4: ACCESS TO EXOTICS

I now turn from households, segmentation and distinction, to the evidence for exchange. Lithics and bronze can both be found on archaeological sites as unprocessed starting materials (nodules and ores). They can also be found as finished, exhausted or discarded tools and ornaments (e.g. sickles and axes). The raw material for both of these is exotic to the lower Körös basin (Chapter 4). Items may have arrived to local consumers as finished products or as raw material. In this section, I address the distribution of exotic chipped stone and finished metal objects from surface collection. In the craft production section, metallurgy is revisited with a different class of evidence.

Appendix E outlines the relative density of Bronze Age ceramics on surface collected sites and, if relevant to transect and waypoint collection, where they occurred. Overall, I chose only to systematically collect where the overwhelming majority of the diagnostic ceramics were Middle Bronze Age, thereby providing a degree of confidence in attributing the surface remains such as chipped stone and metal slags to my period of focus. Nonetheless, there is no guarantee that surface collected material belongs to the dominant cultural phase, and the possibility the surface material is attributable to another phase must be kept in mind. Moreover, the surface collection densities are very low. The conclusions provided here are therefore tentative, but plausible given the collection conditions.

Distribution of exotics and density of exotic finished goods or resources

Lithics

The two primary categories of stone tools are groundstone and chipped stone. All lithic resources have to be imported to the micro-region save quartz and quartzite, which occasionally occur in river beds as small pebbles. All lithic identifications were made by Tibor Márton at the Archaeological Institute of the Hungarian Academy of Sciences (Budapest) in 2007. Special attention was devoted to identifying and removing lithic types typical of the Neolithic and Copper Age from the sample[84]. Those removed for this purpose are noted in the following tables and those forms and raw materials that remain are either known to occur only in the Bronze Age or are not specific to one phase of prehistory.

Chipped stone is grouped by source area in Table 9.3. The Bronze Age lithics collected are grouped into open settlements and sites in fortified clusters, and identified

[84] These calls were made by Mr. Márton during inspection of the lithic collection.

by primary ceramic component on the surface (OT= Ottomány, GY = Gyulavarsánd). Values for systematically collected units (U) are placed next to individual waypoints (W). The material from excavation at Tarhos 26 is added in order to increase the sample size (S = special sample, L = lot). Ground stone categories are presented in Table 9.4. These are not discussed at length because of the difficulty of identifying their provenance. The summary totals of exotics can be found in maps for each period (Figure 9.9 and 9.10).

Chipped stone on Hungarian prehistoric sites has previously been grouped into seven broad varieties for comparison (see Figure 4.8 in Chapter 4): (I) obsidian; (II) hydro- and limnoquartzite; (III) Transdanubian radiolarite; (IV) Mecsek radiolarite; (V) Northern "import" flint; (VI) Southern "import" flint, and (VII) 'other' (Biró 1998a, 1998b). The data are presented according to this framework for comparability to other assemblages.

Comparing summary values for chipped stone sources between the Ottomány and Gyulavarsánd is nonetheless difficult because of the large difference in numbers (Table 9.5). Although there is a greater percentage of limnoquartzite from the Northern Mid-Mountains in the early period and a slightly higher component of southern import in the later, at such low frequencies, changing these real numbers by a single addition or subtraction has a large effect in percentages. These proportions are therefore not necessarily real.

The availability of exotic raw material to open and fortified settlements (with periods lumped) is presented in Table 9.6. One and a half times the number of square meters were collected for open settlements, and the average exotic lithic per metre square for the open settlements is 0.009 compared to 0.003 for fortified sites. The area over which waypoints were taken was about equal.

Collection in waypoints adds an additional measure, as when lithics were identified on the surface outside of transects, a GPS point was taken and they were almost always collected. Using the approximate collection area adds flesh to sites like Békés 179 which actually had a high amount of chipped stone, but broadly distributed in space. Adding these values helps establish the basic pattern. The only conclusion that can be made with any confidence based on these low values, however, is that exotic stone is present on both site types, in both phases, but the absolute numbers appear to decrease from the earlier to the later phase.

	Open settlements																Fortified sites									
																	Tarhos 1 Cluster			Sarkad 8 Cluster		Sarkad 46 Cluster		BRONZE AGE TOTAL	**BRONZE AGE %**
	SUB-VARIETY	Békés178		Békés179		Bélmegyer2		Tarhos26				Bélmegyer 45		Tarhos32		Tarhos19		Tarhos2	Sarkad88		Sarkad24			
Component		OT		OT		OT		OT				GY		GY		GY			GY		GY			
Collection method		U	W	U	W	U	W	U	W	S	L	U	W	U	W	U	W	W	U	W	U	W		
N. MID-MOUNTAINS																								
Obsidian (I)		1	1		2			1		2	1			1							1		10	**14.9**
Hydro-limnoquartzite (II)		6	5		4						4				1								20	**29.9**
Opal (Matra)																	1						1	**1.5**
Jasper (Matra)					1													1					2	**3.0**
Fossilized wood/bone											1												1	**1.5**
TRANSDAN. MNTS																								**0.0**
Transdanubian radiolarite (III)																							0	**0.0**
SW HUNGARY																								**0.0**
Mecsek radiolarite (IV)		1																					1	**1.5**
Mecsek flint		2		1												1			1				5	**7.5**
IMPORTS																								**0.0**
Northern Flint (V)	Volhenian Flint									1													1	**1.5**
Southern Flint (VI)	"Banat"														1									**0.0**
	"Balkan"	2	2										1										6	**9.0**
OTHER																								**0.0**
Quartz / quartzite		4			1					5	8			1		0					1		20	**29.9**
TOTAL BA		**16**	**8**	**1**	**8**	**0**	**0**	**1**	**0**	**8**	**14**	**0**	**1**	**2**	**2**	**1**	**1**	**1**	**1**	**0**	**2**	**0**	**67**	**100.0**
Unidentifiable		3	1		5							1												
Likely other periods		1																						

Table 9.3. Raw values for chipped stone tools in the micro-regional surface collection and excavation of Tarhos 26. Values for exotics in Figures 9.8 and 9.9 combine U and W, subtracting quartz, unidentifiable, and lithics likely from other periods.

	Open settlements														Fortified sites								
															Tarhos 1 Cluster			Sarkad 8 Cluster		Sarkad 46 Cluster			
	Békés178		Békés179		Bélmegyer2		Tarhos26				Bélmegyer 45		Tarhos32		Tarhos19		Tarhos2	Sarkad88		Sarkad24		TOTAL	Percent
Component	OTT		OT		OT		OT				GY		GY		GY			GY		GY			
	U	W	U	W	U	W	U	W	S	L	U	W	U	W	U	W	W	U	W	U	W		
GROUNDSTONE																							
Sandstone									1	2	1											4	10.5
Limestone									1	4								1		2		8	21.1
Granite										14								2				16	42.1
Metamorphic		1																				1	2.6
Volcanic (andesite, basalt)									1	1	1				1				2			6	15.8
Crystallic														1								1	2.6
Crystalline (metamorphic, paleozoic) W. Hungary or Romania										2												2	5.3
	0	1	0	0	0	0	0	0	3	23	2	0	0	1	1	0	0	3	2	2	0	38	100.0

Table 9.4. Groundstone recovered from systematic collection, waypoints and excavation in the micro-region.

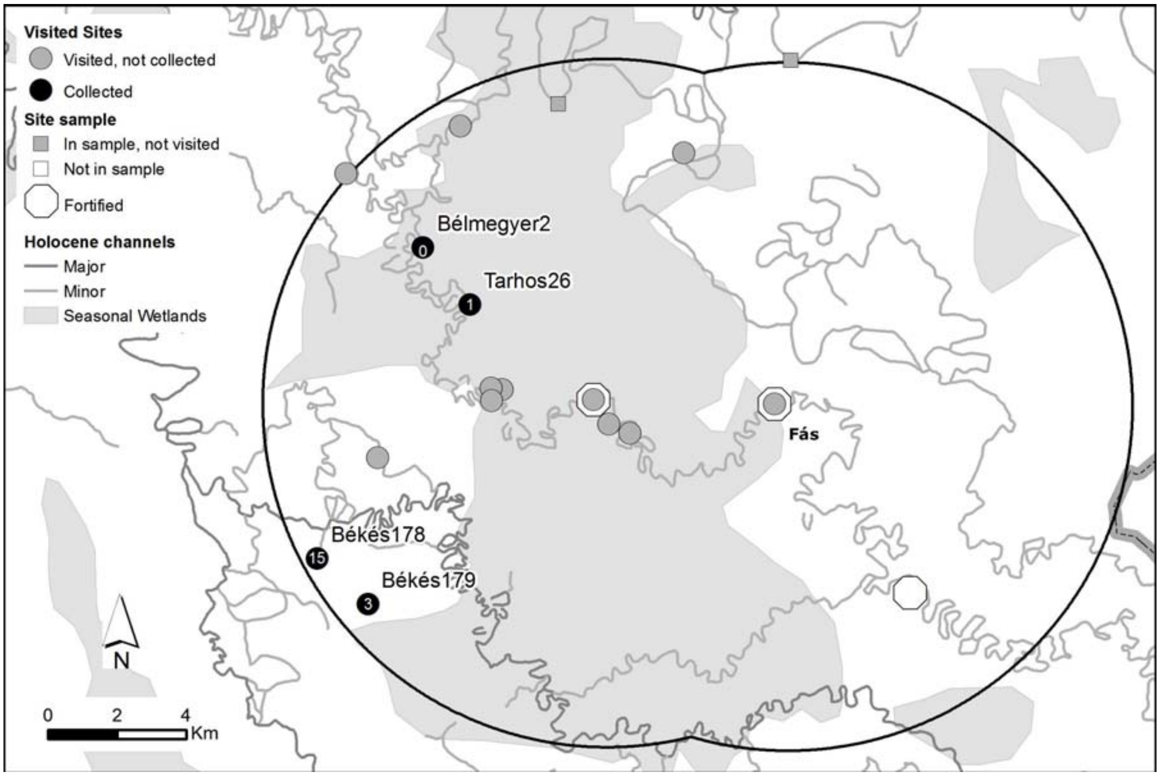

Figure 9.9. Distribution of exotic lithics surface collected for Ottomány phase sites.

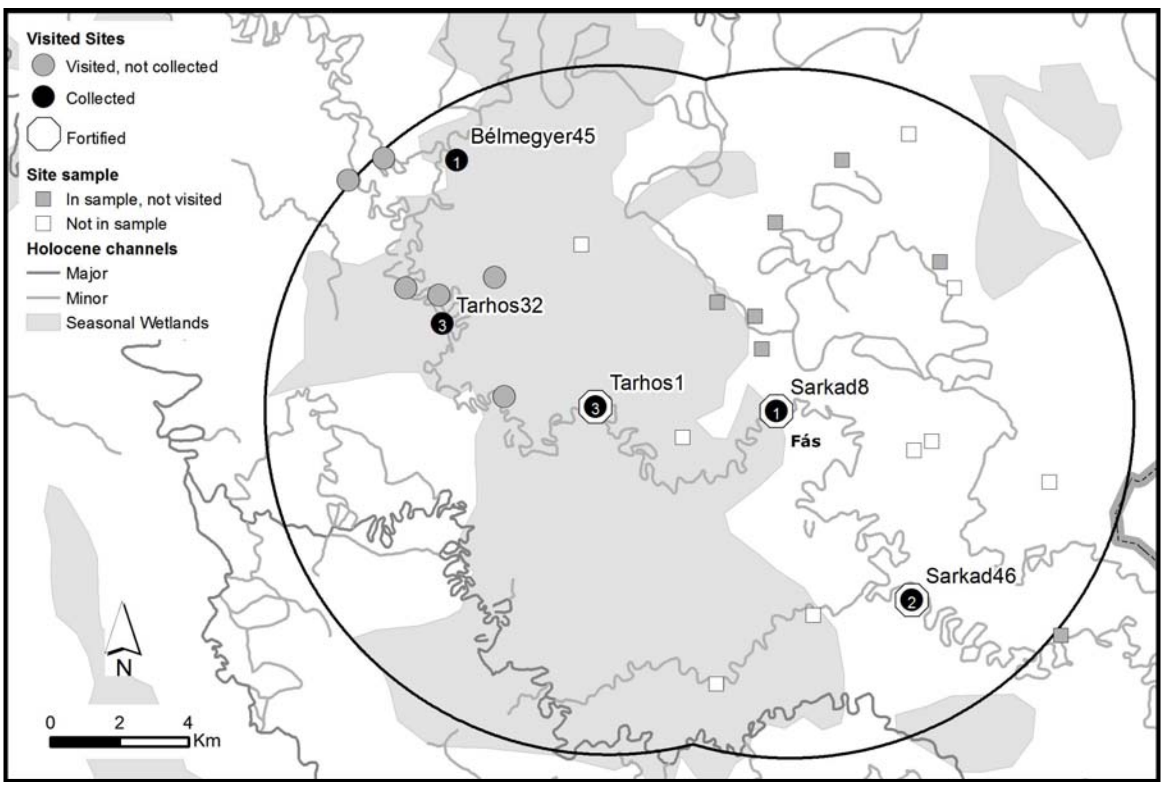

Figure 9.10. Distribution of exotic lithics surface collected for Gyulavarsánd phase sites.

	TYPE	OTTOMÁNY TOTAL	**OTTOMÁNY %**	GYULAVARSÁND TOTAL	**GYULAVARSÁND %**	BRONZE AGE TOTAL	**BRONZE AGE %**
N. MID-MOUNTAINS							
Obsidian	I	8	15.7	2	28.6	10	17.2
Hydro-limnoquartzite	II	19	37.3	1	14.3	20	34.5
TOTAL			53		42.9		
TRANSDAN. MNTS							
Transdanubian radiolarite	III	0	0.0	0	0.0	0	0.0
SW HUNGARY							
Mecsek radiolarite	IV	1	2.0	0	0.0	1	1.7
OUTSIDE C. BASIN							
Northern Flint	V	1	2.0	0	0.0	1	1.7
Southern Flint	VI	4	7.8	2	28.6	6	10.3
OTHER (Mostly quartzite)	VII	18	35.3	2	28.6	20	34.5
TOTAL		**51**	**100.0**	**7**	**100.0**	**58**	**100.0**

Table 9.5. Chipped stone collected in the micro-region sorted by source area and period.

		OPEN SETTLEMENTS		FORTIFIED SETTLEMENTS	
	SUB-VARIETY	UNITS (M^2)	WPTS (HA)	UNITS (M^2)	WPTS (HA)
Component					
Collection method					
N. MID-MOUNTAINS					
Obsidian (I)		3	3	1	1
Hydro-limnoquartzite (II)		6	10	0	0
Opal (Matra)		0	0	0	1
Jasper (Matra)		0	1	0	1
Fossilized wood/bone		0	0	0	0
TRANSDAN. MNTS					0
Transdanubian radiolarite (III)		0	0	0	0
SW HUNGARY					0
Mecsek radiolarite (IV)		1	0	0	0
Mecsek flint		3	0	2	2
OUTSIDE C. BASIN					0
Northern Flint (V)	Volhenian Flint	0	0	0	0
Southern Flint (VI)	"Banat"	0	1	0	0
	"Balkan"	2	2	0	0
TOTAL		15	18	3	2
AREA COLLECTED		1676	13.6	964	13.5
LITHIC DENSITY		0.00895	1.32353	0.00311	0.14815

Table 9.6. Density of exotic raw material compared between open and fortified settlements.

Finished metal goods

Metal objects from surface collection and excavation occur at even lower densities than lithics. Moreover, because bronze likely becomes more accessible during the Late Bronze Age and Iron Age, there is a concern that these objects, when found on sites with Early or Middle Bronze Age components might be attributable to these later periods. Results from survey add little to the regional patterns highlighted in Chapter 7. Nonetheless, I present them in Table 9.7.

The sheet metal from Bélmegyer 2 is from Unit 10. It is 6.5 cm long by 5 cm wide and only 1-2 mm thick. There are no diagnostic landmarks, but it was among earlier BA diagnostics with brushed surface treatments, and 30 meters away from the nearest LBA diagnostics. By spatial logic then, it could belong to the Ottomány component. The piece from Tarhos 26 is a special sample (SS#14) from excavation, very likely a fish hook. It is 24 mm on its long axis, and 11 mm wide on the short hook end. It was located outside of the structure among a pile of Unio shell and rubble from the house fire, in Layer B, an intact archaeological deposit. The object from Sarkad 24 is a bronze tube of uncertain function (Unit 18). It is 14 mm long, and tapered at one end. The diameter at the large end (broken) is about 7 mm and approximately 5 mm at the short end. Although there were 2 Sarmatian sherds in the next collection unit (4 meters away), the Bronze Age diagnostics in these units were very high.

Finally, a decorated bracelet or ingot (*oval Armring*) was found on the surface of Tarhos 2, just across the ancient meander separating it from the fortified site of Békés-Várdomb (Wpt JJ10). It is 7 x 5.5 cm, about 1.2 cm at its thickest, with horizontal lines and grouped zigzags and triangle decorations. It is comparable to the one found in the Debrecen hoard, *Fund I* (Mozsolics 1985: 110, Plate 213:8). Typologically, this find dates to the Kurd Horizon, contemporary with or slightly before the Gáva settlements of the Late Bronze Age.

	Open settlements						Fortified sites				
							Tarhos 1 Cluster		Sarkad 8 Cluster	Sarkad 46 Cluster	
	Békés178	Békés179	Bélmegyer2	Tarhos26	Bélmegyer 45	Tarhos32	Tarhos19	Tarhos2	Sarkad88	Sarkad24	TOTAL
Component	OT	OT	OT	OT	GY	GY	GY		GY	GY	
M^2 COLLECTED	380	136	284	188	476	476	244		468	252	
Area visible (ha)	0.9	2.2	2.3	0.7	6	1.5	1.5	5	5	2	
			U	P				W		U	
Finished piece				1				*		1	2
Sheet metal			1								1

Table 9.7. Distribution of metal by site and collection context.

Access to exotics: summary

Exotics are useful archaeological indicators because we know the distances they had to travel prehistorically, and we can therefore assign them a value more easily than we can for items that were locally obtainable and not scarce. Isolating the distribution of these exotics is therefore a critical part of recognizing differences in access to valued resources that may have resulted from social distinctions locally present. In several different cultural systems observed ethnographically, obtaining and then distributing exotics was an important source of self-promotion, and important in the evolution of inequalities and dependencies.

Only a small sample of both exotic lithic material and finished bronze pieces was obtained during systematic surface collection. Nonetheless, if we take the overall trends as a plausible indication of the occurrence of exotic stone and bronze in the micro-region, a couple of conclusions seem likely.

First, exotic stone can be found in both open settlements and fortified sites. The low densities and distribution pattern suggests that access to exotic chipped stone was not an important marker of anything, as there is no privileged access to the material. Second, there is an overall decrease in stone in the Gyulavarsánd compared to the preceding Ottomány phase.

Tarhos 26 is the only excavated open settlement, but the range of exotics from secure contexts there is comparable to the material from surface collection; occasional chipped stone and only a single piece of finished bronze. While small, the range of exotics at open settlements is not unlike the range seen at the fortified sites of the lower Körös basin (Chapter 7). One therefore cannot argue that finished bronze objects and other exotics were due to privileged access by a small group of people at the fortified centers. People away from the fortified sites took part in the exchange networks bringing exotics into the local system, or travelled to obtain whatever they needed.

Nonetheless, evidence for consumption is not the same as evidence for production. Models of political economy for Bronze Age societies involve not only control of the distribution, but more importantly, control of the productive process. The dependence on others for these exotic goods, and the appropriation of labour from craft producers, creates the structural inequalities of political economy. In order to make the argument that open settlements were not dependent on the fortified sites for exotic goods, the organization of craft production must be considered more specifically.

DIMENSION 5: CRAFT PRODUCTION

Instead of discussing *craft specialization*, I use the four parameters offered by Costin (1986, 1991) to describe specific aspects of *craft production*. Isolating stages of the productive process in time and in space allows the possibility of recognizing different patterns of craft production and exchange. As with the previous social dimension, the samples involved are small, but suggestive. Although we looked for evidence of ceramic production during field survey, we didn't encounter a single instance of ceramic wasters or kiln fragments on the surface. Such paucity of evidence probably indicates a continuation of household scale production from the Copper Age tradition, as documented among the communities of the Maros (Michelaki 1999). Although stone tool production was broken down into productive states, the values are too low to be intelligible and are presented in Appendix F for interested readers. The overall decrease in lithics in the Gyulavarsánd, however, may be related to the evidence we do have for metallurgy.

Context of production

The context of production refers to the degree to which the craft producer operates independently of his or her patrons. There is currently no settlement evidence in the lower Körös Basin to suggest that an elite class existed, and therefore spatial evidence that craft producers were attached to them is understandably elusive. With a modest few open settlement surface collections and a single excavation, however, we have begun to build evidence for independent craft production.

Relative regional concentration

While several candidates for finished bronze items were found on the surface, the only evidence recovered for metallurgical production to come out of the surface collection is slag. No mould, *tuyère* or crucible fragments were identified. The slag data from transect collection and waypoints are presented in Table 9.8.

	Open settlements						Fortified sites			
							Tarhos 1 Cluster		Sarkad 8 Cluster	Sarkad 46 Cluster
	Békés178	Békés179	Bélmegyer2	Tarhos26	Bélmegyer 45	Tarhos32	Tarhos19	Tarhos2	Sarkad88	Sarkad24
Component	OT	OT	OT	OT	GY	GY	GY		GY	GY
Unit slag	2	0	0	997	13	0	0		6	34
Unit area	380	136	284	188	476	212	244		468	252
Slag/m^2	**0.005**	**0**	**0**	**5.303**	**0.03**	**0**	**0**		**0.0128**	**0.13**
Wpt slag	1	0	0	18	4		0	1	5	2
Wpt area (ha)	0.9	2.2	2.3	0.7	6	1.5	1.5	5	5	2
Wpt slag/ha	**1.111**	**0**	**0**	**25.71**	**0.67**	**0**	**0**	**0.2**	**1**	**1**

Table 9.8. Metallurgical slag in transect and waypoint collection.

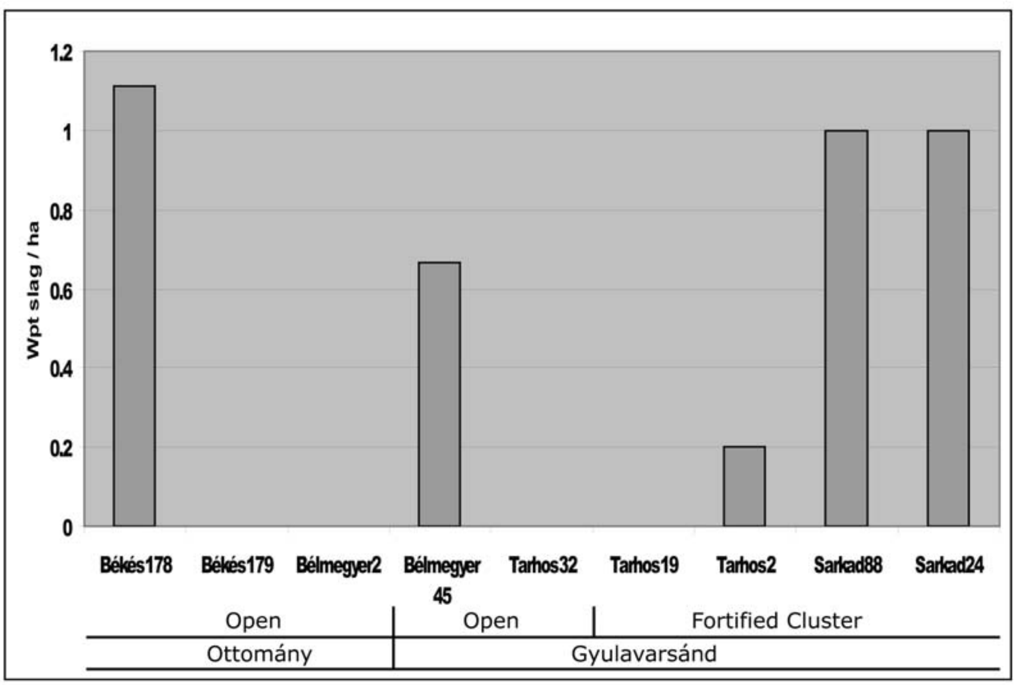

Figure 9.11. Slag per ha collected as waypoints (Tarhos 26 removed).

As with lithics, slags were collected upon identification as waypoints. The 'waypoint area' is the area visible at the site during collection. They clearly also occur at low densities.

Tarhos 26 is an obvious exception, with almost 1000 slag pieces counted in 188 m^2 (Figure 9.14, below). The topsoil itself seemed to be saturated with slag at Tarhos 26, so we did not collect and take a waypoint at every slag, nor even count them all in some units. A histogram of all the waypoint data is provided in Figure 9.11, with Tarhos 26 omitted.

In contrast to the primary production of lithics, metallurgical slags occur disproportionately at the Gyulavarsánd sites, though the ^{14}C data at Tarhos place the final living structure in the transitional phase. Although no slag was identified at Tarhos 19, there was a single waypoint slag identified at Tarhos 2, another in the Tarhos 1 Cluster, and we know that there are moulds from the fortified tell. Clearly, the occurrence of production debris outside of the fortification clusters (i.e. Békés 178, Tarhos 26, and Bélmegyer 45) indicates that metallurgy was not restricted to the regional centers. No other strong conclusion can be drawn concerning differences in Figure 9.11, except that they all represent very low densities. The surface collected sites are therefore shown in Figure 9.12 and 9.13 with slag marked as 'present' or 'absent.'

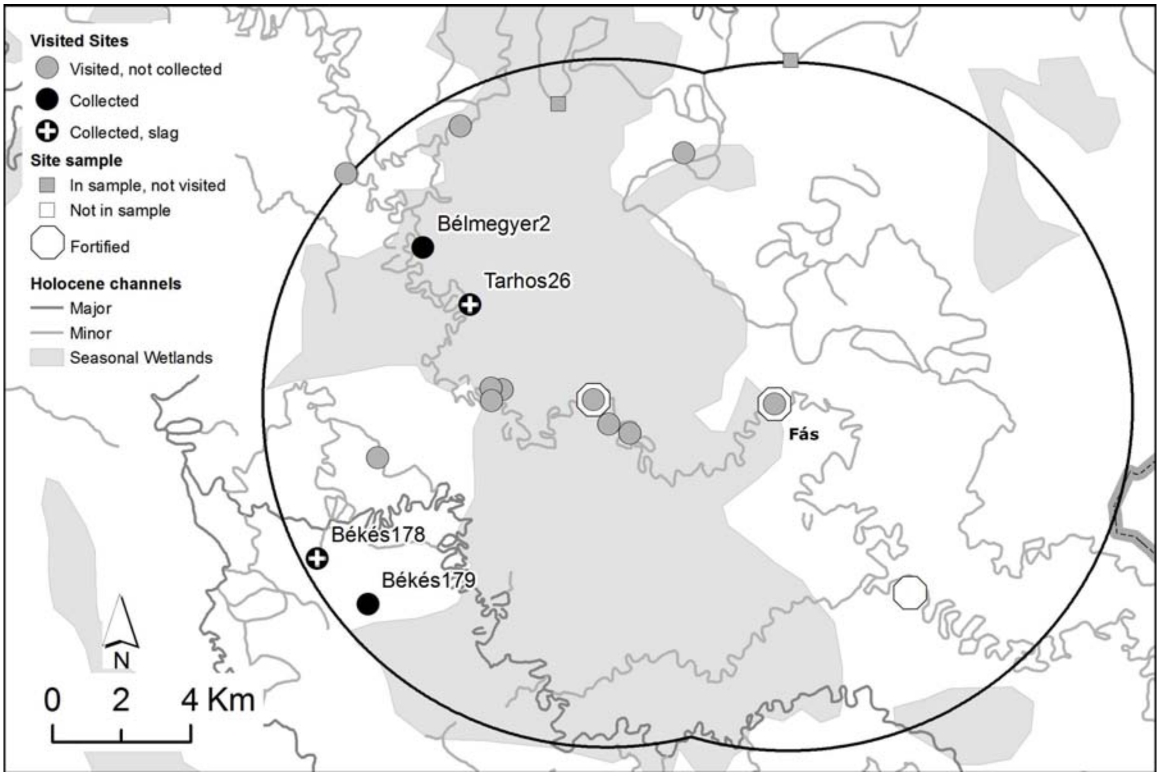

Figure 9.12. Distribution of slags in surface collected Ottomány site sample.

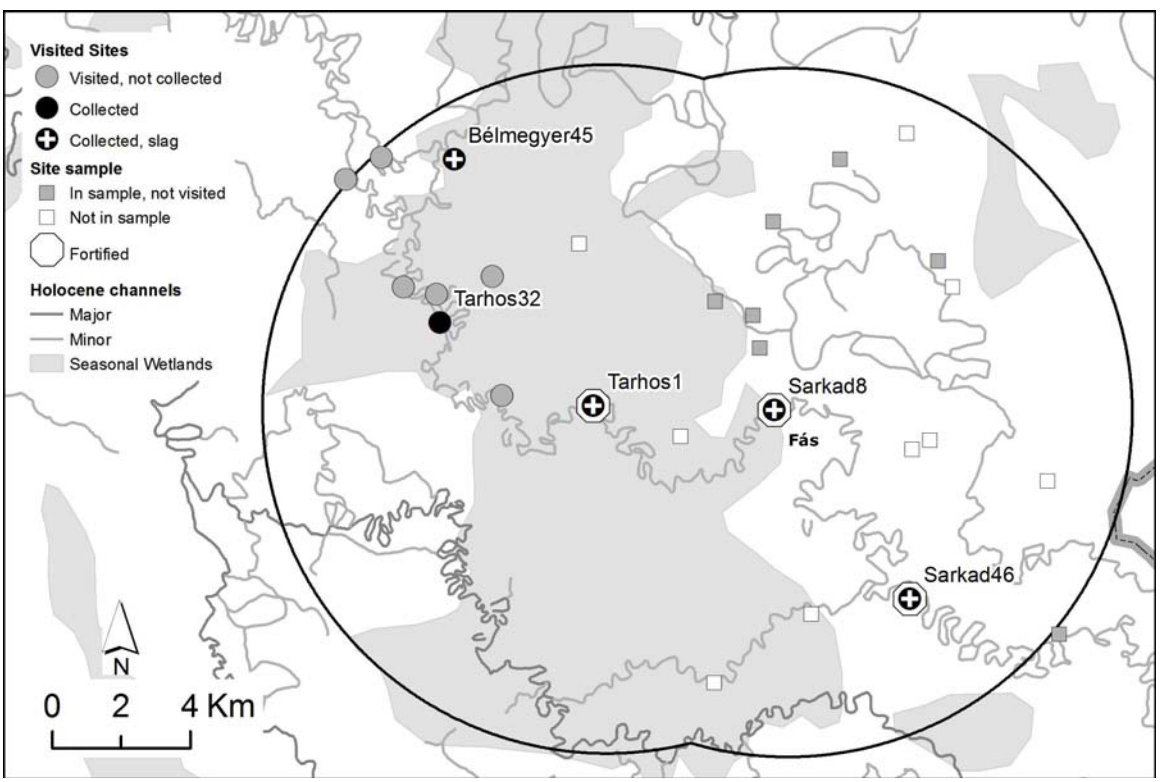

Figure 9.13. Distribution of slags in surface collected Gyulavarsánd site sample.

Tarhos 26 is a strongly single component site, covered with ceramics, and 98% of the diagnostics on the surface are plausibly attributable to the Middle Bronze Age (Appendix E). Yet the radical difference in density between Tarhos 26 and the other sites raises the possibility that the identification of slags at other sites in the field might be in error. There is good evidence to believe this is not the case. A sub-sample of the surface collected slags – the best or only candidates – were sent to Christopher Papalas at Arizona State University for study in 2006. All but Tarhos 32 and Tarhos 2 are represented in his study, which employed compositional analysis (PIXE), structural analysis (x-ray diffraction), and optical and electron microscopy (Papalas 2008)[85].

These slags, along with those identified at the Bronze Age Maros sites of Klárafalva-Hajdova and Kiszombor-Új-Élet, grouped into six categories: Vitrified sediments, Gehlenite, Refractories, Glasses, Fayalite, and Anorthite (Table 9.9).

Group	Est. Temp	Parent Materials	Interpretation
Vit. Sediments	850 C	Sediment, fuel ash	Burned earth
Gehlenite	850 C +	Limestone or shell, fuel ash, ceramic	Non typical metallurgical slag
Refractories	1150 C +	Ceramic, fuel ash, shell or limestone	Furnace/crucible/mold frags.
Glasses	1150 C +	Shale, ceramic, carbon (+ bog iron)	Non typical metallurgical slag
Fayalite	1205 C +	Shale, fuel ash, bog iron or Fe rich ore	Typical metallurgical slag
Anorthite	850 C	All of the above	Furnace conglomerate

Table 9.9. Slag types (modified from Papalas 2008:145, Table 16).

Each group has its own matrix of parent materials, estimated temperature at which the slag was created, and archaeometallurgical interpretation. The breakdown of the lower Körös and Maros slags suggests directional change across time. The earliest and most technologically inefficient processes suggested are the gehlenites from Békés 178 and Tarhos 26 (Table 9.10).

[85] One waypoint slag was collected from Bélmegyer 2. Four unit slag pieces, and one waypoint slag were collected from Tarhos 32. The Bélmegyer specimen and the two most likely slag specimens from Tarhos 32 were also sent to ASU but pulled out in preliminary analysis for being non-slags. The tables and figures provided reflect these specimens pulled from the analysis.

Site	Range	Type	Gehlenite	Refractories	Glasses	Fayalite	Anorthite
Bekes178	2100-1650 BC	Open	1				
Tarhos 26	1900-1600 BC	Open	5	1	7	1	9
Belmegyer 45	1750-1400 BC	Open		1	2		
Sarkad88	1750-1400 BC	Fortified cluster		2	2	3	
Sarkad24	1500-1400 BC	Fortified cluster		1	2	2	

Table 9.10. Slag types for collection samples (modified from Papalas 2008:150).

These are the product of limestone hosted ores or the use of shell to flux copper melts at low temperatures (Papalas 2008:147). It is interesting in this respect that Tarhos 26 also had a high number of shell in the transect data, followed by tremendous amounts in piles outside the house in primary context (see faunal discussion under 'Regional Consolidation,' below).

The fayalitic group is a shale based ore that requires a higher temperature oven and the use of iron fluxing (natural occurring in the shale, or added bog iron), something that was probably accidental at first. Both Sarkad 24 of the Sarkad 46 Cluster and Sarkad 88 of the Sarkad 8 Cluster have fayalitic slags, essentially identical to historical ones (Papalas:2008:151). Anorthites are partly decomposed ore fragments, composed of gangue, charcoal and a bonding agent. The high number of these 'furnace conglomerates' at Tarhos 26, then, might have been produced at 800 degrees °C by those unskilled in metallurgy (Papalas 2008:145).

Refractories are intermediate but their occurrence with fayalites suggests that they are part of the smelting process. If found alone they can also suggest very pure oxides, native copper, or the melting of already smelted copper (Papalas 2008:147). The presence of refractories and ore matrix types at most sites, however, suggests that both primary ore smelting and probably melting into forms. The shale content of glasses can only indicate smelting.

Papalas argues that the range of slags at these sites does not conform to expectations for iron smelting because the background matrix is quite different. Although Late Bronze Age bronze production cannot be excluded, the logical evolution of the techniques represented over time supports a Middle Bronze Age date consistent with site phasing by ceramic diagnostics on the surface.

In summary, two of the four Ottomány sites have evidence for metallurgical production, both primary smelting. Four of the five Gyulavarsánd sites have evidence for smelting (Tarhos 19 did not have slag, but the tell has evidence for metallurgy). Increased efficiency of production is shown over time, with the early Ottomány site using limestone based ores fired at low temperatures, and the Gyulavarsánd phase using shale housed ores with high iron content or bog iron fluxing.

Scale of production

Although there are some differences in the chipped stone reduction at sites (Appendix F), it would be difficult to argue there is anything more than a household lithics industry. Chipped stone production does not require large labour pools, only one or two skilled individuals, and it is difficult to imagine quantities of raw materials large enough to supply even an extended household.

The slag debris at both open settlements and fortified clusters also occurs in small amounts. The exception of course is Tarhos 26. The overall slag distribution at this site is represented by a number of waypoints in Figure 9.14, illustrating a high density slag running along a ridge NE-SW, probably no larger than half a hectare. It is unclear how many features (e.g. metallurgical pits) would be required to produce such a mass, nor the exact impact of ploughing on its distribution. But two factors weigh against an argument for large scale production, even within the 'extra-familial labour' category (see Chapter 6). The first is the longevity of the occupation, about 300 years (ca. 1900-1600) BC, according to the three radiocarbon dates at one sigma (Chapter 8). The second is the range of different slags identified on the surface, resulting from inefficient limestone based techniques at low temperatures, to shale cased ores at high temperatures using effective, essentially modern, techniques. What emerges from Tarhos 26 is therefore a household or perhaps extended household tradition, rather than an extra-household tradition. Unlike chipped stone tool production, a larger labour pool is required for metallurgical production, primarily for obtaining enough wood and creating enough charcoal to raise the fire to the required temperature.

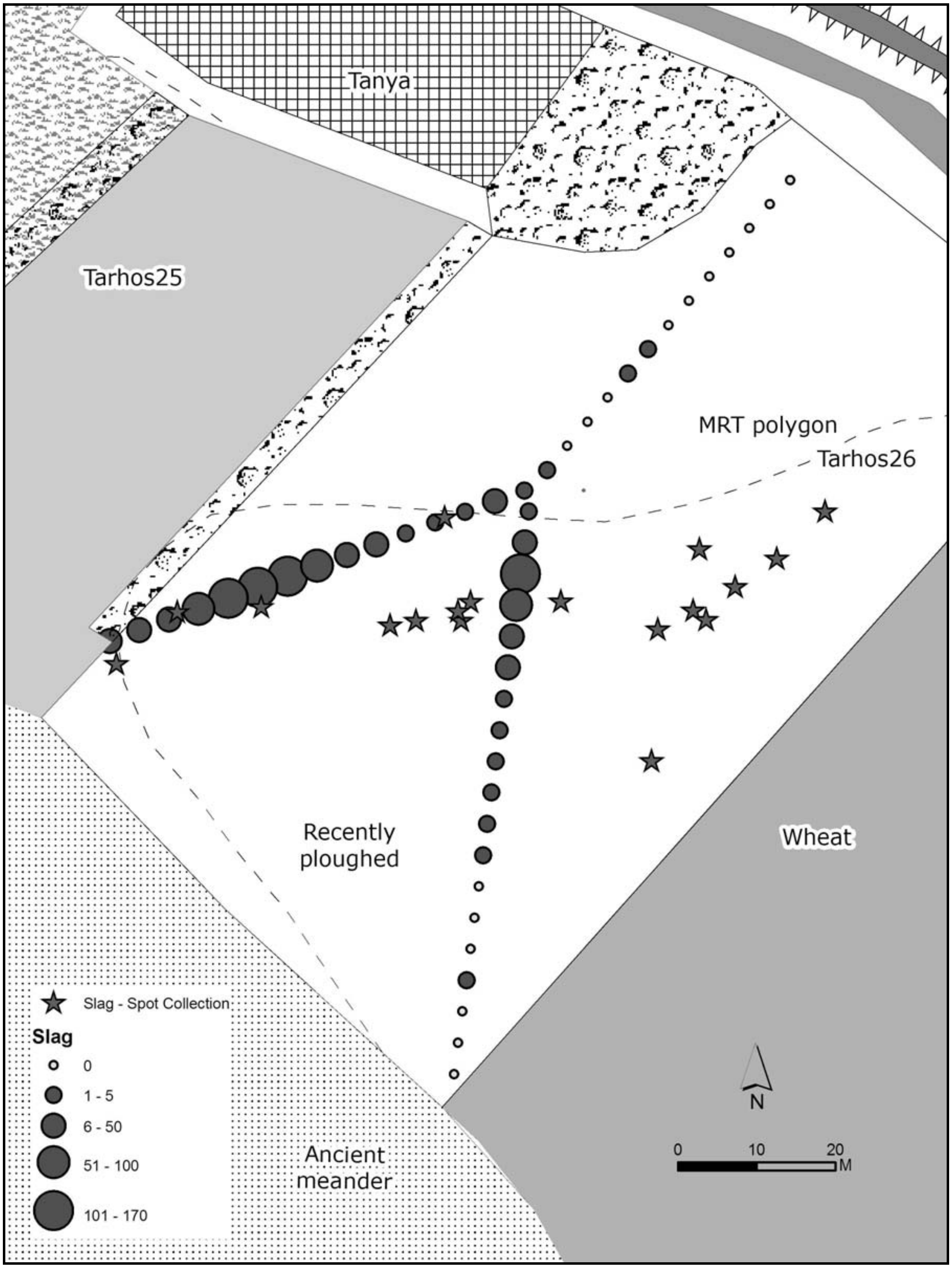

Figure 9.14. Metallurgical slag distribution at Tarhos 26.

Intensity of production

The intensity of production refers to the proportion of working time dedicated to crafting. Even if an extended household is involved in the smelting of ores and production of finished metals, metallurgy may not have been the only focus of working hours. There is of course no guarantee that the inhabitants of the particular structure excavated at Tarhos 26 are responsible for the slag produced on the surface, but it is in the thick of the slag distribution on the surface, and the multiple types of slag that indicate several smelting episodes. Only two slags were found from primary contexts in and around the house (and are unanalyzed), but we would expect at least a minimal distance between the structure itself and a fire pit burning at 1150 degrees °C.

One might make the argument, as Bronze Age archaeologists have in the past, that the metal production area would not be anywhere near the residential structures. Ethnographically, however, metallurgists are known to work next to their houses or at a greater distance, depending on cultural circumstances. Iron smelting sites in Malawi were located in the villages in the first part of the iron producing chronology, and only moved out beyond the settlement around AD 1200 (Childs and Killick 1993:327). Though this probably reduced the noxious gasses at the villages, keeping smelting sites at a distance also served taboo purposes. The furnace was anthropomorphized, known as the ironworker's "wife," and production failures were sometimes attributed to infidelity (to the furnace). In addition, the secret rituals of iron workers were kept out of view, and the risk of witchcraft and contamination was reduced.

Though there were probably taboos surrounding metal production, there is currently no evidence that bronze smelting or smithing involved great distances or social rules. The arsenic content in the ores used in bronze smelting, and the high temperatures of the fires, would surely require some minimum distance from the houses, even if it was 10-20 m. Although metallurgical slags and oven candidates are found within settlement enclosures on the Maros, they are somewhat segregated from the main habitation area {O'Shea, n.d. #1788}.

Because we have evidence for smelting and habitation on the same single component site, I argue that the house at Tarhos 26 may have belonged to the metallurgist. Although slags are found on the surface directly above the excavated house, they are most concentrated a sufficient distance (30 m away) to keep poisonous gasses and fires from endangering a flammable structure. If this is the metallurgist’s house, we can use the interior of it to address the intensity of production.

The range of artefacts even in the small area opened over the structure at Tarhos suggests that its inhabitants were involved in many other tasks (Figure 9.15). Some implements such as the ground stone axe, vessel and the bone tool we might expect in anyone’s domestic inventory, but the grindstone and fishnet weights suggest that some primary resource procurement and processing occurred in addition to any metallurgical crafts. It is a small sample to boot, but sufficient to suggest more of a part-time devotion to metallurgy above anything else.

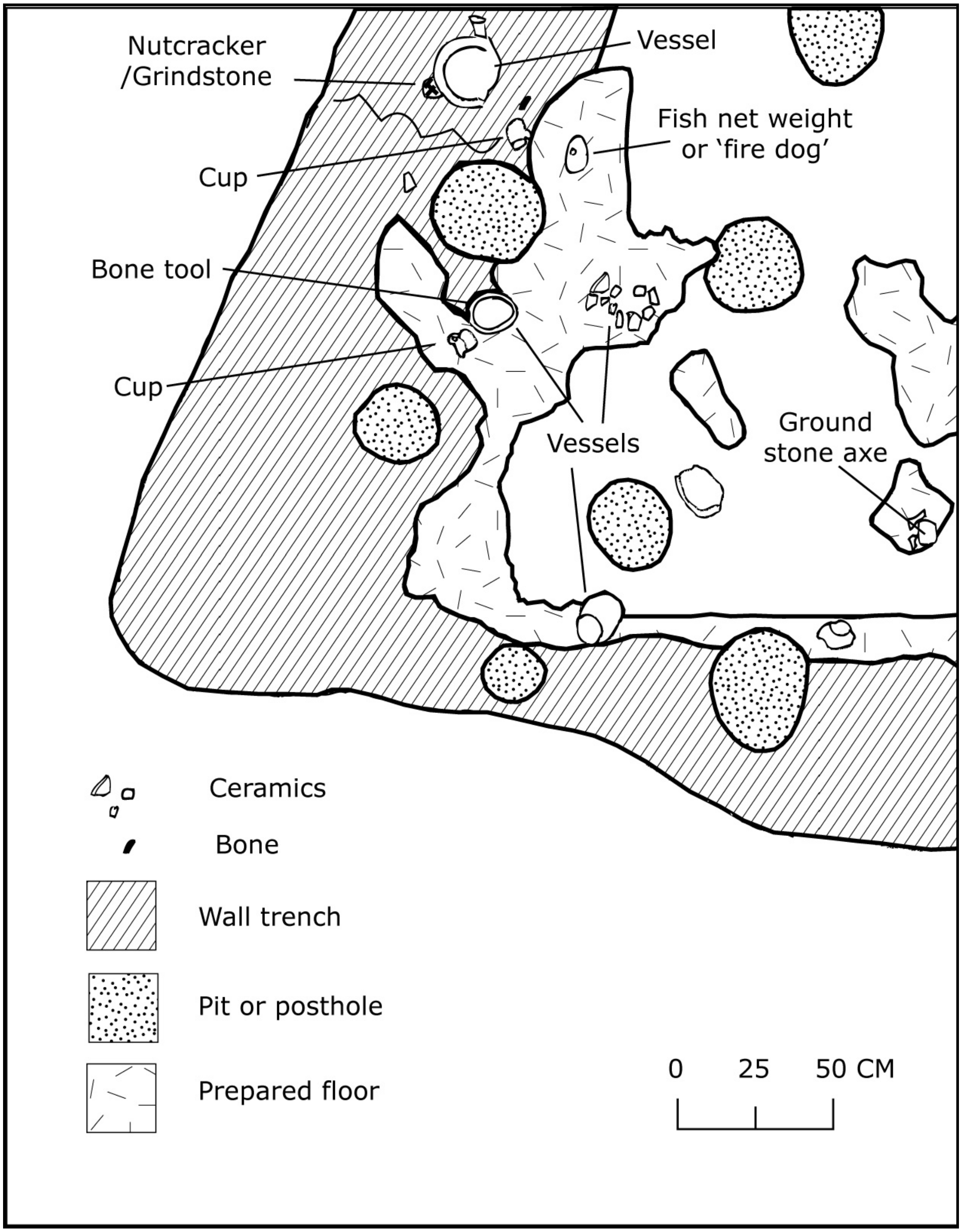

Figure 9.15. Artefact detail of the southwestern corner of the structure at Tarhos 26.

Craft production: summary

Finished bronze, and the limited available evidence for production, occurs disproportionately in the southeastern part of the Körös basin (Chapter 7). The limited evidence for finished bronze outside the fortified sites, such as the fish hook at Tarhos 26, and surface bronze plausibly attributable to MBA components at open settlements, indicates that this regional pattern of consumption was not exclusive to tells. Even in this situation, however, one may reasonably argue that finished bronze pieces were being obtained from local centers.

Adding production data at open settlements to the comparison changes this picture. Evidence for bronze production occurs at all three fortified sites of the later phase. Nonetheless, surface evidence for metallurgy occurred at two of four open settlements during the Ottomány phase, and one of two open settlements in the Gyulavarsánd. Field conditions at the site with no slags were poor, with less than 20% of the site visible (see Tarhos 32, Chapter 8). Therefore, better field visibility may provide opportunities for slag recognition in the future.

The open settlements with evidence for metal production must be carefully considered in tandem with an evaluation of fortified sites. During the time when other people lived in fortified communities, Tarhos 26 was in the beginning or middle stages of a long tradition of bronze smelting. Nonetheless, the Gyulavarsánd is the real phase of classical metal production. As we have seen above, the Gyulavarsánd phase is also when large fortified settlement clusters emerge. If a hamlet three or four hectares in size (e.g. Bélmegyer 45) is still producing bronze ten kilometres away from Békés-Várdomb, it is not possible to argue for a restriction in the production of metals by a sub-group of people at these populated fortifications at the end of the Middle Bronze Age.

The idea of ‘wealth finance’ for this society, where open settlements might produce metal for people within the fortifications, seems inappropriate. The resolution of our data at particular sites is still not adequate to address the possibility that the labour and products of craft producers was ‘marginalized’ by an elite class, but because of the current lack of evidence for an elite class, this possibility remains unlikely.

The possibilities for refining the model of bronze production in the Körös basin therefore hinge not on how carefully it was controlled by an elite, but rather how individual smiths obtained the ores for smelting, and at what point in space they were more likely to obtain ingots through exchange. The slags at Tarhos 26 indicate that primary smelting occurred there. Local metallurgists may have obtained the ores themselves upriver in the Apuseni mountains. Or, if metallurgy was as common across the landscape as I suspect it was, the ores may have circulated in exchange networks as a currency that would be consumed (in flames), rather than making it into the mortuary record as other standards of value might. If it was a currency in addition to a consumable, it was taphonomically doomed and can be added to the list; bronze probably also circulated as a standard and when pieces broke, they were melted and re-cast. There may be a final reason, however, why we don't have more evidence for production and consumption, not related to taphonomy, but to the number of participants in the system. Next I reconstruct the number of people (and therefore consumers) who would have been part of this regional economy.

DIMENSION 6: DEMOGRAPHIC SCALE

As I indicated in the 'Segmentation' dimension above, reconstructing population numbers provides fuel for speculating about individual village dynamics. At the regional level however, it is useful for determining whether intensification of food production was mandatory. To model the number of people living in an area at a given time, I use sites with Ottomány and Gyulavarsánd phases recorded in the MRT. There are three variables that have to be controlled before these numbers can be provided: 1) the size of each site, 2) the density of occupation (enclosed versus open), and 3) longevity of the stylistic phase to which the site belongs.

In Chapter 8, I identified several correspondences between MRT site descriptions, polygon size and observations during site visits. The first part of this section builds rules for estimating site size for unvisited sites in the micro-region. The second part sums population numbers generated by different occupation densities, and places these population estimates in time. The third part addresses the site size hierarchies by archaeological phase as static entities, corrected for differences in population density.

Estimating size for BA occupation in the micro-region

In Chapter 8, I arrived at several conclusions about size from revisiting open settlements. I now use these conclusions to extrapolate size for sites in the micro-region I was unable to visit. Middle Bronze Age (MBA) components were coded as Low, Moderate or High (*L*, *M*, *H*) and the combined weights of other components (Non-MBA) were coded the same way.

MBA coded	Non-MBA coded	MRT site polygon size	Site size allotted
M or H	nil	- any -	MRT dependent, unless field tested
M or H	L	< 5 ha	MRT dependent
M or H	L	> 5 ha	Case by case
M or H	M or H	< 5 h	MRT dependent / 2
M or H	M or H	5-10 ha	3 ha
M or H	M or H	> 10 ha	5 ha
L	- any -	- any -	1 ha

Table 9.11. Rules generating size allotments to MRT sites.

An explicit set of rules for estimating site sizes of open settlements in the micro-region is listed in Table 9.11. The rules are designed to maximize use of the evidence for site size gathered during fieldwork, employ the MRT site boundaries within their useful limits, and when in doubt, err on the side of a large site size estimate (in favour of the null hypothesis, i.e. high population). There are also a few anomalous, large open settlements in the Gyulavarsánd phase that I deal with individually, working through the site descriptions in the MRT. Values for site size generated from field work are compared to values generated by the coding scheme for these sites in Table 9.12. As one can see, the rule-based estimate is within the estimate given during fieldwork, or a little higher.

Size estimates were provided for all sites in fortified clusters in the 'Segmentation' section above. Since we know that both Tarhos 1 and Sarkad 8 were occupied in the Ottomány phase, these fortified areas are included in both phases, but the large settlement areas around them established through fieldwork are not. For the Ottomány phase they receive the 'rule based' estimate, even though having surveyed these sites, I think this is artificially large.

SiteID	MRT Area (ha)	Neolithic	Copper Age	Ottomány	Gyulavarsánd	Hajdúbagos	LBA	Later	MBA	Non MBA	Collected?	Surface collection estimate		Collection-free estimate (ha)	RULE GENERATED
												Min Size (ha)	Max Size (ha)		
Békés170	3.21		*	*				*	L	L	N			< 1	1
Békés178	0.51	*	*	*					M	L	Y	0.3	0.8		0.51
Békés179	5.73			*				*	M	L	Y	0.1	2.2		5.73
Bélmegyer2	12.99		*	*	*		*	*	M	M	Y	1.4	2.3		5
Bélmegyer45	7.02				*				M		Y	2	6		
Okány20	4.08		*	*			*	*	M	M	N			2-4	2.04
Tarhos25	0.15			*	*			*	H	L	N			< 1	0.15
Tarhos26	2.72			*	*			*	H	L	Y	2.4	3.3		2.72
Tarhos29	3.34				*			*	L	H	N			< 1	1
Tarhos32	5.50	*			*		*	*	M	M	Y	1	4		2.75
Tarhos33	7.81				*	*	*	*	M	M	N			< 3	3
Tarhos48	8.29	*		*				*	M	L	N			< 1	CASE
Tarhos65	10.7				*			*	M	L	N			< 5	CASE
Tarhos9	8.60			*				*	L	M	N			< 1	1

Table 9.12. Site visit estimates compared to estimates generated by rules.

In addition to these Middle Bronze Age sites, we know there are potentially more of the same sites lurking in the general categories Early Bronze Age (EBA) and General Bronze Age (GBA) assigned in the MRT volumes (Chapter 8). These are generally very small artefact scatters. When we consider the proportion of Late Bronze Age sites by parish, it becomes clear that two thirds of the time, GBA sites probably belong to an LBA category (Table 9.13). The number decreases even further when one considers that it must be assigned to a specific phase (e.g. Makó, Nyírség, Ottomány) based on relative weight by parish. Consequently, I exclude these sites from population estimates[86]. The coding

[86] It is possible that one MBA phase is being more readily identified in survey than others, making their way more often into the GBA or 'Prehistoric' category. The latest Middle Bronze Age often has well fired, highly burnished, decorated, recognizable ceramics; are Ottomány phase sites being under-recognized? The question should be more carefully addressed in the future, but there are at least three reasons that it may not be the case. The first is the practice of surface treatment brushing in the Ottomány phase; circa 15% of otherwise undiagnostic body sherds are brushed at Tarhos 26 (Duffy, unpublished notes). Outside of this, there is an additional 25% of the ceramic assemblage that is diagnostic in some way. The second reason is that Late Bronze Age (e.g. Gáva) ceramics are often highly burnished, black, and have curvy designs too, so this feature is not unequivocally attributable to the MBA and ceramic specialists look for other features before assigning them to one or the other. Finally, field visits to Ottomány and Gyulavarsánd sites indicate that both vary in the number of diagnostics, even for single component sites.

scheme is applied to Ottomány and Gyulavarsánd sites in the micro-region in Table 9.14 and Table 9.15.

Parish Name	GBA sites	EBA as % of identified	MBA as % of identified	LBA/EIA as % of identified
Okány	3	33.3	13.3	53.3
Békés	24	26.0	18.0	56.0
Bélmegyer	16	29.7	18.9	51.4
Tarhos	22	26.1	28.3	45.7
Doboz	5	0.0	0.0	100.0
Sarkad	36	4.5	22.7	72.7
Sarkadkeresztúr	3	15.0	20.0	65.0
MEAN %		19.2	17.3	63.4

Table 9.13. Number of sites identified as 'General Bronze Age' for parishes that have GBA sites in the micro-region.

SiteID	Fortified cluster	Estimated Size	Estimate Type
Békés170		1.00	R
Békés178		0.55	FW
Békés179		1.15	FW
Bélmegyer17		5.00	R
Bélmegyer2		1.85	FW
Bélmegyer30		1.00	R
Okány15		4.55	R
Okány20		4.00	FW
Tarhos26		2.85	FW
Tarhos38		5.00	R
Tarhos49		1.93	R
Tarhos48		1.00	FW
Tarhos6		0.68	R
Tarhos9		1.00	FW
Vésztő47		2.74	R
Sarkad24	*	5.00	R
Tarhos2	*	5.00	R
	SUM	**44.45**	
High density sites			
Tarhos1		0.27	FW
Sarkad8		0.46	FW
Tarhos72	*	2.01	R

Table 9.14. Size estimates for Ottomány sites in the micro-region. R=Rule-based, FW=Fieldwork-based estimate. (Note: Tarhos 25 is included in the Tarhos 26 calculation, and Tarhos 2 and Sarkad 24 are given the rule-based estimate rather than the fieldwork estimate.)

SiteID	Fortified cluster	Estimated Size	Estimate Type
Bélmegyer17		5.00	R
Bélmegyer2		1.85	FW
Bélmegyer20		5.00	FW
Bélmegyer45		4.00	FW
Kötegyán14		5.00	R
Méhkerék63		1.00	R
Mezőgyán19		1.00	R
Sarkad119		3.76	R
Sarkad175		1.00	FW
Sarkad178		1.00	FW
Sarkad247		4.45	R
Sarkad251		3.00	R
Sarkad252		5.00	R
Sarkad31		5.00	R
Sarkad36		5.00	R
Sarkadkerestúr102		10.00	R
Sarkadkeresztúr1		2.10	R
Sarkadkeresztúr73		10.00	R
Sarkadkeresztúr90		20.00	R
Tarhos24		5.78	R
Tarhos26		2.85	FW
Tarhos29		1.00	FW
Tarhos32		2.50	FW
Tarhos33		3.00	FW
Tarhos38		5.00	R
Tarhos65		5.00	FW
Sarkad24	*	9.00	FW
Sarkad30	*	15.00	R
Sarkad7	*	7.00	FW
Sarkad88	*	16.00	FW
Sarkad89	*	2.00	FW
Sarkad9	*	0.33	FW
Tarhos19	*	2.23	FW
Tarhos2	*	17.56	FW
	SUM	**187.41**	
High density sites			
Tarhos1		0.27	FW
Sarkad8		0.46	FW
Tarhos72	*	2.01	R

Table 9.15. Size estimates for Gyulavarsánd sites in the micro-region. R=Rule-based, FW=Fieldwork-based estimate. (Note: Tarhos 25 is included in Tarhos 26. Tarhos 2 and Sarkad 24 have fieldwork estimates).

Simulating contemporary populations

This section provides population estimates in the micro-region. To estimate contemporary population numbers, all site areas are summed and divided by time for three periods: (1) Ottomány (2150-1750 BC); (2), the Transition (1750-1650 BC) when both styles exist and (3), Gyulavarsánd (1650-1400 BC). The fundamental archaeological unit of comparison for demography is site hectares, but because sites were not occupied simultaneously, I provide an estimate of settlement hectares in use at one time based on phase duration.

As for the 'Segmentation' dimension above, the 'one hundred year' occupation rule is employed for all sites except for the fortified components of Békés-Várdomb and Sarkad-Peckesi-domb, which were occupied throughout the sequence. There are 11 Ottomány open settlements without a Gyulavarsánd component, 10 with both ceramic styles present, and 28 with only a Gyulavarsánd component. Although we might intuitively want to assign bi-component sites to the transitional phase, given the 750 year length of time involved it is equally likely that these sites were occupied once early in the Ottomány phase, abandoned, and re-occupied hundreds of years later in the Gyulavarsánd phase. The few open settlements that exceed 10 ha are dealt with individually[87].

The sum of occupation divided by time, with population estimates, is presented in Table 9.16. All open Ottomány sites combined for the micro-region tally to 44.45 ha. The Ottomány period stretches between 2150 and 1750 BC, but the Transitional phase (1750-1650 BC) is also apportioned sites. Therefore, if each 100 years is assigned a percentage of total site coverage, this means on average only 8.89 ha were occupied at any given time. All of the open Gyulavarsánd sites sum to 187.41 ha. The Gyulavarsánd phase stretches from 1650-1400 BC, but the Transitional phase is also apportioned sites, making 350 years total. This means that each 100 year stretch is represented by 58.69 ha of occupation.

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[87] Sarkadkeresztúr 73 has low density Árpád and Sarmatian over a large part of the site; Bronze Age material occurs mostly on the south and northwestern portion of the site. I speculate that a third of this site might belong to the Bronze Age, say 10 ha. Sarkadkeresztúr 90 is mostly Bronze Age up until the northernmost part of the site, without any LBA found anywhere. For this reason, I'll attribute 20 of the 22.51 ha of the site to the E-MBA. Sarkadkeresztúr 102 is more intensively occupied in the north, with a fall-off to the south, although Sarmatian and Árpád are infrequent and no other prehistoric components were encountered. I suppose 10 of the 14 hectares have Gyulavarsánd material.

OTTOMÁNY (2150-1750 BC)	Area (ha) occupied	Population multiplier	Population estimate
Fortified settlements			
Tarhos 1 and Sarkad 8	0.73	220	161
Tarhos72	2.01	110	221
Open settlements			
All Ottomány site (500 years)	44.45		
Estimated simultaneously (100 years)	8.89	40	356
TOTAL SIMULTANEOUS			**737**
TRANSITION (1750-1650 BC)	Area (ha) occupied	Population multiplier	Population estimate
Fortified settlements			
Tarhos 1 and Sarkad8	0.73	220	161
Tarhos72	2.01	110	221
Open settlements			
Ottomány sites at half life (50 years)	4.44	40	178
Gyulavarsánd sites at half life (50 years)	28.84	40	1071
TOTAL SIMULTANEOUS			**1630**
GYULAVARSÁND (1650-1400 BC)	Area (ha) occupied	Population multiplier	Population estimate
Fortified settlements			
Tarhos1 and Sarkad 8	0.73	220	161
Tarhos72	2.01	110	221
Sarkad46	2.83	40	113
Open settlements			
All Gyulavarsánd sites (350 years)	187.41		
Estimated simultaneously (100 years)	53.55	40	2142
TOTAL SIMULTANEOUS			**2637**

Table 9.16. Population estimates modeled for three different phases of the Bronze Age in the micro-region (420 km^2).

The Transitional phase consists of both Ottomány and Gyulavarsánd sites. If the same logic of 100 year sites is applied to this phase, it by definition has the highest simultaneous population definition of the three phases, the sum of both Ottomány and Gyulavarsánd sites modelled for a 100 year period. Instead, I posit a transition in which sites have only half the longevity of a site in a non-transitional period. Summing half of each 100 year value yields 34.5 ha (4.44 ha and 28.84). Adding the fortified sites to each period and the population multipliers for each site type achieves the population numbers in Table 9.16.

It has been argued in the past that there is a population increase in the Middle Bronze Age, but this had never been empirically documented in Hungary. Although the population numbers provided in Table 9.16 are rough estimates, they are controlled estimates. There is between a three and four fold increase in population in this 420 km^2 area, potentially in a short time.

Site size hierarchy in the Körös Gyulavarsánd

We cannot discuss site size patterns for the Transitional Phase, but we can do it for both the Ottomány and the Gyulavarsánd individually. I contrast two different settlement patterns, because it illustrates an important point: when people are concentrated behind fortifications, site size hierarchies based on area rather than population are misleading when the size range is small. This is because in the micro-region, tell sites in the Ottomány phase are not so different than open settlements in size, but the settlement density in the former is five times that of the latter. In the Gyulavarsánd phase, the range is much larger, and the small amount of densely settled tell area in fortified clusters is dwarfed in comparison to the settlement around it, even if the density is much lower. Consequently, when tell area remains constant, but the range is increased, the site size hierarchies based on area illustrate the same pattern as those based on population. I take advantage of this finding in Chapter 10.

The data to illustrate this point are provided in two figures for each phase at the same scale. The traditional site distribution based on size is presented in Figures 9.16 and 9.18, and the second weighted by population and accounting for the differences in density between fortified sites and open settlements, is presented in Figures 9.17 and 9.19. The population figures are palimpsests, and in this sense they are comparable to hectares, the traditional measure.

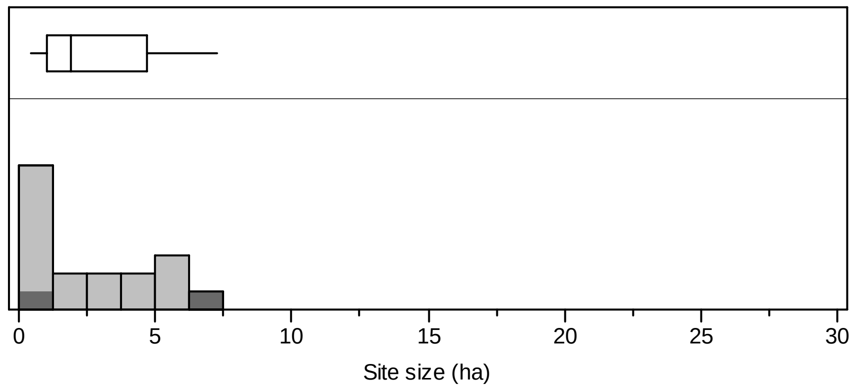

Figure 9.16. Distribution of Ottomány sites by size in the micro-region. Fortified sites, in dark grey, are grouped into clusters. Tarhos 1 is the largest at over 7 ha.

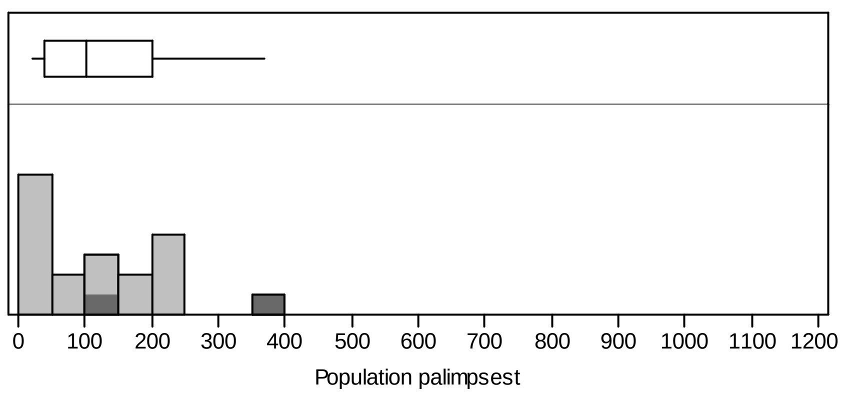

Figure 9.17. Distribution of Ottomány sites by population estimate in the micro-region. Population sizes do not account for time. Fortified sites are dark grey. Tarhos 1, again, is the largest at over 350 people.

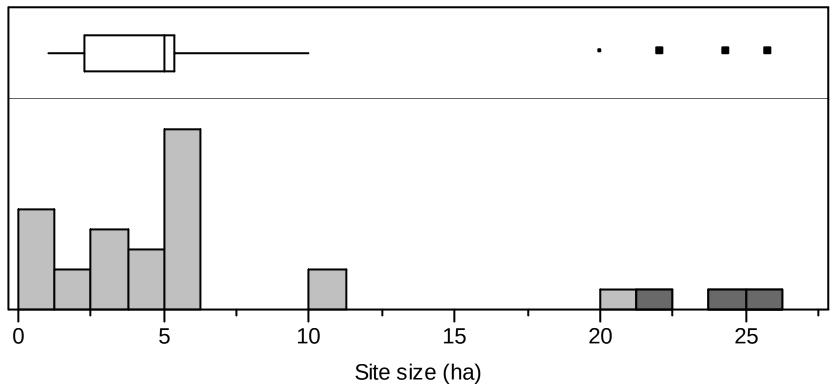

Figure 9.18. Distribution of Gyulavarsánd sites by size in the micro-region. Fortified sites are dark grey.

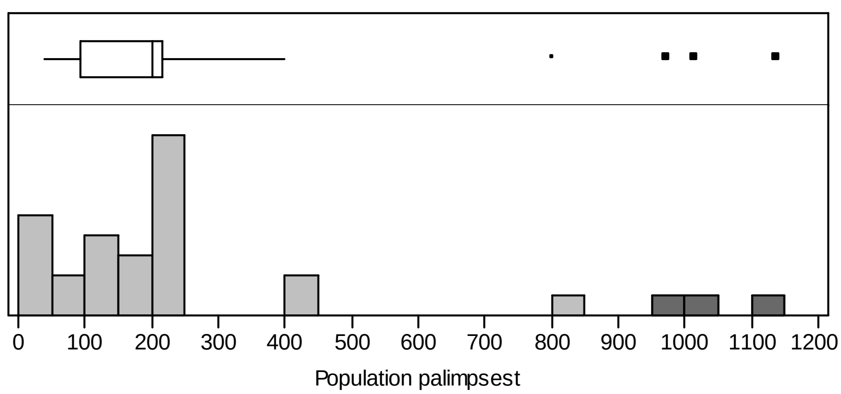

Figure 9.19. Distribution of Gyulavarsánd sites by population estimates in the micro-region. Fortified sites are dark grey.

There is a full size range in size or population in the Ottomány phase. Tarhos 1 is an outlier at 7 ha (or over 350 people), although it is further from the mean in the figure reckoning size by population. As an enclosed site, Sarkad 8, without a surrounding cluster in the Ottomány phase, is disproportionately small and therefore among the tiniest in the traditional frequency distribution by hectare. It occurs right at the mean in the population frequency distribution, which is a better estimator of what the population probably really was compared to other sites. In either figure however, what we see is a range of sites from 0.5 to 5 ha with a slightly larger outlier.

In the Gyulavarsánd, this lower range of sites between 1 and 5 ha is still the best represented. There are two additional site types – an open settlement at 10 ha, and the fortified cluster over 20 ha. There is also one open settlement at the low end of the fortified site range – 20 ha. Population numbers are less distorted by arranging the sites by size when they are spread across a much larger range, because the dominant population components of the fortified sites are the people on the outside of the fortification. In the Gyulavarsánd phase, there is a clear site size hierarchy, regardless of how it is measured. This hierarchy is further explored in Chapter 10.

Demographic scale: summary

The population estimates indicate that the largest sites in the region were probably only about 500 people. This number is around the maximum observed ethnographically for middle-range societies with no permanent or 'simultaneous' on-site hierarchy responsible for conflict resolution. Although there are cases in non-hierarchical societies where a village of more than a thousand is encountered (e.g. Tuzin 2001; Trigger 1990), they are quite rare and short lived.

Population growth, or resource scarcity, are often argued to play a role in social changes in the Bronze Age. There is certainly an increase in settlement in the micro-region between 2150 and 1400 BC. Unless we are dealing with disproportionate site loss from the Ottomány, or complex social processes that makes settlement in the Gyulavarsánd seem more numerous than it is, the three to four fold increase over the Ottomány should be taken seriously.

The population at the fortified clusters drops from 52% in the Ottomány phase to 18% in the Gyulavarsánd. Although large aggregated communities such as those at the fortified cluster are often a sign of security concerns, most of the population in the final phase of the Middle Bronze Age are not living in fortified communities. Although the significance is not currently clear, it does not support an increase in warfare *within* this area, though perhaps because it had a better secured perimeter. I come back to this topic below.

DIMENSION 7: INTENSIFICATION OF FOOD PRODUCTION

In the lower Körös basin, arable land, not pasture, is the limiting resource for farmers in a mixed economy (Chapter 4). This section on intensification first establishes crop production to the extent possible with the macro-botanical remains. I then assess whether populations in the micro-region were so high that lower quality land had to be farmed.

General planting strategy

The only macro-botanical evidence in the micro-region comes from ten flotation samples excavated from Tarhos 26 in the summer of 2006 (see Table 9.1 and Figure 9.5, above). The flotation and identification of the botanical sample took place in Százhalombatta in 2007 (Berzsényi, n.d.). The macro-botanical remains include emmer (*Triticum dicoccum*), fragments of hulled wheat (*Triticum* sp.), spelt (*Triticum* cf. *spelta*), and hulled barley (*Hordeum vulgare* subsp. *Vulgare*). Summer annuals and the presence of medium and high growing weeds indicate sickle harvesting low on the plant. Wild cornelian cherry, a tree that grows on calcareous, well-drained forest soil, is also part of the macro-botanical assemblage. This cherry can be turned into sweet drinks or fermented.

Hulled species of wheat are robust and well adapted to poor soils and environments. Barley endures poor and dry soils even better than hulled wheat. If we take the proportion of wheats in the flots as a reasonable indication of cultivation emphasis, the planting strategy at Tarhos 26 therefore appears to mostly include an emmer / spelt mix with some barley on the side. The estimates used for productive yields in Chapter 6 are therefore supported by the suite of cereal remains available (emmer/spelt). It is unclear, however, the extent to which intensive versus extensive cultivation was practiced. Without a larger sample of macro-botanical remains and analysis of the weed assemblage we are unable to distinguish between different varieties of cultivation. In a later section, I model both intensive and extensive strategies for single settlements. First, however, I explore the possibility of a regional need to expand into low quality soils to meet the productive requirements of intensive gardening.

Regional population density and land availability

In this section I evaluate whether lower quality land would have been required for cultivation in order to meet the agricultural demands of the growing population in the Bronze Age of the Körös basin. Chapter 6 set out to divide the land in this region into three categories: 1) prime, 2) sub-prime, and 3) unfarmable. First, one class of unfarmable land is removed. In Chapter 4, the distribution of solonetz soils was described and it was further indicated that they cannot be tilled using prehistoric techniques. Here, I also note areas of the micro-region where the water-table is between 0-1 m in depth and would have been too high for grain production (Figure 9.20). Both of these areas are extracted in Figure 9.21.

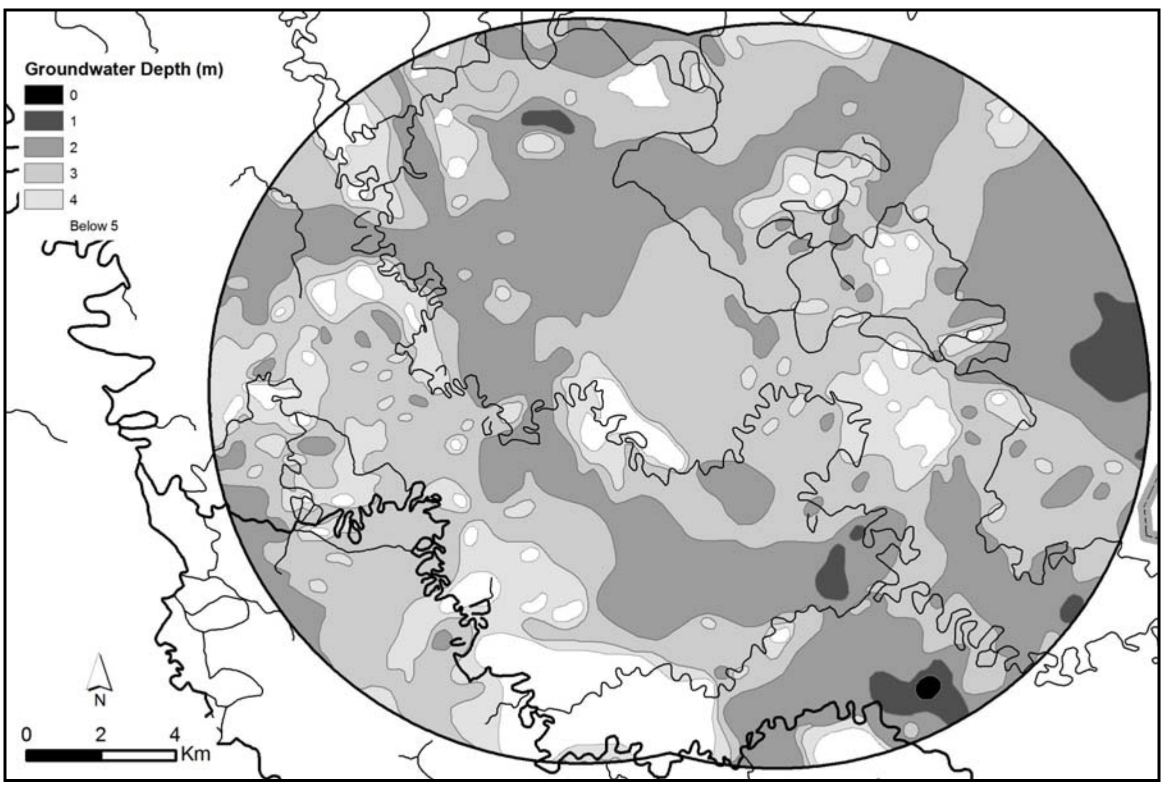

Figure 9.20. Groundwater depths in the micro-region overlaid with paleo-channel reconstruction.

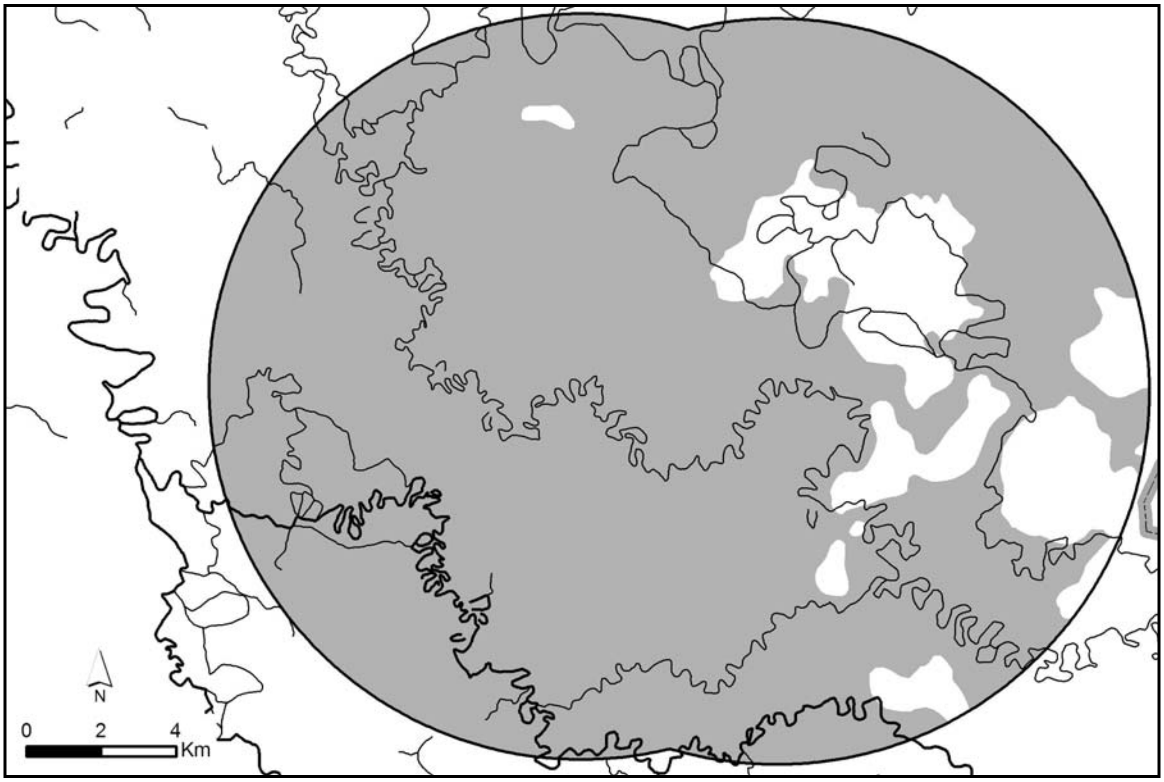

Figure 9.21. Area in the micro-region excluding solonetz and high groundwater depth. The white area is the land excluded.

The quality of land in the area that remains can be divided into at least two categories based on elevation, because drainage is the primary factor influencing yield reliability. The next step therefore divides the remaining landscape into land with good drainage (prime) and more questionable elevations, with the idea that sub-prime can be identified in between, within a half meter below prime.

Local elevation variation, rather than variation in elevation by region, is the critical variable for establishing farmable elevations. Although the basin in the micro-region has an extremely restricted range of elevations (81.5 – 91.5 m), there is an average rise in elevation as one travels upriver. I assume the areas in which Ottomány and Gyulavarsánd settlement occurred were permanently dry. This seems reasonable because visual inspection of their place in the landscape suggests they invariably chose the higher points in the landscape. I argue that the elevation at these settlements can be used as a guide to which areas in between them were habitable, and by definition, also high enough to be farmed.

This logic can be extended to create a model of the habitable and farmable landscape during the Bronze Age. The first step is to create an interpolated landscape of habitable elevations based on the *actual* elevations settled in prehistory. Values were created for points in the landscape (with no settlement) based on elevations from known settlements. Creating this artificial landscape overcomes the problem of the gentle rise in elevation as one travels upriver.

To create this landscape, I used Ottomány and Gyulavarsánd sites, and included additional settlements outside the micro-region to increase the reliability of the interpolated values inside of the micro-region. MRT polygons defining the site often cover multiple elevations. Lower elevations, however, might be disproportionately represented in an MRT site polygon because of an aggrading landscape. I therefore selected the highest elevations on which approximately 50% of the site lies. These elevations were obtained through visual inspection of site polygons over topographic contour lines and entered into the attribute table of a point shapefile. The interpolated raster landscape of habitability based on these values is presented in Figure 9.22. Although the landscape is illustrated in 1 metre increments here, the pixel values are actually in centimetres.

Next, I took a Digital Terrain Model (DTM) of the micro-region with 5 x 5 metre pixels, and overlaid it with the *habitable* landscape raster. The precision of the DTM elevation is also in centimetres. Where the elevation of a pixel in this DTM was greater than the value in the *habitable* landscape, a location high enough to settle was identified. This terrain is presented in Figure 9.23, and includes 7,661 hectares of habitable elevations[88]. From this area, the regions of high groundwater and solonetz had to be removed in order to isolate those areas that were habited and had prime farmland. The result is the landscape of prime land in Figure 9.24. In this landscape, there are 5,311 hectares of prime arable land. The utility of the land below the 'habitable' threshold is of questionable utility.

[88] The pixel resolution of this raster and those that follow is 25 by 25 m.

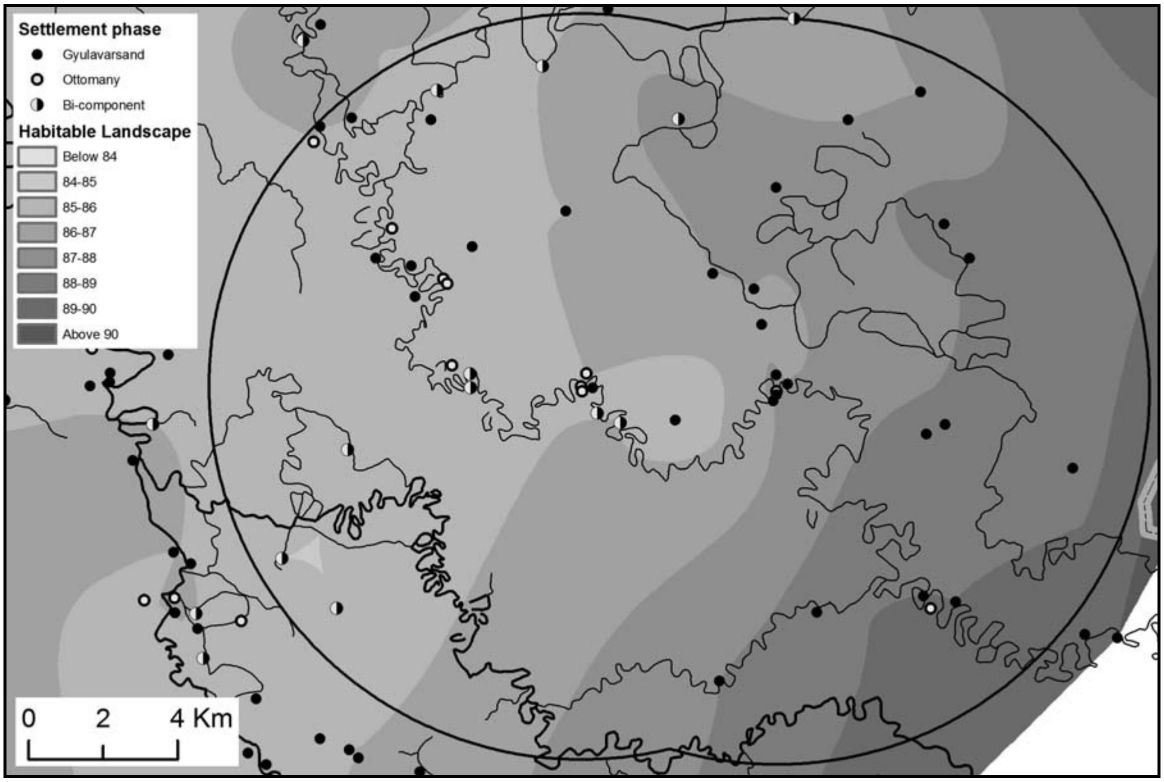

Figure 9.22. Habitable/farmable elevations specified by settlement elevation for both Ottomány and Gyulavarsánd combined. Pixel values are actually in centimetres.

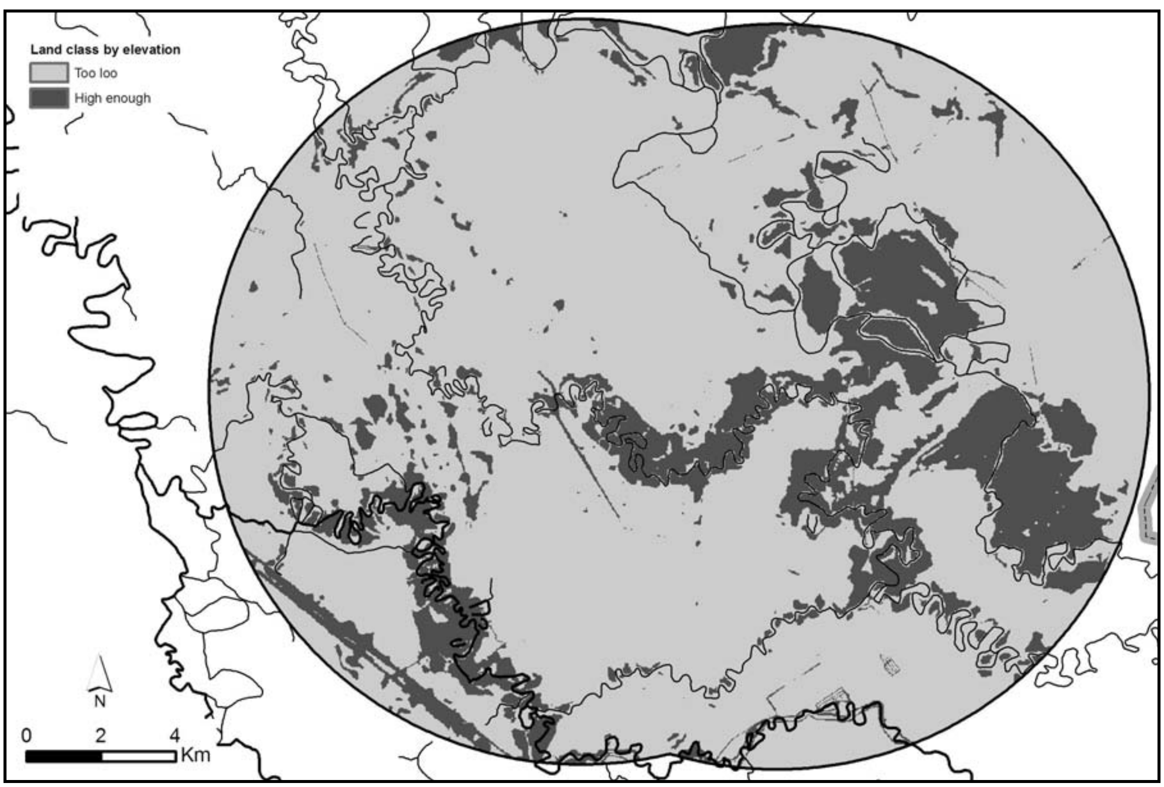

Figure 9.23. Land dry enough to be settled in the micro-region.

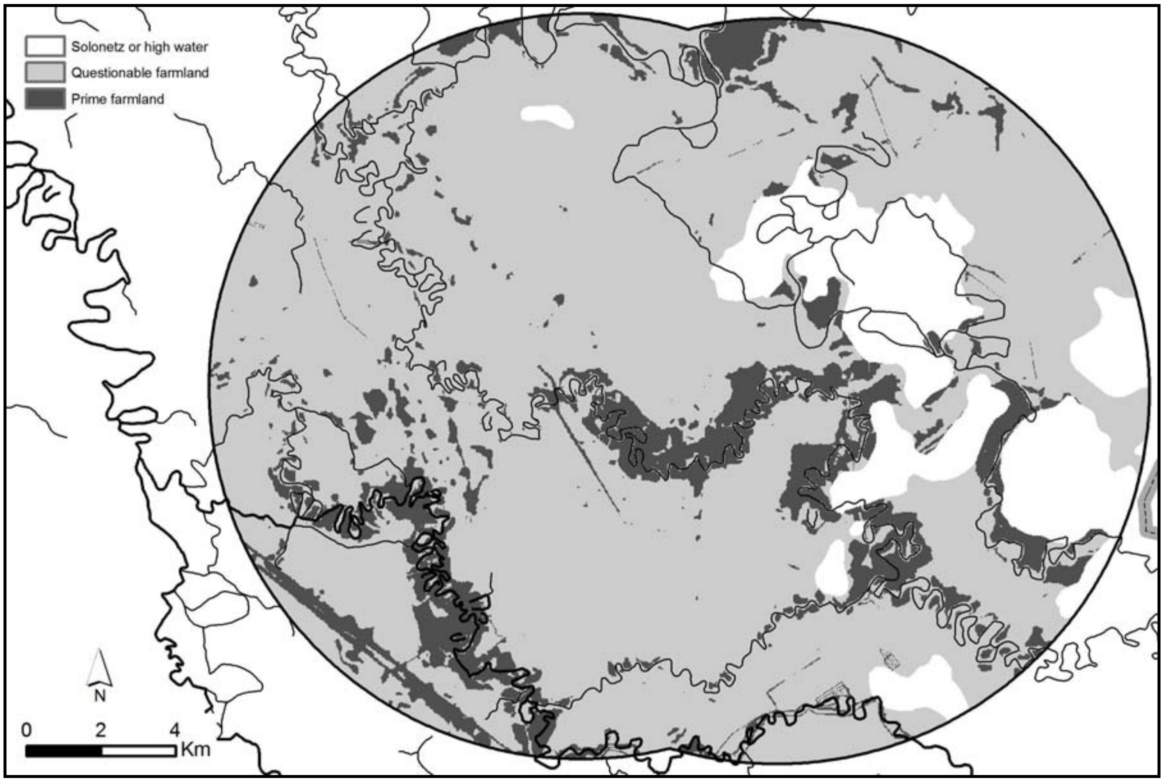

Figure 9.24. Land use possibilities in the micro-region.

According to the Ottomány demographic simulation, there would have been 737 people living in the micro-region at any given time during this phase of the Bronze Age. Estimates suggest that 800 kilograms of wheat per hectare is the lower end of the normal range of productivity from a garden plot (Chapter 6, 8.1). With calories from grain supplying 80% of the dietary requirement (and animal products, fruit and legumes supplying the rest), about 230 kilos of wheat are required to feed an average person for a year. Therefore, 169,510 kilos of wheat would be needed to feed the simulated population. It would take about 212 hectares of land to grow this much food in a single year under garden agriculture, compared to the 5311 hectares available. This is only four percent of the prime land calculated for the micro-region.

According to the Gyulavarsánd demographic simulation, 2,637 people would have been living in the micro-region at any given moment, and required 606,510 kilos of wheat per year. It would take 758 hectares of land to produce this much food in a worse than average (but non-catastrophic) year using garden agricultural techniques. This is only fourteen percent of the prime land available in the region[89].

Intensification of food production: summary

By any account, there was no need to intensify production to lower quality farmland in either the Ottomány or the Gyulavarsánd phase. There was no requirement at the regional level to use lower quality land or include plough agriculture to the cultivation strategy. We do not even need to calculate 'sub-prime' land because there was so much high quality land available. Whenever required in my population estimates, I have erred on the size of larger sites; when a site was probably half a hectare, I assumed it was a hectare. The figures generated for populations may there be twice the actual values of Bronze Age populations. I believe this is a strong rejection of the notion that there was any population pressure or resource scarcity driving local change in the Bronze Age Körös. If the Bronze Age was characterized by population growth and warfare, and I think it often was, it did not result in competition over land as Gordon Childe (1954) suggested long ago.

Livestock are often an important source of wealth as well as food in middle-range societies from the Old World, and they should not be neglected in considering intensification of landscape use. Inequalities in metal accumulation and display may have been matched in the Bronze Age by the accumulation of cattle or sheep and goats. This form of wealth storage is difficult to recognize archaeologically because intensify herding in an economy may simply mean adding more animals to the pastures. The preceding analysis was built on the fact that arable land would have been the limiting factor for settled farmers also raising animals. The results in this section therefore indicate that grazing land in the micro-region would have been more than abundant, even with sizeable herds.

Nonetheless, the data in this section do not indicate that Middle Bronze Age communities *did not* intensify production; it only indicates that, under the assumption of the model, they didn't have to. The arable land evidence at the regional scale, however,

[89] I point out here that there are high linear features in this landscape (the levees of the Kettős Körös in the southwest, and a road just west of Békés-Várdomb) that are modern and artificial. These do inflate the value obtained for farmland, but probably not beyond five or ten percent.

need not hold at the scale of particular sites. I next turn to this settlement scale. The next social dimension addresses the possibility that open settlements and fortified sites were in an unequal partnership involving the moving of food products from the former to the latter.

DIMENSION 8: REGIONAL CONSOLIDATION

Regional consolidation describes the political integration of multiple settlements to form a single political unit. This integration does not need to take the form of a regional hierarchy (e.g the Nuer), but when it does (e.g. Kamehameha's unification of the Hawaiian Islands), certain elements such as tributary relationships become critical to sustaining the operation and evolution of the social entity. The loss of village independence and the emergence of regional village hierarchies is what Kalervo Oberg (1955) defined as the 'politically organized chiefdom' many years ago. The presence of site size hierarchy, such as the one for the Gyulavarsánd described in a previous section, is for many archaeologists a marker of such regional political hierarchy. I use three different measures below to evaluate the possibility that regional political hierarchy characterized societies of the lower Körös basin, having reviewed the slim evidence for storage in Chapter 7. The third, settlement aggregation, is dealt with in Chapter 10.

Catchment productivity for fortified sites

Settlement sizes exceeding the productive capacities of their catchments often have subservient villages providing them food surplus (Brumfiel 1976; Steponaitis 1981). The possibility that fortified sites in the lower Körös basin received such food tribute was evaluated by visiting and reconstructing the catchment productivity of four sites in the MRT region. One site is in the micro-region, but the other three are found outside of it. I established their sizes through shovel testing (Chapter 8, Appendix E). This section evaluates their productive potential.

In Chapters 4 and 6, elevation was established as a critical variable for settlement and farming in the lower Körös basin. From the base of the Apuseni mountains in

Romania to the confluence of the Sebes and Kettős Körös (50 km east-west), there is only 20 m of vertical change. In any given location within this gradient, however, there is *local* variability, usually on the order of 3-5 m. The impact of this narrow range of local variability is documented by coring and palaeopedological studies at archaeological sites on the Great Hungarian Plain such as Tiszapüspöki-Karancspart (Sümegi 2004b). Local differences in elevation strongly influence the distribution of soils. The highest 2.5 m of this site were characterized by fertile organic chernozem soils, but below 86 m, there is a sharp increase in clay and carbonate content, with a sharp decrease in organics. This *locally determined* correspondence between elevation and soil characteristics had important consequences for which parts of the immediate landscape could be farmed[90].

All of these fortified sites have artificial elevation created by the gradual build up of living debris. These artificial topographic highs are usually small in area (less than 0.5 ha) and conspicuous against the narrow range of elevation in the kilometres surrounding it. This elevation must first be subtracted from our estimate of the local topographic high. The percentage of the site at different elevations is established by digitizing topographic contour lines, and clipping these lines with the population polygon obtained by shovel testing. I then determine the area of each polygon as a percentage of the whole.

For each site, I first determine a precise elevation range established by the polygon boundaries obtained from shovel testing and interpolation[91]. The procedure for establishing site size polygons is explained in Appendix E for the Tarhos 1 Cluster. My estimate for prime farmable elevation around a site is similar to the previous section, but more explicit about the specific elevation range of individual settlements. The model assumes only the highest natural elevation of settlement could be farmed, and that material found below this elevation is potentially ploughed out or peripheral to the core. For example, if 60% of a site falls above 86 m, farmland at this elevation is assumed to be the highest quality and most reliable. Although slightly lower local elevations may have also been high quality, my error in estimating the quantity of prime farmland will

[90] This correspondence could certainly be demonstrated statistically using high resolution (1:5,000) soil maps overlaid with a digital terrain model at a number of sites. Unfortunately, no such detailed soil maps were available at the time of the study.
[91] The elevation dataset here was created by digitizing topographic lines from 1:10,000 scale topographic maps.

favour the proposition that population exceeds productive catchment. I therefore tentatively call land below the prime threshold 'questionable.'

As there is currently no direct evidence for plough agriculture, or its relative importance in Middle Bronze Age agricultural regimes, I model both an intensive gardening strategy and the addition of extensive plough cultivation (Chapter 6, 8.1). I am again concerned with how many people the catchment could support in the lower range of normal productive output. Intensive gardening is the more productive of the two strategies, feeding 3.48 people per hectare in a poor year, while extensive plough based agriculture feeds 1.12 people on the same quality of land. Nonetheless, because there is lower labour investment and no use of manure, people will travel further from the village for plough agriculture.

In Chapter 6, I indicated that intensive gardening usually takes place within 500 m of the house. Here I model intensive gardening using a 500 m estimate *and* a 750 m estimate in the event that Bronze Age gardeners were willing to walk a little further to manure their wheat patch. The 500 m catchment is the primary focus in the text, although I refer to the 750 m catchment for borderline cases. Each site has two catchments defined, one at 500 m or 750 m for intensive gardening, and one at 4 km for extensive cultivation. Catchment boundaries are produced using buffers around the site polygon identified through shovel testing. Modelling both strategies allows the recognition of whether *in principle*, ard agriculture, and therefore intensification, would have been required at the local level. In considering the extended catchment, additional sites in the area sharing that catchment must also be considered. If it becomes clear that even plough agriculture, *in addition to* garden cultivation could not supply the resources for the entire village, the possibility that the fortified settlement obtained food tribute from neighbouring villages must be seriously considered.

Vésztő 65 - Vadas

In the MRT description, the Nyírség phase 'tell' of Vésztő 65 is estimated to rise up to 1.5 m, but the artificial maximum probably doesn't extend past an area some 50 by 25 m. The estimated population in this area is only 29 people (Table 9.17). The small area outside of the fortification ditch, Vésztő 64, could have been occupied simultaneously. Together, the population is 76.

SiteID	Size (ha)	Fortified	Multiplier	Population Estimate
Inside fortification (Vésztő 65)	0.13	*	220	29
Outside (Vésztő 64)	1.19		40	48
Total	**1.32**			**76**

Table 9.17. Population estimate for Vésztő 65 cluster.

Input variable	Elevation	Area	Percentage
Highest elevation	86.5	0.12	4.7
Second highest elevation	86	1.08	41.8
Third highest elevation	85.5	0.50	19.4
Fourth	85	0.33	12.8
Fifth	84.5	0.55	21.4
TOTAL		2.57	100.2

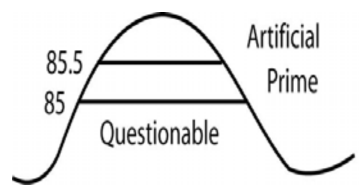

Table 9.18. Elevation range at Vésztő 65.

The elevation percentages of Vésztő 65 are presented in Table 9.18. The tell itself is probably about 1.5 m of deposit. This elevation range (85.5 - 86.7 m) of the site is therefore artificial (65%). The elevation initially settled was probably between 85 and 85.5, which currently makes up only 12.8 % of the inhabited area. The remainder, under 85 m, makes up 20% of the total area calculated for the site polygon. The remainder is possibly error due to settled area interpolation at the edge. This idea receives support from the interpolation of the Vésztő 64 polygon further away from the meander, found entirely between the elevations of 85 and 85.5 m. This means that elevation above 85 m is the highest quality farmland calculated for the 500 m and 4 km catchments.

The two catchments of Vésztő 65 are illustrated in Figure 9.25. The availability and productive capacity of land above 85 m is presented in Table 9.19. For the gross area of intensive garden agriculture (*Gross I*), the built environment (estimated at 30%) is subtracted, leaving us with a number of hectares (*Net I*) to serve as a multiplier for the number of people intensive farming could support (3.48 people/hectare). The same procedure is then run for extensive plough agriculture (*Gross E*), where the catchment of Intensive agriculture (*Gross I*) is subtracted, and the resulting number is multiplied by the number of people the catchment could support (1.12 people/hectare). The sum of these two techniques is listed at the bottom, providing combined productive ability under this scenario.

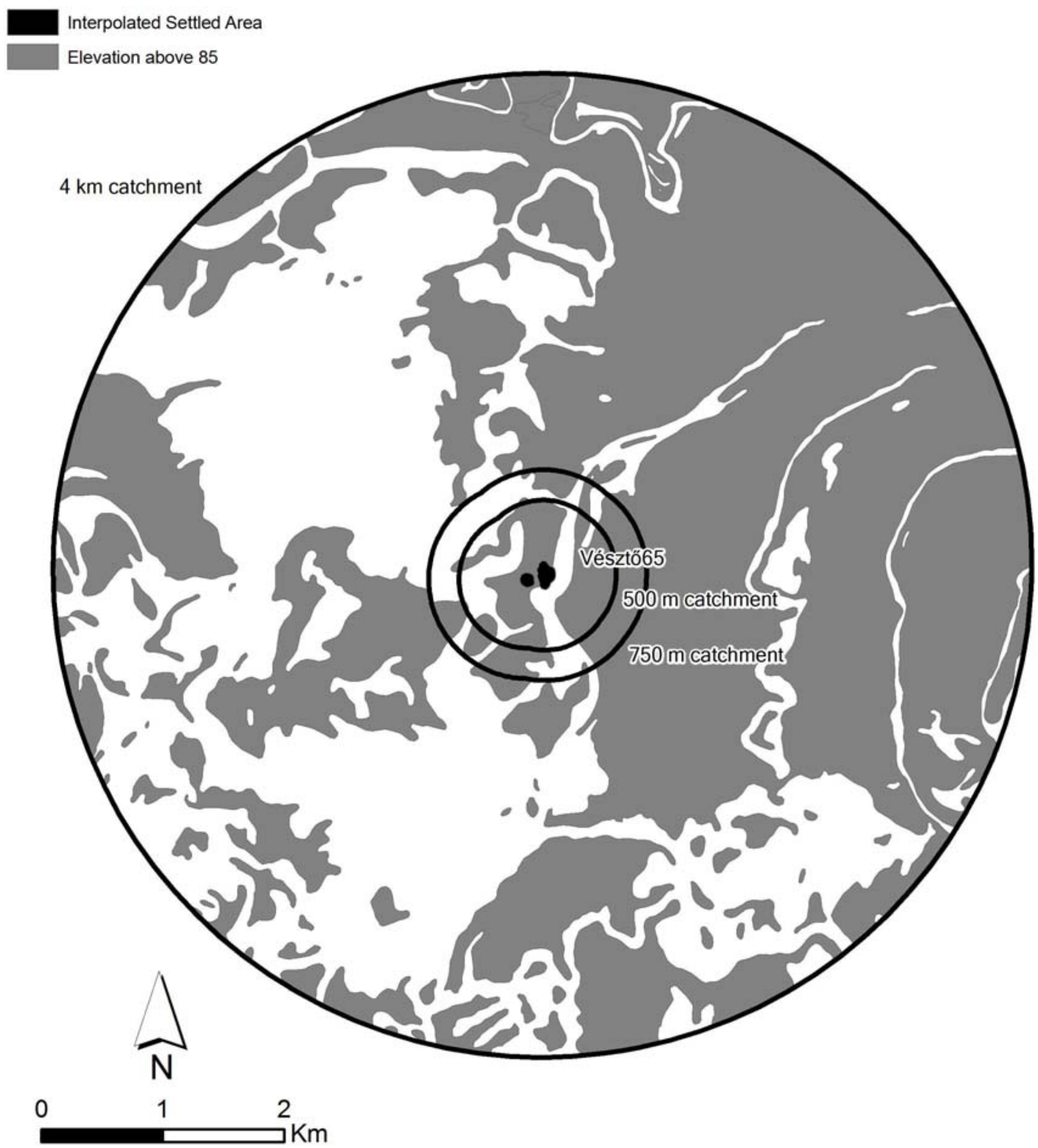

Figure 9.25. Catchment areas for Vésztő 65. No Nyírség sites are in the vicinity.

	Strategy	*Land use*	Above 85
500 m Garden Catchment	INTENSIVE GARDEN	*Gross I* ha (within 500m)	77.3
		Built and open environment within 500 m	3.8
		Net I ha (within 500m)	73.5
		Max people fed per year (*Net I* ha*3.48)	**256**
	EXTENSIVE PLOUGH	*Gross E* ha (within 4 km)	2946.0
		Net E ha (*Gross E* - *Gross I*)	2868.7
		Max people fed per year (*Net E* ha*1.12)	**3213**
	POPULATION SUSTAINABLE		**3469**
750 m Garden Catchment	INTENSIVE GARDEN	Gross I ha (within 750m)	142.4
		Built and open environment within 750 m (30%)	1.1
		Net I ha (within 750m)	141.3
		Max people fed per year (Net I ha*3.48)	**492**
	EXTENSIVE PLOUGH	Gross E ha (within 4 km)	2946.0
		Net E ha (Gross E - Gross I)	2803.6
		Max people fed per year (Net E ha*1.12)	**3140**
	POPULATION SUSTAINABLE		**3632**

Table 9.19. Sustainable population for Vésztő 65.

Within 500 m there are 77.3 ha, and since one site is fortified and the other small, I subtract the area of both of them to get the net hectrage. There are 2946 ha of land above 85 m within a 4 km area. Therefore, the range of Vésztő 65's catchment could produce enough food for 256 people using only intensive gardening, but enough for up to 3469 people if extensive agriculture were added. The estimated population is 76, suggesting that the settlers of Vésztő 65 could have easily sustained themselves using only intensive gardening techniques within the 500 m catchment.

Dévaványa 66 – Tó-kert

The tell component to Tó-kert is approximated at 1.5 m over a 150 m by 50 m area. Without a clear sense of how the ditch might divide the site, the most conservative population estimate takes the total site size (11.45 ha), assigns 0.75 ha to a tell multiplier and the remainder to an open settlement multiplier (Table 9.20). The resulting population estimate is 287 people.

SiteID	Size (ha)	Fortified	Multiplier	Population Estimate
'Tell' area	0.75	*	220	165
Outside 'tell' area	10.7		Ha/3.5*40	122
Total	11.45			**287**

Table 9.20. Population estimate for Dévaványa 66.

The tell component is essentially the highest part of the site from 86.5-88 m. When the settlement was founded, it was likely at the 86 m level, and 65 % of the site now falls above 86 m (Table 9.21). Most of the remainder falls between 85.5 and 86 m – whatever lies below might be interpolation error. The threshold for the highest quality land is therefore 86 m.

Input variables:	Elevation	Area	Percentage
Highest elevation	88	0.0529	0.5
Second highest elevation	87.5	0.1999	1.7
Third highest elevation	87	0.8115	7.1
Fourth	86.5	1.8486	16.1
Fifth	86	4.597	40.0
Total calculated (86 and above)		*7.5099*	*65.3*
Remainder	Below 86	3.9861	34.7
Total		11.496	100.0

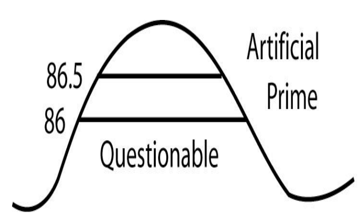

Table 9.21. Elevation range at Dévaványa 66.

The 500 m, 750 m and 4 km catchments for Dévaványa 66 are illustrated in Figure 9.26. Because the site lies on the western edge of a Pleistocene meander, very little of the 500 m or 750 m catchments include land above 86 m (Table 9.22). Therefore, unless the population estimate is twice as high as it should be, extensive plough agriculture was required in the larger catchment area. Only a small fraction of the best land in the 4 km catchment would be needed to be farmed with extensive techniques. It is also possible, however, that people took their chances with land a little lower in elevation.

	Strategy	***Land use***	**Above 86 m**
500 m Garden Catchment	INTENSIVE GARDEN	*Gross I* ha (within 500m)	32.6
		Outside 'tell area' built environment (30%)	3.2
		Net I ha (within 500m)	29.3
		Max people fed per year (*Net I* ha*3.48)	**102**
	EXTENSIVE PLOUGH	*Gross E* ha (within 4 km)	554.5
		Net E ha (*Gross E* - *Gross I*)	522.0
		Max people fed per (*Net E* ha*1.12)	**585**
	POPULATION SUSTAINABLE		**687**
750 m Garden Catchment	INTENSIVE GARDEN	Gross I ha (within 750m)	61.2
		Built and open environment within 750 m (30%)	4.3
		Net I ha (within 750m)	56.9
		Max people fed per year (Net I ha*3.48)	**198**
	EXTENSIVE PLOUGH	Gross E ha (within 4 km)	681.4
		Net E ha (Gross E - Gross I)	620.2
		Max people fed per (Net E ha*1.12)	**695**
	POPULATION SUSTAINABLE		**893**

Table 9.22. Sustainable population for Dévaványa 66.

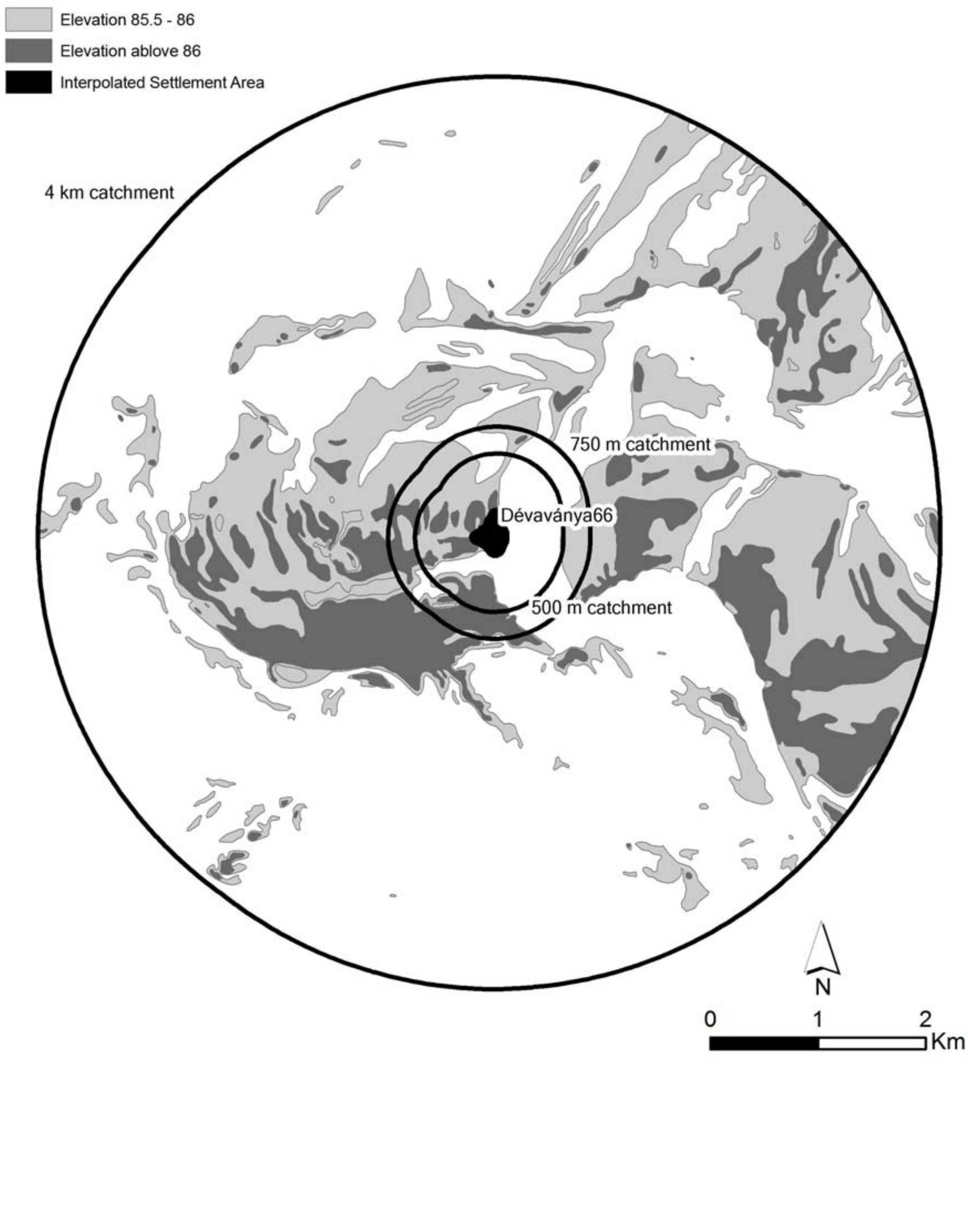

Figure 9.26. Catchment areas for Dévaványa 66. No Ottomány or Gyulavarsánd sites are in the vicinity.

Füzesgyarmat 77 – Szőke tanya

Based on the survey map provided in the MRT, the fortified area of the site is about 0.48 ha. If this area is considered occupied at the usual tell density, and the remainder of the site polygon is afforded the open settlement multiplier, 226 people lived at this settlement at any given time (Table 9.23). If anything, this population estimate is probably high given there is an Ottomány and a Gyulavarsánd component.

SiteID	Size (ha)	Fortified	Multiplier	Population Estimate
Inside fortification	0.48	*	220	106
Outside	10.53		Ha/3.5*40	120
Total	**11.01**			**226**

Table 9.23. Population estimate for Füzesgyarmat 77.

Input variables:	Elevation	Area	Percentage
Highest elevation	89.5	0.4	3.6
Second highest elevation	89	1.37	11.9
Third highest elevation	88.5	2.36	20.5
Fourth	88	3.05	26.5
Fifth	87.5	2.19	19.1
Total calculated		9.37	81.5
Remainder	Below 87.5	1.64	14.3
Total		11.01	100.0

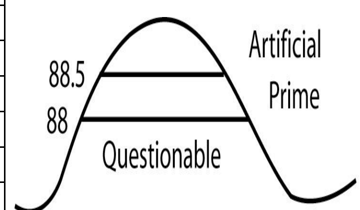

Table 9.24. Elevation range at Füzesgyarmat 77.

If we assume that the 1.5 m rise in elevation described as 'tell deposit' is restricted to the upper range of the elevation spectrum (88-89.5+), this means that 88 m was the highest base elevation at the time. This settlement elevation accounts for 62.6% of the site polygon (Table 9.24).

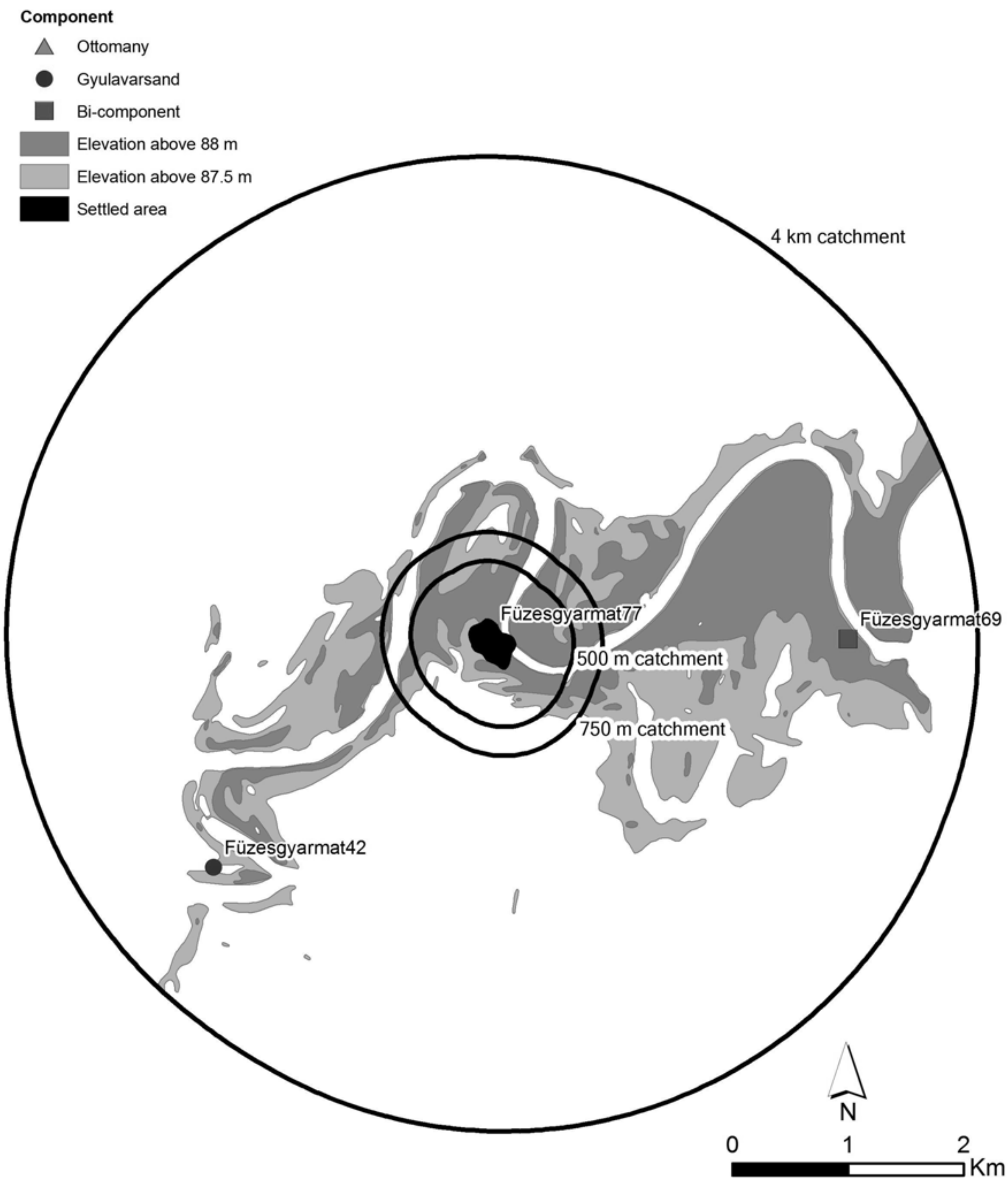

Figure 9.27. Catchment areas for Füzesgyarmat 77. Ottomány and Gyulavarsánd sites in vicinity are shown.

The catchments are presented in Figures 9.27. The 500 m catchment available yields only 79.6 ha, enough land to produce food for 277 people in a poor year (Table 9.25). The extensive catchment for plough based agriculture adds another 517 ha at this elevation, in total yielding enough for 763 people.

	Strategy	***Land use***	**Above 88**
500 m Garden Catchment	INTENSIVE GARDEN	Gross I ha (within 500m)	83.2
		Built and open environment within 500 m (30%)	3.6
		Net I ha (within 500m)	79.6
		Max people fed per year (Net I ha*3.48)	**277**
	EXTENSIVE PLOUGH	Gross E ha (within 4 km)	517.1
		Net E ha (Gross E - Gross I)	433.9
		Max people fed per (Net E ha*1.12)	**486**
	POPULATION SUSTAINABLE		**763**
750 m Garden Catchment	INTENSIVE GARDEN	Gross I ha (within 750m)	121.6
		Built and open environment within 750 m (30%)	3.6
		Net I ha (within 500m)	118.0
		Max people fed per year (Net I ha*3.48)	**411**
	EXTENSIVE PLOUGH	Gross E ha (within 4 km)	517.1
		Net E ha (Gross E - Gross I)	395.5
		Max people fed per (Net E ha*1.12)	**443**
	POPULATION SUSTAINABLE		**853**

Table 9.25. Sustainable population for Füzesgyarmat 77.

There is an additional site in the 10 km catchment that should be considered: Füzesgyarmat 69 (Figure 9.27). The site is registered by the Hungarians as a fortified tell and was briefly visited during fieldwork but not collected. It also has Gyulavarsánd material, so may or may not be perfectly contemporary. If we follow the rules afforded to other site estimates in the MRT region, the site is 23 hectares in size, but it is probably closer to the size interpolated for Füzesgyarmat 77. If we therefore double the population for the catchment calculated here, there would have been still enough productive land to sustain the population at both sites, even if it meant some plough agriculture or walking a little bit further to your field.

Tarhos 1 Fortified Cluster

The population estimates for the Tarhos 1 Cluster were discussed above under 'Segmentation.' but are reproduced here. The sum of these figures comes to 507 for simultaneous occupation (Table 9.26).

SiteID	**Size (ha)**	**Fortified**	**Multiplier**	**Population estimate**
Tarhos1	0.27	*	220	59
Tarhos72	2.01	*	110	221
Tarhos2	17.56		Ha/3.5*40	201
Tarhos19	2.23		Ha/3.5*40	25
Total	**22.07**			**507**

Table 9.26. Population estimate for Tarhos 1 Cluster.

The interpolated area for Tarhos 2 is the largest continuous area of archaeological site and the elevations included in its polygon probably suffer from the least amount of error because of its size; I use it to calculate the percentages of elevations occupied. This polygon is 17.56 ha, and its intersection with the highest elevation – 86 m – accounts for 70.6 % of it (Table 9.27). Another 15.1% falls between 85.5 and 86 m and 14.3% falls between 85 and 86[92].

[92] The area of the 1.5 meter of artificial strata of the 'Northern village' is quite small and does not figure on the topographic maps.

Input variables:	Elevation	Area	Percentage
Highest elevation	86	12.4	70.6
Second highest elevation	85.5	2.65	15.1
Third highest elevation	85	2.51	14.3
Site polygon total	85-86	17.56	100.0

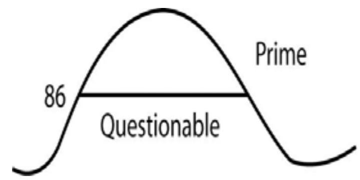

Table 9.27. Elevation range at Tarhos 1 Cluster. Only Tarhos 2 was used to calculate percentages.

The two catchments for the Tarhos 1 Cluster are illustrated in Figure 10.4. Within 500 meters of the settlement, there are 62.7 ha of land above 86 m (Table 9.28). The productive potential of this area and even the 750 m catchment falls short of the population estimate by a significant margin. To feed the village, plough agriculture would have been required.

	Strategy	*Land use*	**Above 86**
500 m Garden Catchment	INTENSIVE GARDEN	Gross I ha (within 500m)	62.7
		Built and open environment within 500 m (30%)	6.6
		Net I ha (within 500m)	56.1
		Max people fed per year (Net I ha*3.48)	**195**
	EXTENSIVE PLOUGH	Gross E ha (within 4 km)	681.4
		Net E ha (Gross E - Gross I)	618.7
		Max people fed per (Net E ha*1.12)	**693**
	POPULATION SUSTAINABLE		**888**
750 m Garden Catchment	INTENSIVE GARDEN	Gross I ha (within 750m)	89.4
		Built and open environment within 750 m (30%)	6.6
		Net I ha (within 750m)	82.8
		Max people fed per year (Net I ha*3.48)	**288**
	EXTENSIVE PLOUGH	Gross E ha (within 4 km)	681.4
		Net E ha (Gross E - Gross I)	592.0
		Max people fed per (Net E ha*1.12)	663
	POPULATION SUSTAINABLE		**951**

Table 9.28. Sustainable population for Tarhos 1 Cluster.

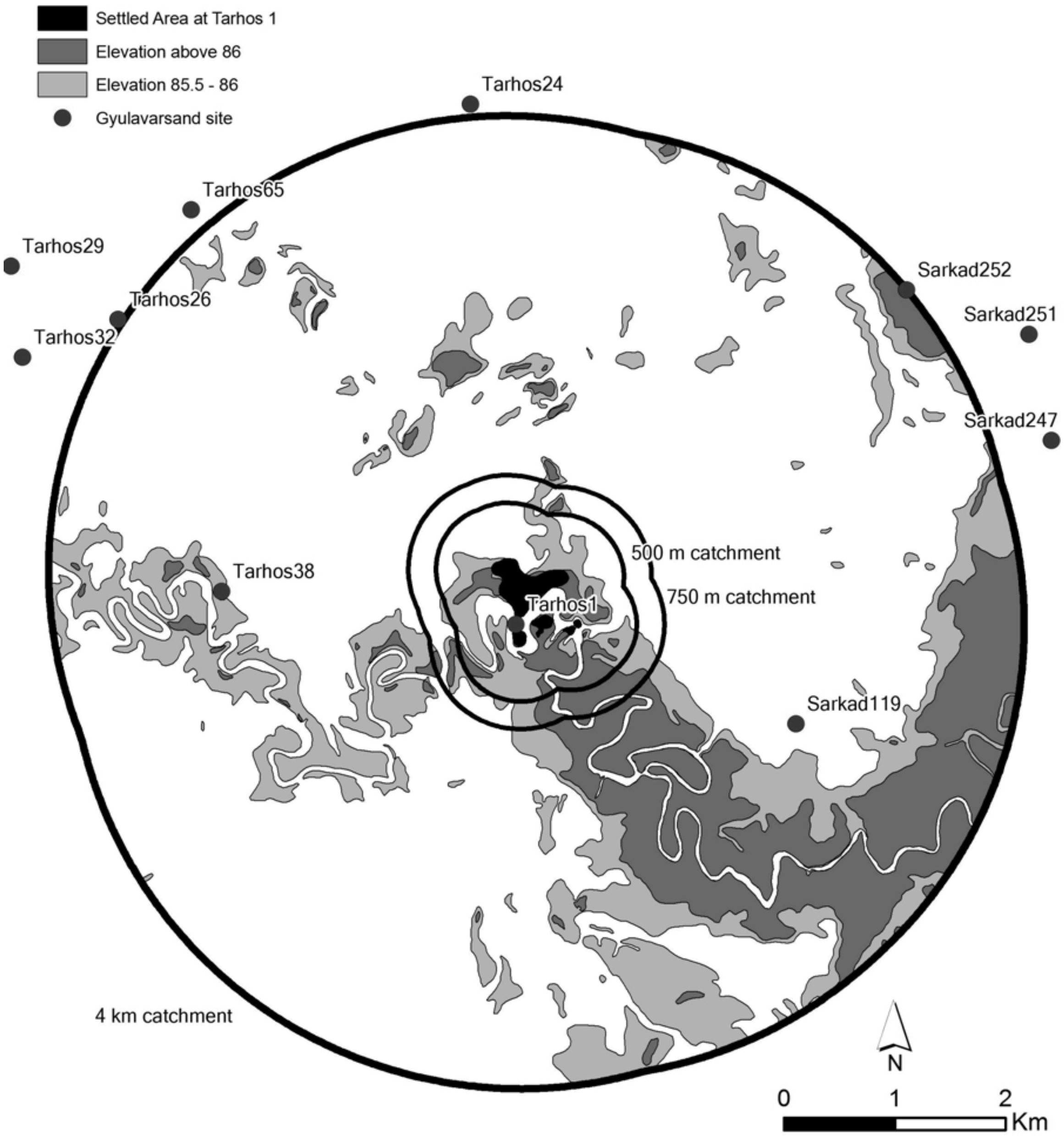

Figure 9.28. Catchment areas for Tarhos 1 Cluster. Gyulavarsánd sites in immediate vicinity are shown.

Unlike in the three previous cases, however, the density of sites close by to the Tarhos 1 Cluster's 4 km catchment forces a re-scaling and re-evaluation of the population needs. Although the small sites just outside the catchment can be ignored, the proximity of the Sarkad 8 Cluster 5 km to the east must be considered (Figure 9.28).

All Gyulavarsánd sites in a combined 4 km catchment for Tarhos 1 and Sarkad 8 are illustrated in Figure 9.29. We do not know whether or not they were exactly contemporary with the fortified clusters. Their estimated populations are listed in Table 9.29.

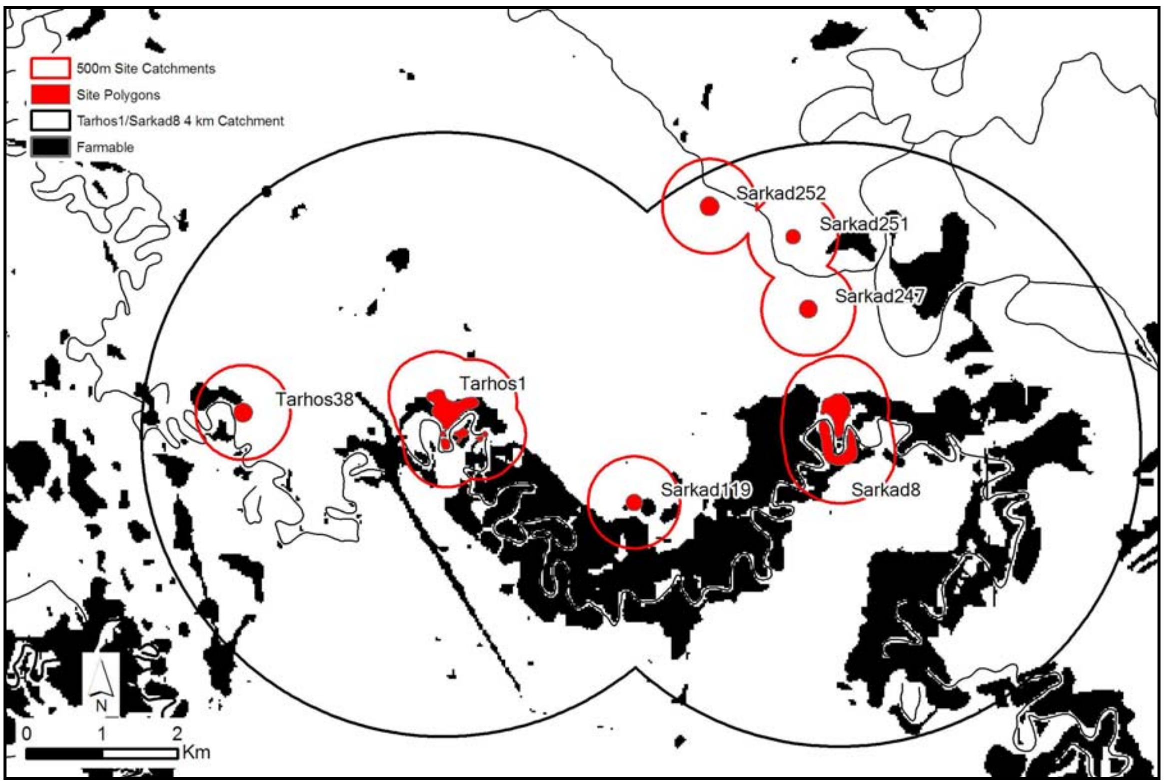

Figure 9.29. Tarhos 1 and Sarkad 8 clusters, sites in their catchment, overlaid with prime farmable land identified regionally.

SiteID	Fortified	Estimated Size	Estimate Type	Population Estimate
Sarkad119		3.76	R	43
Sarkad247		4.45	R	51
Sarkad251		3.00	R	34
Sarkad252		5.00	R	57
Tarhos38		5.00	R	57
Tarhos1	*	22.07	FW	507
Sarkad8	*	25.79	FW	423
TOTAL				**1172**

Table 9.29. Population estimates for sites within the Tarhos 1/ Sarkad 8 4 km catchment. R=rule-based and FW=Fieldwork based size estimate.

The population estimate for this 4 km catchment area of both the Tarhos1 Cluster and the Sarkad 8 Cluster, is 1172 people. Does this area have enough farmland to support the estimated population?

Answering this question requires calculating garden plots and extensive farming estimates for all sites within this area, even some I haven't visited. Since the multi-component MRT site polygons are often so misleading, I use the size estimates in Table 9.30 to create idealized sites, circles based on the X/Y coordinates of their centroid[93]. For the Tarhos 1 Cluster I use the same buffer as above and for the Sarkad 8 cluster I use the minimal site size of Sarkad 88 and the MRT polygon for Sarkad 7 as the best approximation to capture the geometry of the occupied elevation (see Appendix E). All of these site polygons, and their 500 m intensive gardening catchments, are shown in Figure 9.29.

[93] Radius is calculated using the area of a circle formula ($r = \sqrt{A / \pi}$), and the Create buffer tool in ArcGIS. Using circles rather than the MRT polygon restricts the intensive gardening catchment, and is the more conservative approach.

	Strategy	Summary land use within 4 km buffer	'Prime Land'
500 m Garden Catchment	INTENSIVE GARDEN	Gross I ha (within 500m)	222.4
		Built and open environment within 500 m (30% of 71.84 ha)	23.4
		Net I ha (within 500m)	199.0
		Max people fed per year (Net I ha*3.48)	**692**
	EXTENSIVE PLOUGH	Gross E ha (within 4 km)	1581.0
		Net E ha (Gross E - Gross I)	1358.6
		Max people fed per (Net E ha*1.12)	**1522**
	POPULATION SUSTAINABLE		**2214**
750 Garden Catchment	INTENSIVE GARDEN	Gross I ha (within 750m)	366.3
		Built and open environment within 750 m (30% of 71.84 ha)	23.4
		Net I ha (within 750m)	342.9
		Max people fed per year (Net I ha*3.48)	**1193**
	EXTENSIVE PLOUGH	Gross E ha (within 4 km)	1581.0
		Net E ha (Gross E - Gross I)	1214.7
		Max people fed per (Net E ha*1.12)	**1360**
	POPULATION SUSTAINABLE		**2554**

Table 9.30. Sustainable population for the combined Tarhos 1 / Sarkad 8 cluster catchment areas.

The sum of all site area is 71.84 ha, and when the estimated settled area is extracted from the 'farmable' land, there are 199 ha left, enough to feed 692 people with produce from garden agriculture. This is clearly deficient for the 1172 people. Therefore, unless people were able to garden at lower elevations than I estimate, or people walked up to 750 m to garden, there is no doubt that plough agriculture was required in this area.

Catchment productivity at the fortified sites: summary

In this section I offered a model for food production using intensive and extensive farming practices. If both were employed, the highest areas were more than likely kept as gardening agricultural plots, while plough agriculture made use of lower elevations if required. These data indicate that given the population estimates and the available land for farming, no fortified sites had populations so large that they would have required the surplus of other villages. Despite this fact, there is a higher than average concentration of people in the environs of the Tarhos 1 and Sarkad 8 slusters requiring us to zoom out in scale and to calculate productivity and population for larger units. Even at this scale, however, the productive abilities of the settlement seem to be well within their ability supply enough arable land for the inhabitants.

There is therefore no obvious dependency between fortified sites and settlements nearby. No tributary economy would be required to keep the largest villages running and therefore every village was in principle as autonomous as any other. It is interesting nonetheless that some plough agriculture was required to sustain the largest villages and densest areas of settlement. In previous syntheses this has been correlated with hierarchies and the unequal distribution of land. After reviewing the data for the final two measures of regional consolidation, I suggest an alternative.

Dietary variability between settlements

Between 2006 and 2008, the fauna from the unpublished excavations at the Sarkad 8 tell (Sarkad-Peckesi-domb) and the Tarhos 26 excavations were analyzed by Amy Nicodemus. The specific goal of the analysis was to isolate different food production strategies or patterns of consumption outlined in Chapter 6. If Tarhos 26 was in an asymmetrical partnership with a fortified site, it would probably be the Tarhos 1 Cluster however, not Sarkad 8 (Figure 9.30). The analysis is therefore a comparison of sites of different *types*, rather than sites of a *particular* relationship. Full details of this analysis are found in Nicodemus (n.d.-c).

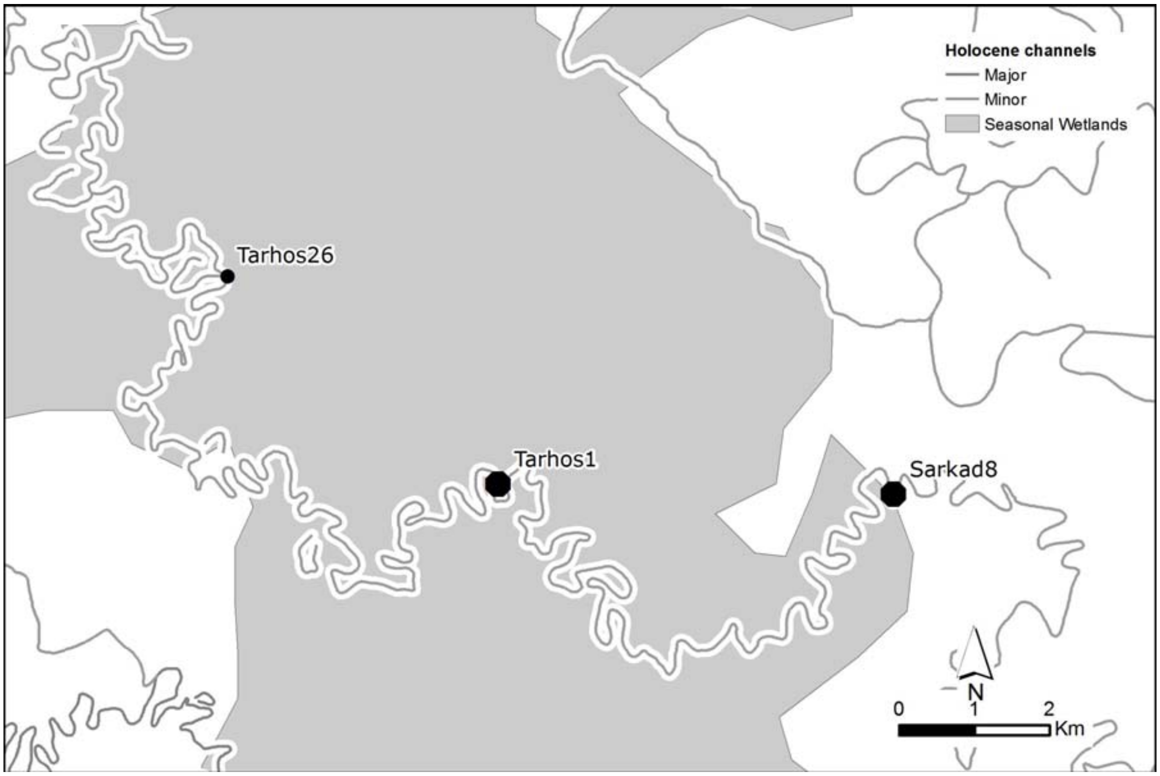

Figure 9.30. Location of Sarkad 8, Tarhos 26 and Tarhos 1.

The analyzed assemblage from Tarhos 26 included 7580 specimens from inside and outside the structure, the pits, and general fill layers. The assemblage from Sarkad 8 included 4398 faunal specimens from similar contexts. Hand tools were used for both excavations, but screening and careful recovery of faunal materials during hand excavation at Tarhos 26 greatly influenced recovery rates. Disproportionate loss of smaller bones – and, consequently, smaller taxa – contribute to difficulties in comparison, but novel methods were employed to answer the basic questions while avoiding the problems created by differential recovery rates.

The largest immediate difference between the two assemblages is the high percentage of molluscs at Tarhos 26. While these were most likely deposited by people rather than alluviation, it is unclear whether they were actually eaten or result from some other purpose or process (such as flux in metallurgical production or attachment to fishing nets). Consequently, invertebrates are removed in Figure 9.31. The revised *N* is 2880 for Tarhos 26 and 4263 for Sarkad 8. Certain differences do emerge, notably in wild animal use, ovicaprid and pig. Although fish and bird appear to differ strongly between the sites, more than likely this results from recovery methods.

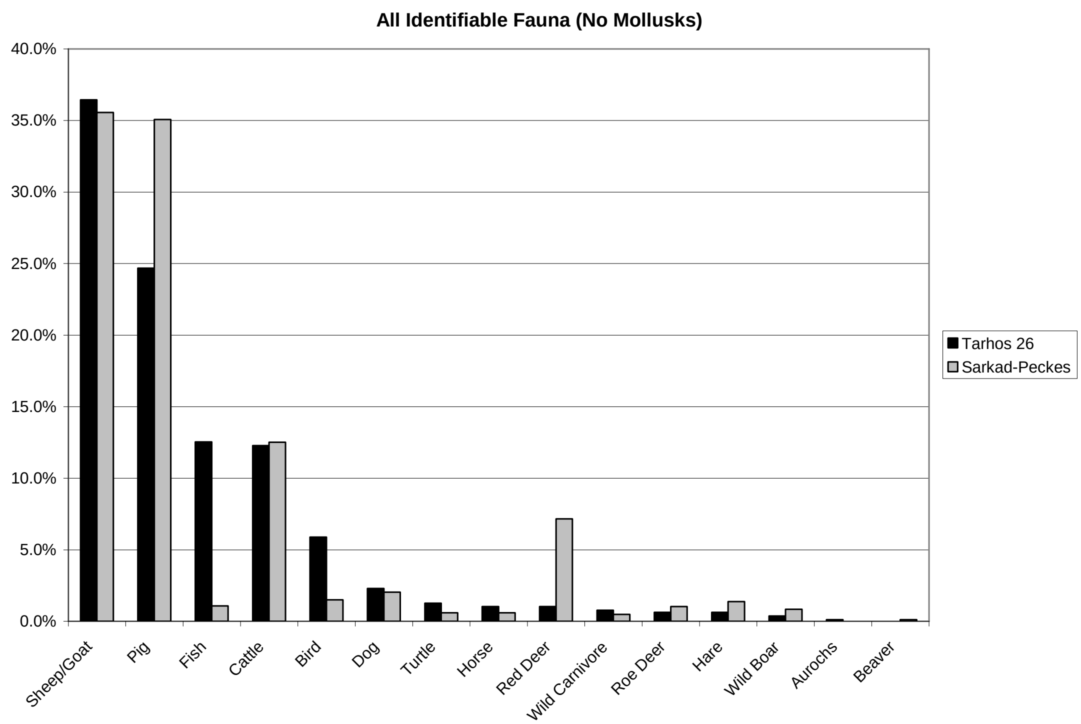

Figure 9.31. All identifiable vertebrates at Sarkad 8 and Tarhos 26 (from Nicodemus, n.d.-c).

Nicodemus (n.d.-c) finds that when sample size and recovery bias are taken into account, there are few differences between Sarkad 8 and Tarhos 26. Red deer hunting occurred more at Sarkad than at Tarhos. Cattle are found in equal amounts at both sites, although they may have been consuming younger cattle at Sarkad 8. Ovicaprids dominate over pig in domesticates at Tarhos, while they are found in equal proportions at Sarkad. These differences may indicate distinctions in status, but might also simply suggest slightly different food productive strategies, cultural choices at the village level, or even sampling error.

Body part representation also indicates basic similarities. The presence or absence of different elements is primarily related to patterns of butchering and consumption. These, in turn, often relate to differential access to higher quality meat cuts. Nicodemus's (n.d.-c) analysis indicates that for both sites, the first identifiable pattern is that animal butchering took place away from the central occupation area, and consumption in or near the houses. Size mediated collection bias strongly impacts the comparison between these sites, because the body parts of smaller livestock are disproportionately lost. A different measure was used to compare these sites – the proportion of upper limb to lower limb. Lower limbs have much less meat on them but are almost as large as upper limbs (Figure 9.32).

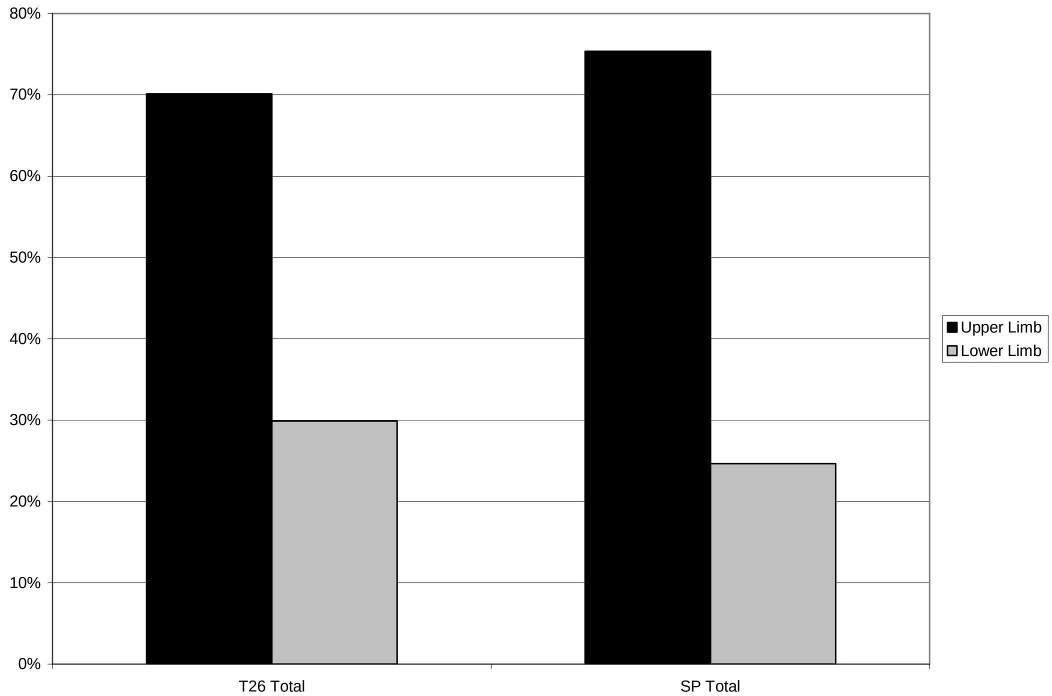

Figure 9.32. Comparison of upper and lower limb proportions at Sarkad 8 and Tarhos 26 (from Nicodemus, n.d.-c).

It is clear from this figure that there is no difference in meat cut access between these sites. Although the sample sizes are small, the analysis of mortality profiles similarly suggests that animals did not move from open settlements to the fortified center.

CONCLUSION: THE MIDDLE BRONZE AGE IN THE MICRO-REGION

The only excavation data away from the fortified site clusters come from one Middle Bronze Age site excavated during my fieldwork. The sample is small, but the new information concerning the household here is instructive. The signature identified there is very much like the one observed at the fortified sites. Houses are small, around 50 m^2, with internal storage and food preparation. Besides small differences in house construction attributable to structural concerns, the primary difference between open settlements and fortified sites is size. Large populations living in close proximity at the enclosed tells might have required closer kinship affiliations, such as decent groups, and there may have been corporate ownership over the fortified enclosure. No other local resource of worth outside of closer farmlands is identifiable in the data evaluated so far, given the availability of land at the regional level. A minimalist interpretation of the kinship structure at hamlets such as Tarhos 26 might conclude there is no evidence for segmentation at all, and that these anarchical residential clusters were so autonomous, they had little loyalty to group beyond the household.

Sample sizes for evidence of craft production and exotics are likewise small. They nonetheless suggest social organization and processes never observed in the research area and are worthy of consideration. Surface collection and excavation indicate that the consumption of finished products of both exotic chipped stone and finished bronze occurred not only at the fortified clusters, but also the open settlements (Table 9.31).

		Lithics		**Metals**	
	No. sites	% Producers	Open and fortified site consumption	% Producers	Open and fortified site consumption
Ottomány	4	50	*	50	*
Gyulavarsánd	5	?	*	80	?

Table 9.31. Summary statement for qualities of craft production observed in the surface collection of the micro-region.

In the Ottomány phase, half of the settlements have evidence of exotic chipped stone tool use, and half of the sites were producing metals – Békés 178 being the only example that has both. By contrast, in the Gyulavarsánd phase, almost everyone produced metal. There is a sharp drop in both the evidence for production and consumption of lithics at this time. Tarhos 26 probably has greater longevity than the other Ottomány sites, and the radiocarbon data indicate it extended through the Transitional Phase. It is perhaps unsurprising, then, that it has the most evidence for metal production, and trial and error in techniques, occurring during a long phase of occupation.

The evidence for craft production at the scale of the lower Körös basin (Chapter 7) indicates that most metal production and consumption may have been in the micro-region investigated here and further south on the Fehér Körös. At a higher resolution, the micro-region suggests regional decentralization, low intensity, part-time, independent production. The number of sites in the surface collection sample is not large enough for strong conclusions, but I suspect that over the course of the Middle Bronze Age, bronze production became more common at all kinds of sites, rather than increasingly restricted to a few fortified centers. The decreasing signs of stone tool manufacture indicate that over a few hundred years, bronze may have become the technological choice *par excellence*, not only for symbolic display by the rich, but for unspecialized fishing in the countryside by rural farmers.

The second trend that becomes clear from an analysis of the survey data in the micro-region is that the populations may have tripled or quadrupled in size, perhaps in a relatively short amount of time. Figures 9.33 and 9.34 offer a basis for comparison. Site distribution by population is overlaid with the highest quality farmland and areas of wetland and solonetz.

In the Ottomány phase, about 50% of this population is taken up in the environs of fortified 'tell' sites, but in the Gyulavarsánd this falls to about 20%. Based on spatial segmentation of these populations in the later phase, I argue that scalar stress would not have been strong enough to require a low-level hierarchy for conflict resolution at these large villages. Figure 9.34 also indicates that there are some large population aggregations outside of the clusters. These occur in the northeastern block of the micro-region at the edge of an area high in solonetz soils, and we currently do not know much about them. Such a site has never been excavated or collected using high resolution techniques (other than spot pickup). Because they occur in areas of more marginal farmland, I raise the possibility that their economic structure was somewhat different from that represented on the Fás Ér, perhaps with a greater emphasis on ovicaprid raising.

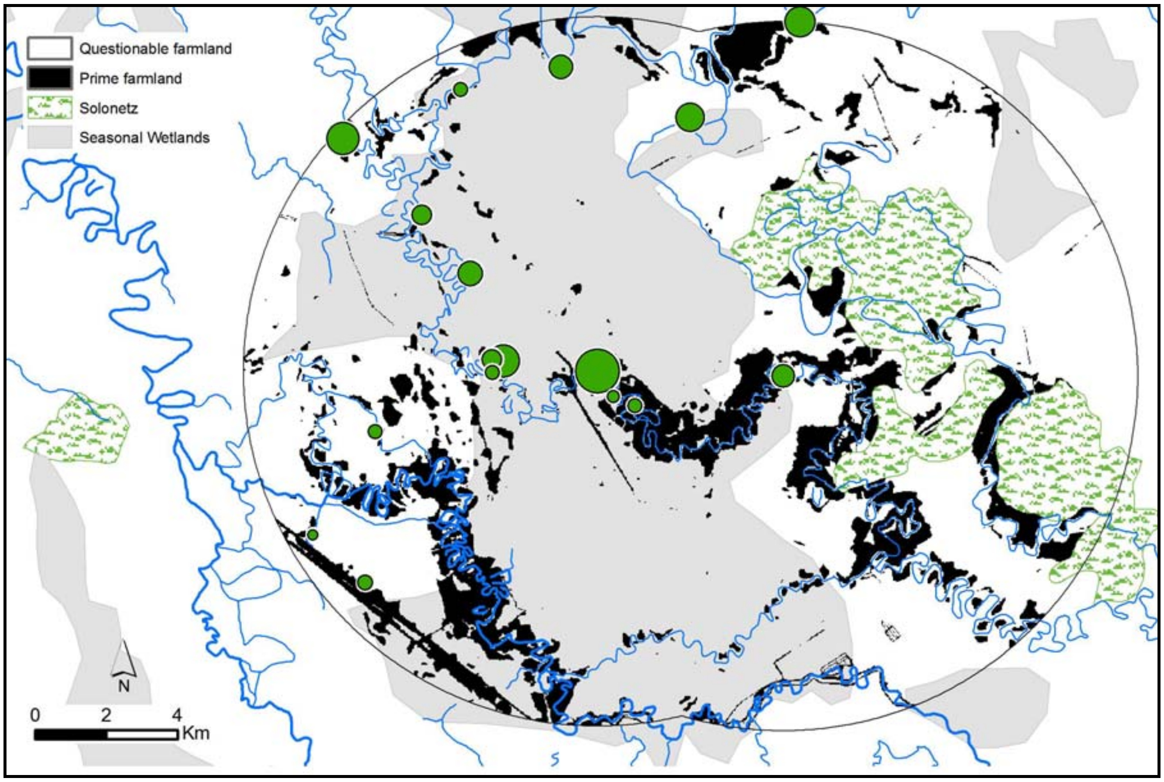

Figure 9.33. Ottomány site distribution by relative population size.

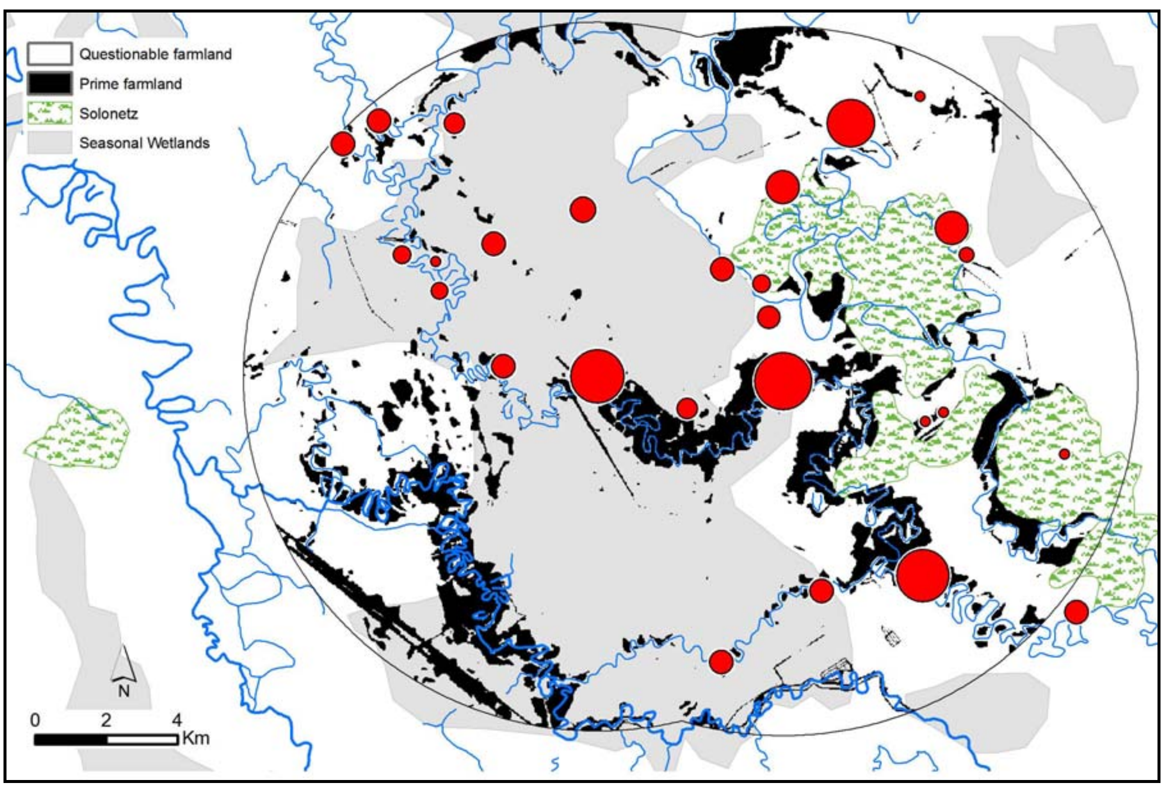

Figure 9.34. Gyulavarsánd site distribution by relative population size.

Despite the common assertion that populations grew to levels unsustainable and that wars broke out over land shortages, the population and land availability model indicates that the landscape was not under pressure, and there was no technological *requirement* for intensified production in a way that Boserup (1965) might have envisioned.

The evidence from storage practices and faunal resources at open and fortified sites suggest that it is unlikely they were part of an asymmetrical exchange involving the movement of animals or meat cuts to the fortified sites. The differences that can be observed likely derive from differences in environmental exploitation or perhaps slightly different, complementary economic strategies, as might be the case for the fortified sites Szilhalom and Gáborján in the Berettyó area (Chapter 7).

For the most part, however, it seems that fortified sites fended for themselves when it came to producing food. A reconstruction of site productive catchment of the Middle Bronze Age population centers shows no indication that food surplus was required from smaller outlying settlements to support the fortified population aggregation. At small hamlets such as Tarhos 26, people were atomized into household units that did not have to use plough agriculture and may not even have been organized into strong descent groups. Nonetheless, in some cases, more intensive food production – plough agriculture – was plausibly required to sustain the population levels at the fortified clusters.

Ploughing raises the possibility that a minority had access to capital and a larger pool of labour during the harvest bottleneck, but I suggest that an alternative thesis is more likely. The evidence from spatial segmentation and likely populations at or below around 500 suggests that we needn't assume a permanent hierarchy characterized these sites. The partitioning of land into residential areas, possibly even associated with corporate group boundaries, would more than likely provide a sufficient labour pool for harvesting a corporate plot so long as some families or individuals staying in that neighbourhood were not committed to intensive gardening. This would provide an opportunity for more of a focus on craft production, travel, and exchange during eleven months of the year, although the harvest season would require everyone's attention focused in the fields. Although there is no evidence for regional land scarcity, in areas such as the Tarhos 1 / Sarkad 8 cluster catchment, land may have approached scarcity enough to spur the development of corporate management and defence of land parcels. This might have been especially likely if there was an on-going incursion of new people to the region, as some specialists have argued for the Gyulavarsánd phase.

The lack of evidence for hierarchy does not mean that changes in social conditions did not occur. As I have shown, there certainly was a population increase in the Gyulavarsánd. Rather than an increase in warfare, however, given that the population living at the fortified clusters decreased from 50% to 20% we might argue that conditions became more stable. The placement of a new fortification upriver on the Gyepes, Belső-Szőlők, and the appearance of a new 20 ha open settlement north of the pastures raise the possibility that these settlements may have effectively served as gateways communities of large size that allowed smaller, undefended settlements to become more common. This speculation is somewhat premature, however, because the final section of model building for 'Regional Consolidation' is yet to come. I revisit the significance of the micro-regional settlement pattern once it can be considered in a broader regional framework.

Chapter 10: Regional Consolidation in the lower Körös basin

In the previous chapter, I built a model of Bronze Age society for the Körös micro-region that differs from the orthodox understanding found in the literature. Using data on household and community size, regional agricultural production, craft production and exchange, I argued that the communities of the micro-region were most likely decentralized and autonomous.

This chapter describes the extent to which regional social units were politically consolidated in the Middle Bronze Age of eastern Hungary. The spatial analysis in this chapter takes place at greater geographical scales. The Late Neolithic and Middle Bronze Age sites in the MRT region are first compared using a common analytical framework to identify site aggregation and population nucleation. In the later sections of the chapter, I consider regional consolidation by broadening the focus to include the wider Körös basin.

REGIONAL CONSOLIDATION (CONTINUED)

Regional consolidation in space

The Late Neolithic (Tisza-Herpály[94]) and Middle Bronze Age (Gyulavarsánd) in the MRT area share a common settlement pattern. In both systems, tell sites are assumed to be the locus of regional activity and political importance. The Late Neolithic, however, does not exhibit the evidence for wealth inequalities we see in Bronze Age cemeteries of the Great Hungarian Plain. A comparison of aggregation in space should provide insight into political consolidation emerging from inequalities between fortified and unfortified sites.

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[94] The Herpály group, with a slightly different material culture and settlement pattern, evolved out of an earlier Tisza, and coexisted with a later classical Tisza phase (Kalicz and Raczky 1987). A few Herpály sites fall in the MRT sample but the distinctions are not critical for this analysis.

The Copper Age (4500-2700 BC) settlement patterns have been compared to the Late Neolithic in the past (Sherratt 1983, 1984; Parkinson 1999, 2002b, 2006). The settlement analysis by Parkinson (2002b) identified a spatial modularity between interacting settlements in the Late Neolithic and Early Copper Age, despite cultural differences occurring between periods. Settlements clustered around tell sites in the Late Neolithic, and may have persisted in some areas, centering around a regional cemetery in the Early Copper Age (Parkinson 1999:302). The absence of similarly large central settlements in the Copper Age makes a comparison to the Bronze Age patterns less useful. I leave the Copper Age out in this analysis, but return to this issue of modularity at the end of the chapter.

In Chapter 9, I concluded that the Gyulavarsánd settlement pattern using population numbers and hectares are similar to each other. In the following analysis I use hectares to compare the Gyulavarsánd and Tisza patterns. The comparison of site clustering in space requires first establishing basic similarities in size distribution. After a brief overview of each period's site size distribution and in particular their single component sites, I combine the Late Neolithic and Gyulavarsánd samples for comparison. At that point I look for differences in aggregation.

Late Neolithic sites

There are 62 sites total in the region, including 56 open settlements and 6 sites identified as 'tells' (5) or 'fortified' (1) in the site registry (Table 10.1, Table 10.2) [95]. Where Late Neolithic tells have been excavated in Hungary, however, they invariably have fortification ditches (Horváth 1988; Parkinson and Duffy 2007; Raczky, et al. 2007; Sarris 2006). There is therefore good reason to consider Neolithic tells fortified sites, and they are so coded here (Table 10.3). Of the six fortified sites two are over 34 ha, but have substantial amounts of later material. Even though there is also moderate to high non-Late Neolithic material at the other four sites, they are all under 5 ha. Unlike in the Bronze Age fortified clusters in the micro-region, there is almost no Late Neolithic site clustering indicating a single, if partitioned, settlement. Körösújfalu 6 has a site 300 m to

[95] No sites with question marks next to their identification in the MRT are included in the Late Neolithic and Middle Bronze Age samples.

the west, across the river. Szeghalom 50 has two within 200 meters, and another within 400. But all four sites do not add up past 3 ha total. It is therefore currently unclear if large population aggregation around fortified sites characterizes Late Neolithic sites in the MRT area as it is in the Middle Bronze Age of the micro-region. Population aggregation still occurs, but only as open settlements, or around non-tell sites with no apparent fortification. Nonetheless, large population aggregation does occur at Polgár-Csőszhalom and Hódmezővásárhely-Kökénydomb to the north and west of the Körös basin, so it must not be excluded as a possibility (Horváth 1987b; Raczky, et al. 2007).

The single component settlements of the Late Neolithic with no known or suspected fortification are provided and arranged in a frequency distribution by area in Figure 10.1. Seventy percent are below 5 ha. Over 17% are between 5 and 10 ha and 2 sites (8.7%) are between 10 and 15 ha. Finally, a single outlier – Dévaványa 9, is 25.4 ha. Dévaványa 9 also includes Middle Neolithic, and likely represents a processes of long term occupation and horizontal shift reminiscent of Öcsöd-Kováshalom on the Harmás Körös and the tell of Podgoritsa in Bulgaria (Bailey, et al. 1998; Raczky 1987b; Raczky, et al. 1985; Gyucha, *pers. comm.*).

SiteID	Polygon source	LN	Non - LN	Other Neolithic	CA	BA	Later	Area (ha)
Békés105		Mod	Mod	*		*	*	25.63
Békés108		Low	Mod	*		*	*	1.56
Békés136		Low	Low	*	*		*	6.15
Békés34							*	0.24
Békés5		Low	Mod			*	*	0.74
Békés88		Low	Mod	*	*	*	*	3.68
Bélmegyer17		Low	High	*	*	*	*	21.21
Bélmegyer19		High	High				*	6.86
Bélmegyer20		Low	Mod	*		*	*	12.37
Csárdaszállás26		Low	Low				*	0.40
Csárdaszállás31		Low	Low	*			*	3.08
Csárdaszállás8		High	Low				*	4.64
Dévaványa115	Book							1.15
Dévaványa14	Book	Low	High			*	*	10.81
Dévaványa153		Mod	Mod	*			*	2.53
Dévaványa180		Low						0.47
Dévaványa183		High	Mod	*	*		*	3.40
Dévaványa192		High	High	*		*	*	7.13
Dévaványa66	Book	Low	High					12.17
Dévaványa9	Book	High	Low	*	*			25.39

Table 10.1. MRT size for open Late Neolithic sites in the MRT region (1) (Békés, Bélmegyer, Csárdaszállás, and Dévaványa parishes), coded by component representation.

SiteID	Polygon source	LN	Non-LN	Other Neolithic	CA	BA	Later	Area (ha)
Ecsegfalva4		Low	Low	*	*		*	4.21
Füzesgyarmat17		Low	Low		*		*	4.94
Füzesgyarmat18		Low	Low		*			4.92
Gerla30		Low	Low		*	*	*	2.99
Gerla37		Mod	Mod			*	*	2.84
Geszt32		High						9.69
Gyoma116		Low	High		*	*	*	28.05
Gyoma118		Mod	Low	*				2.76
Gyoma242		Mod	Mod			*	*	1.85
Gyula319		Mod	Mod				*	3.54
Gyula582[96]								0.95
Körösladány16		Low	Mod		*	*	*	0.53
Köröstarcsa34		Low	Mod			*	*	2.66
Köröstarcsa6		Low	Low	*			*	9.23
Köröstarcsa65		Low	Low			*	*	1.85
Körösújfalu15	Book	Low	Mod	*	*		*	1.81
Körösújfalu3		Low	Mod	*	*	*		1.48
Méhkerék18		High						13.56
Mezőgyán61		Mod	Low		*		*	11.18
Sarkadkeresztúr10		Low	Low				*	6.85
Sarkadkeresztúr6		Low	High	*			*	8.87
Szarvas131		Mod						1.34
Szarvas20		Mod	High	*	*		*	2.92
Szarvas21		Mod	High	*	*	*	*	0.79
Szarvas40		Low	High	*	*		*	2.78
Szarvas56		Low	High	*	*	*	*	10.03
Szarvas69		Low	Mod			*	*	1.40
Szarvas70		Mod	Mod	*	*	*	*	1.65
Szeghalom108		High	Low			*		0.64
Szeghalom16		High	Mod	*				60.05
Szeghalom168		Low	Mod		*	*	*	2.83
Szeghalom22		Low	Low		*		*	0.25
Szeghalom49		High	Mod	*	*	*	*	0.62
Szeghalom51		Low	Low		*			0.70
Vésztő30	Book	Low	Low				*	0.51
Zsadány10		Low	Low		*			0.10

Table 10.2. MRT size for open Late Neolithic sites in the MRT region (2). MRT size for open Late Neolithic sites in the MRT region (Ecsegfalva, Füzesgyarmat, Gerla, Gyoma, Gyula, Körösladány, Köröstarcsa, Körösújfalu, Méhkerék, Mezőgyán, Sarkadkeresztúr, Szarvas, Szeghalom, Vésztő and Zsadány parishes), coded by component representation.

[96] See Medgyesi (1997)

SiteID	LN	Non-LN	Other Neolithic	CA	BA	Later	MRT size (ha)
Békés75	Mod	High	*	*	*	*	34.17
Körösújfalu6	Mod	Mod		*		*	3.16
Szarvas1	High	High	*	*	*	*	34.86
Szeghalom50	High	Mod	*	*		*	0.67
Vésztő15	High	High	*	*	*	*	4.55
Zsadány61	Mod	Mod			*		2.54

Table 10.3. MRT size for fortified and possibly fortified Late Neolithic sites.

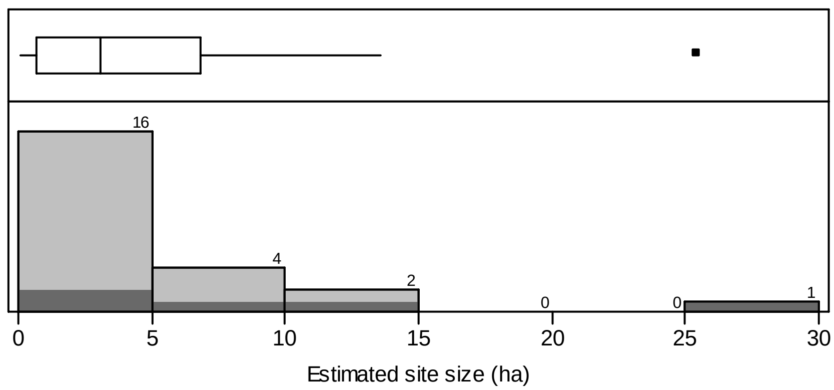

Figure 10.1. Frequency distribution of MRT site sizes for single component LN sites. Dark grey are sites coded as having 'high' amounts of Late Neolithic material.

Middle Bronze Age sites

There are 39 Gyulavarsánd MRT sites in the micro-region that I grouped into 3 fortified site clusters and 26 open settlements in Chapter 8. An additional 79 open settlements and 9 tell or fortified sites are found outside of the immediate micro-region (Tables 10.4, 10.5 and 10.6). In the Bronze Age, fortification ditches are usually much larger than those in the Neolithic, and can often be seen on the surface without excavation[97].

[97] As I noted in Chapter 8, two sites are only listed as 'tells' without any suggestion of a fortification.

SiteID	Neolithic	Copper Age	LBA	Later	Ottomány	Gyulavarsánd	Non-Gyulavarsánd	Area (ha)
Békés101				*		L	M	4.88
Békés105	*			*	*	L	M	25.61
Békés107	*			*		L	M	7.03
Békés108	*			*		M	L	1.60
Békés163			*	*	*	M	M	16.86
Békés27			*			L	L	2.74
Békés3				*		L	L	0.74
Békés68				*		L	H	17.80
Békés81				*		L	L	3.26
Békés88	*	*	*	*		M	L	3.48
Békés91		*		*	*	L	L	1.29
Békés93		*		*		M	M	5.85
Békés94	*		*	*	*	H	M	8.00
Békés96	*			*		L	H	15.44
Békéscsaba306				*		M	L	9.76
Békéscsaba483			*	*	*	M	L	3.58
Békéscsaba82				*		L	L	7.47
Bélmegyer16	*	*		*		M	M	3.49
Bélmegyer56	*	*	*	*		L	H	19.15
Biharugra1		*	*	*		H	M	4.11
Biharugra14			*			H		1.90
Biharugra18						M		1.25
Biharugra51		*		*		L	M	1.38
Biharugra52				*		L	H	6.97
Biharugra53		*	*			L	L	6.34
Endrőd92				*		L	H	5.54
Füzesgyarmat10			*	*		H	L	5.01
Gerla13				*		L	H	10.62
Gerla37	*			*		M	M	2.91
Gerla46				*		M	L	5.97
Gerla47				*		M	L	3.32
Gerla53	*	*	*	*		L	M	15.63
Gerla74	*	*	*	*		M	M	46.54
Geszt100		*				H	L	2.50
Geszt8				*		H	L	0.58
Geszt90				*		M	L	9.81

Table 10.4. Middle Bronze Age open settlements (outside the Micro-region) with coded major components and site sizes (Békés, Békéscsaba, Bélmegyer, Biharugra, Endrőd, Füzesgyarma, Gerla, and Geszt).

The MRT boundary for several of the sites is difficult to use even as a starting point. Due to the quality of the 1:10 000 map photocopies used as in the earlier surveys (volumes 6 and 8), the lines are sometimes difficult to see. The visibility is noted in Table 10.20, and the MRT boundary was traced in the case of 'estimates' based on the illustration published in the gazetteers and orientation, using landmarks such as roads and others sites.

SiteID	Neolithic	Copper Age	LBA	Later	Ottomány	Gyulavarsánd	Non-Gyulavarsánd	Area (ha)
Gyoma116	*	*	*	*		L	H	28.30
Gyoma133		*		*		L	H	19.66
Gyoma160	*		*	*		H	M	1.98
Gyoma282	*	*				H		0.84
Gyula113	*		*	*		M	M	2.64
Gyula5				*		H	M	5.93
Kertészsziget7			*	*		L	L	4.66
Körösladány46			*	*	*	M	L	4.61
Körösnagyharsány9			*	*	*	M	H	3.67
Köröstarcsa7	*	*	*	*	*	H	H	2.65
Körösújfalu11			*	*		H	L	3.17
Körösújfalu12		*	*	*		L	L	2.07
Kötegyán10				*		M	H	2.97
Mezőberény21		*	*	*		M	H	20.06
Mezőgyán13	*			*		L	H	33.55
Mezőgyán32				*		L	M	6.87
Mezőgyán44				*		H	M	24.45
Mezőgyán48	*	*		*		M	L	15.55
Mezőgyán90				*		H	H	11.00
Murony56			*	*		H	L	1.86
Okány27				*		M	L	17.56
Vésztő108				*		M	H	3.62
Vésztő141				*		L	H	3.19
Vésztő149	*			*		L	L	2.51
Zsadány37			*	*		L	L	2.83
Zsadány61	*		*			L	L	0.73
Zsadány8			*	*		M	L	1.34

Table 10.5. Middle Bronze Age open settlements (outside the Micro-region) with coded major components and site sizes (Gyoma, Gyula, Kertésziget, Körösnagyharsány, Köröstarcsa, Körösújfalu, Mezőberény, Mezőgyán, Murony, Okány, Vésztő, Zsadány).

SiteID	Fortified	MBA	Non-MBA	MRT site size (ha)	Site boundary	Shovel test (ha)	Suggested Height
Biharugra1		High	Med	4.11	Clear		1-1.5
Biharugra36	*	Med	Low	1.19	Estimate		
Dévaványa66	*	High	Low	17.58	Estimate	11.5	1.5
Füzesgyarmat69	*	High	Med	23.92	Estimate		2-2.5
Füzesgyarmat77	*	High	Med	4.33	Estimate	11	
Gyoma34	*	High	Low	9.47	Clear		
Kertészsziget6	*	High	High	21.03	Clear		
Köröstarcsa7		High	High	2.65	Unk. Site destroyed		2
Vésztő15	*	High	High	4.23	Likely in large meander loop		7-8 m

Table 10.6. Fortified site occupation and size outside the Micro-region in the Gyulavarsánd phase.

In the Gyulavarsánd phase of the micro-region, it was clear that fortified sites were surrounded by tens of hectares of open settlements. In the rest of the county, however, no such trend is found. Although some of these sites are larger, they are not internally segmented like those identified in the micro-region. Gyoma 34 (Túrkeve-Terehalom) has Gyoma 282 (0.83 ha) 120 m northeast of it. Füzesgyarmat 69 has Füzesgyarmat 71 (2.5 ha) 360 m east of it on the same meander. Vésztő 15 has Vésztő 108 (3.6 ha) 315 m to the northwest. The distances involved are not insignificant, and the additional settlement, even if added to the fortified site as a cluster, barely changes the overall pattern of aggregation.

A study of the single component sites outside the micro-region allows us to identify any other differences in the size distribution at this scale. In order to evaluate the possibility of differences, I lump the sites from the micro-region with the single component Gyulavarsánd sites outside the micro-region to see if they are comparable. Tables 10.7 and 10.8 compile the single component site sizes from outside the micro-region with the size estimates based on fieldwork and rules. This sample is therefore the restricted combination of sites investigated through fieldwork, multicomponent-sites in a region better understood through fieldwork, and single component sites in a greater area less well visited. I refer to this as *Occam's sample* in subsequent figures[98]. A frequency distribution of this sample is presented in Figure 10.3. Although the micro-region is only 10% of the MRT area, it contains about 30% of the Gyulavarsánd sites. The micro-regional sites are highlighted in Figure 10.21. The range is similar. The outlier in the 25-30 ha category is Sarkad 8 at the cusp (25.79). The two sites in the 15-20 ha category, 15.5 and 17.56, plausibly fall into the c. 11 ha size category identified for the micro-region. For the most part, it seems likely that the single component sites in the rest of the MRT area follow the pattern observed in a more tightly restricted area around the Tarhos 1 and Sarkad 8 settlement clusters.

[98] Leaving out the multi-component sites in the micro-region, and comparing only the single components in both periods, would not only drop the Gyulavarsánd sample size significantly, it would also ignore the lessons learned from site visits: there are mega-sites, but they are in a predictable size range. None of the larger sites in the micro-region are single component.

SiteID	Micro-region	Fortified	Site cluster	Estimate Type	Estimated Size
Békés108				MRT	1.60
Békés27				MRT	2.74
Békés3				MRT	0.74
Békés81				MRT	3.26
Békés88				MRT	3.48
Békés91				MRT	1.29
Békéscsaba306				MRT	9.76
Békéscsaba483				MRT	3.58
Békéscsaba82				MRT	7.47
Bélmegyer17	*			R	5
Bélmegyer2	*			FW	1.85
Bélmegyer20	*			FW	5
Bélmegyer45	*			FW	4
Biharugra14				MRT	1.90
Biharugra18				MRT	1.25
Biharugra36		*		MRT	1.19
Biharugra53				MRT	6.34
Dévaványa66		*		FW	11.45
Füzesgyarmat10				MRT	5.01
Füzesgyarmat77		*		FW	11.01
Gerla46				MRT	5.97
Gerla47				MRT	3.32
Geszt100				MRT	2.50
Geszt8				MRT	0.58
Geszt90				MRT	9.81
Gyoma282				MRT	0.84
Gyoma34		*		MRT	9.47
Kertészsziget7				MRT	4.66
Körösladány46				MRT	4.61
Körösújfalu11				MRT	3.17
Körösújfalu12				MRT	2.07
Kötegyán14	*			R	5
Méhkerék63	*			R	1
Mezőgyán19	*			R	1
Mezőgyán48				MRT	15.55
Murony56				MRT	1.86
Okány27				MRT	17.56

Table 10.7. Occam's MBA sample (1). Sites from the micro-region with fieldwork or rule generated size estimates and single component sites from outside the micro-region (where the non-BA component is Low or None). Fortified sites shovel tested during fieldwork are also included. Open sites coded as part of fortification clusters are included in the single cluster SiteID. R=rule-based and FW=Fieldwork based estimate.

SiteID	Micro-region	Fortified	Site cluster	Estimate Type	Estimated Size
Sarkad119	*			R	3.76
Sarkad175	*			FW	1
Sarkad178	*			FW	1
Sarkad247	*			R	4.45
Sarkad251	*			R	3
Sarkad252	*			R	5
Sarkad31	*			R	5
Sarkad36	*			R	5
Sarkad46	*	*	*	FW	24.33
Sarkad8	*	*	*	FW	25.79
Sarkadkerestúr102	*			R	10
Sarkadkeresztúr1	*			R	2.1
Sarkadkeresztúr73	*			R	10
Sarkadkeresztúr90	*			R	20
Tarhos1	*	*	*	FW	22.07
Tarhos24	*			R	5.78
Tarhos26	*			FW	2.85
Tarhos29	*			FW	1
Tarhos32	*			FW	2.5
Tarhos33	*			FW	3
Tarhos38	*			R	5
Tarhos65	*			FW	5
Vésztő149				MRT	2.51
Zsadány37				MRT	2.83
Zsadány61				MRT	0.73
Zsadány8				MRT	1.34

Table 10.8. Occam's MBA sample (2). Sites from the micro-region with fieldwork or rule generated size estimates and single component sites from outside the micro-region (where non-BA comp is Low or None). Fortified sites shovel tested during fieldwork are also included. Open sites coded as part of fortification clusters are included in the single cluster SiteID. R=rule-based and FW=Fieldwork based estimate.

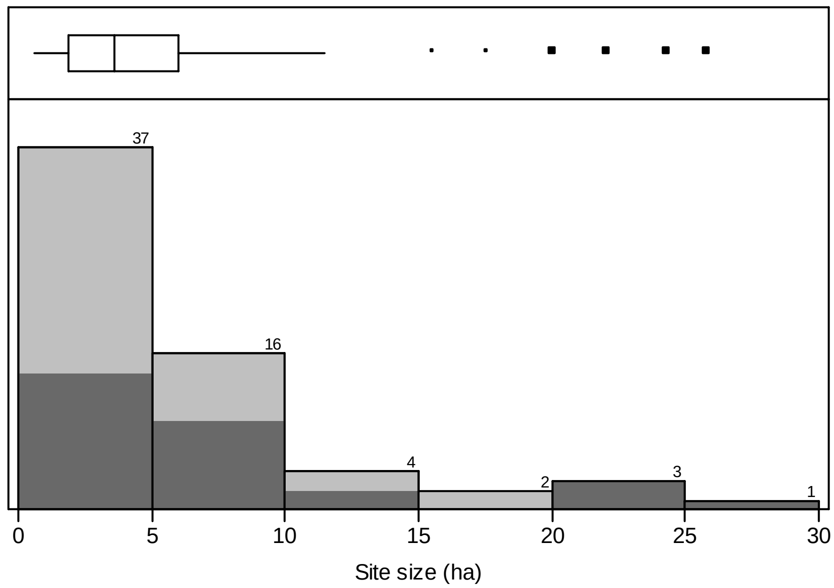

Figure 10.2. Frequency distribution of Occam's MBA sample (1). Dark grey represents sites from the micro-region.

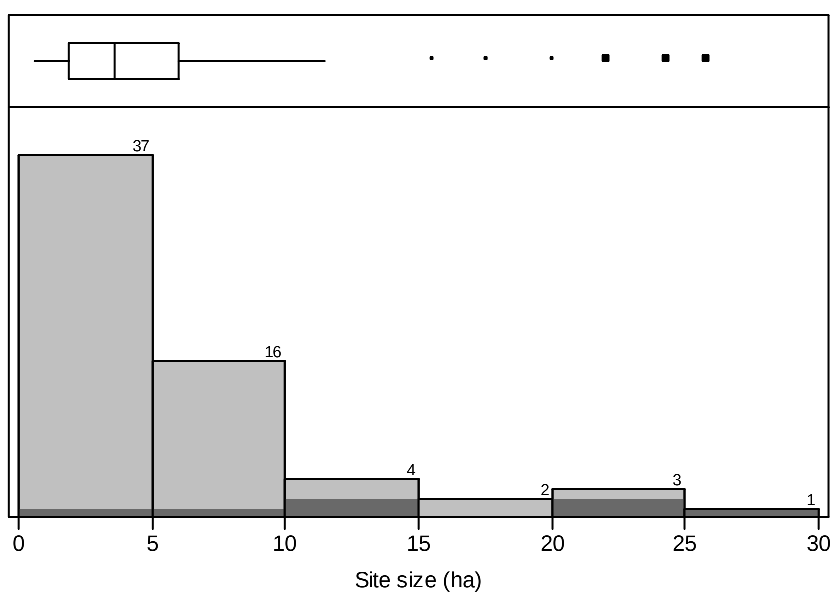

Figure 10.3. Frequency distribution of Occam's MBA sample (2). Dark grey represents fortified sites.

Comparison of size frequency distributions between the LN and MBA

Identifying regional consolidation through a controlled comparison of the Tisza and Gyulavarsánd periods requires a certain degree of similarity between the settlement patterns. The distribution of Gyulavarsánd site sizes in the rest of the MRT area is similar to those in the micro-region, and this larger sample of settlements can therefore be compared to the Late Neolithic. The size range for both periods is similar. The percentage of sites in size ranges is provided in Table 10.9 alongside the Late Neolithic for comparison. Both are right skewed but there is only one site above 15 ha in the Late Neolithic (4.3%). In the MBA, 9.4% are outside of the 15 ha range. Sites from both the Late Neolithic and the MBA Occam sample are lumped together and presented in Figure 10.4. MBA sites are distributed across the entire range, however, while Late Neolithic sites do not occur in the 15-25 ha category.

Size range (ha)	**LN**	**MBA**	**LN%**	**MBA%**
0-5	16	37	**69.6**	**58.7**
5-10	4	16	**17.4**	**25.4**
10-15	2	4	**8.7**	**6.3**
15-20	0	2	**0.0**	**3.2**
20-25	0	3	**0.0**	**4.8**
25-30	1	1	**4.3**	**1.6**
Total	**23**	**63**	**100.0**	**100.0**

Table 10.9. Percentage distribution of size ranges for Occam's MBA sample and the single component Late Neolithic sites.

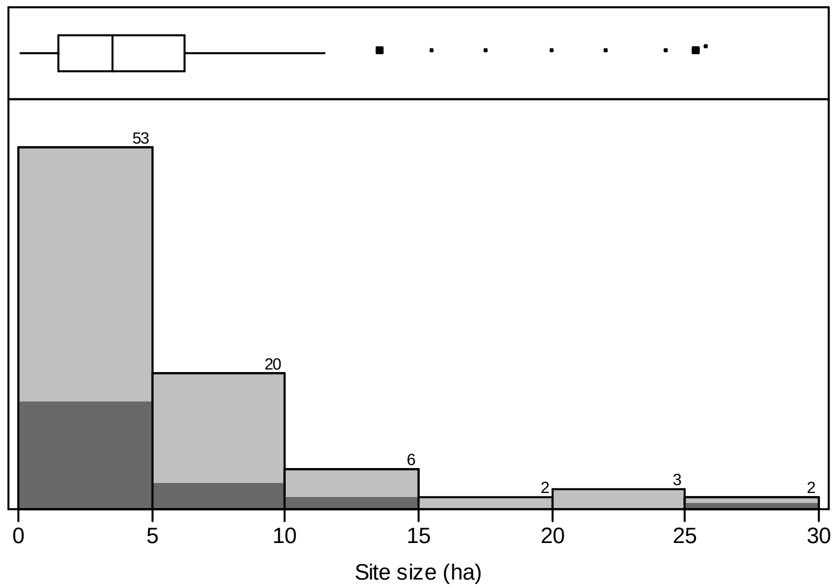

Figure 10.4. Composite of Occam's Middle Bronze Age sample (light grey) and Late Neolithic single component sites (dark grey).

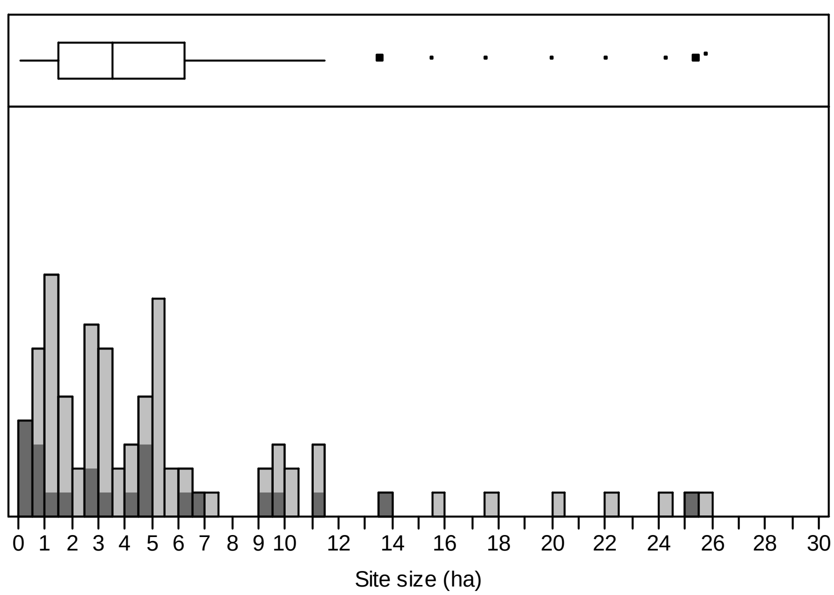

Figure 10.5. Composite of size estimates for Occam's MBA sample (light grey) and Late Neolithic single component sites (dark grey) with single hectare increments.

Despite the noise created from using rule based size estimates (e.g. the 1 and 5 ha size values), increasing the resolution helps resolve what the differences are between these two size distributions. Figure 10.5 compiles single component LN with Occam's MBA sample, illustrating them with 1 ha increments. The observable range has not changed from the previous figure. What seems more likely in this distribution, however, is the presence of three 'modes': 1) sites between 0 and 8 ha; 2) sites between 9 and 11 ha; and 3) sites between 13 and 26 ha[99]. The boundaries between 'modes' are used to define as approximate size classes in Table 10.10.

Size range (ha)	Size Class
0-8	1
8-12	2
12-26	3

Table 10.10. Size categories for Late Neolithic and MBA sites in the MRT region.

In order to proceed with a spatial analysis, multi-component sites in the MRT region must be assigned to one of these categories. I use the rules listed in Table 10.11.

Site Size	Focal Component	Non-focal component	Class destination
Under 8	Low	Mod or High	1
Over 8	Low	Mod or High	1
Over 8	Mod or High	Mod or High	Divide by 2 and place by size
Any	Any	Low or None	Place by size

Table 10.11. Size categories derived from MRT sizes for LN and MBA sites (Micro-regional size-rules are applied for micro-region sites, see Chapter 9).

For the LN, two Class 3 sites emerge independently, and another four sites are achieved by a rule-based division. Both Figures 10.6 and 10.7 present all sites recoded by site class. Although there is a dearth of second-tier sites in the LN in comparison with the MBA, it is probably not worth much attention given the uncertainty of the site sizes in the higher classes. The general take home picture is one of similarity, rather than difference.

[99] I use the word 'mode' loosely here, to suggest groupings useful for organizing otherwise noisy data.

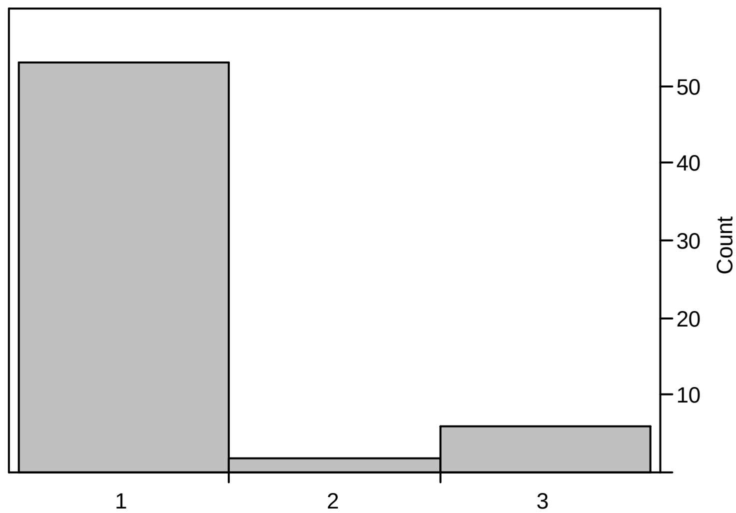

Figure 10.6. Frequency distribution of LN site size classes.

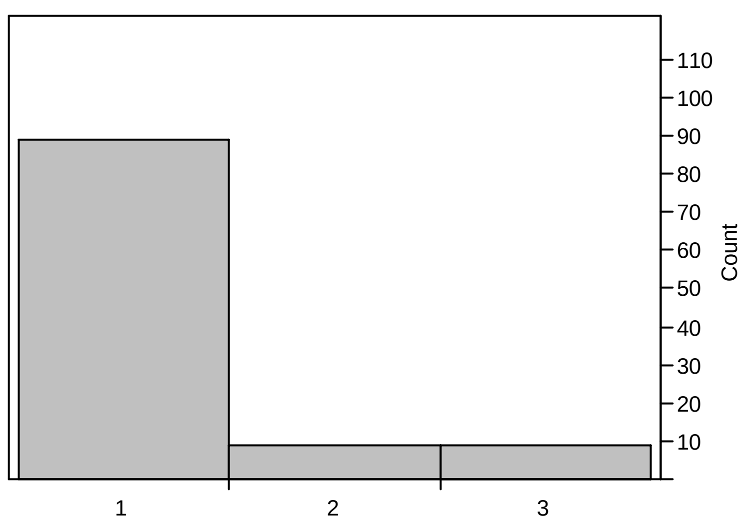

Figure 10.7. Frequency distribution of MBA site size classes.

General comparison between the two periods

Now that the two periods are coded with the same scheme, they can be compared in space. In this section I compare the Late Neolithic palimpsest to the Gyulavarsánd palimpsest. If there was site movement or different patterns within each period this analysis will not capture them. Therefore, differences in site distributions will only emerge to the extent that they were consistent during the duration of their phase. The site distribution by size class is presented for the Late Neolithic and Gyulavarsánd sites in Figures 10.8 and 10.9.

In the Late Neolithic, as before, most of the Békés Plain is avoided. There is however a settlement concentration near the Hármas Körös river. The Dévaványa Plain has several open sites, as does the Kis Sárrét, occupying the high Pleistocene banks of the eastern marsh. Finally, sites also fall along the southern border of the Békés Plain on the Fehér Körös river. As Parkinson (2002b, 2006) has noted, there is a tendency towards site clustering with a 1-4 ha tell in each group, or clustering of small open settlements around a large unfortified site.

A simple comparison of site numbers – from 62 in the Late Neolithic to 108 in the Middle Bronze Age – is almost a doubling of sites in the Middle Bronze Age (Table 10.12). The most common site in both periods is the small open settlement, just under 80%. The similarity between percentage scores across site classes is striking. Although the preferred comparison would be between the hectares occupied in each period, the resolution of the data does currently not allow this. However, given the similarity between size class and the fortified/open distinction, it is possible to think of the increase in absolute numbers as a meaningful one – perhaps on the order of a 75-100% difference in population over the Late Neolithic tell occupation period.

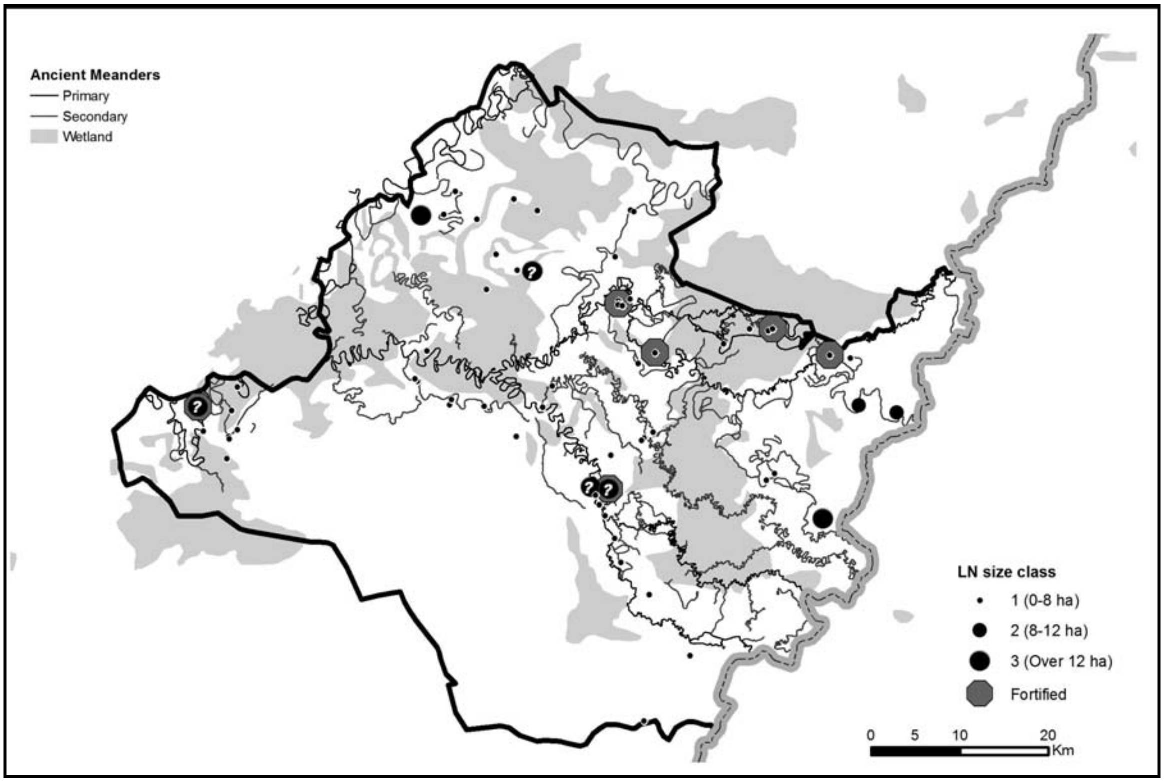

Figure 10.8. Late Neolithic (Tisza-Herpály) sites in the survey area. The four sites labelled with a 'question mark' are Class 3 sites defined by rule assignment.

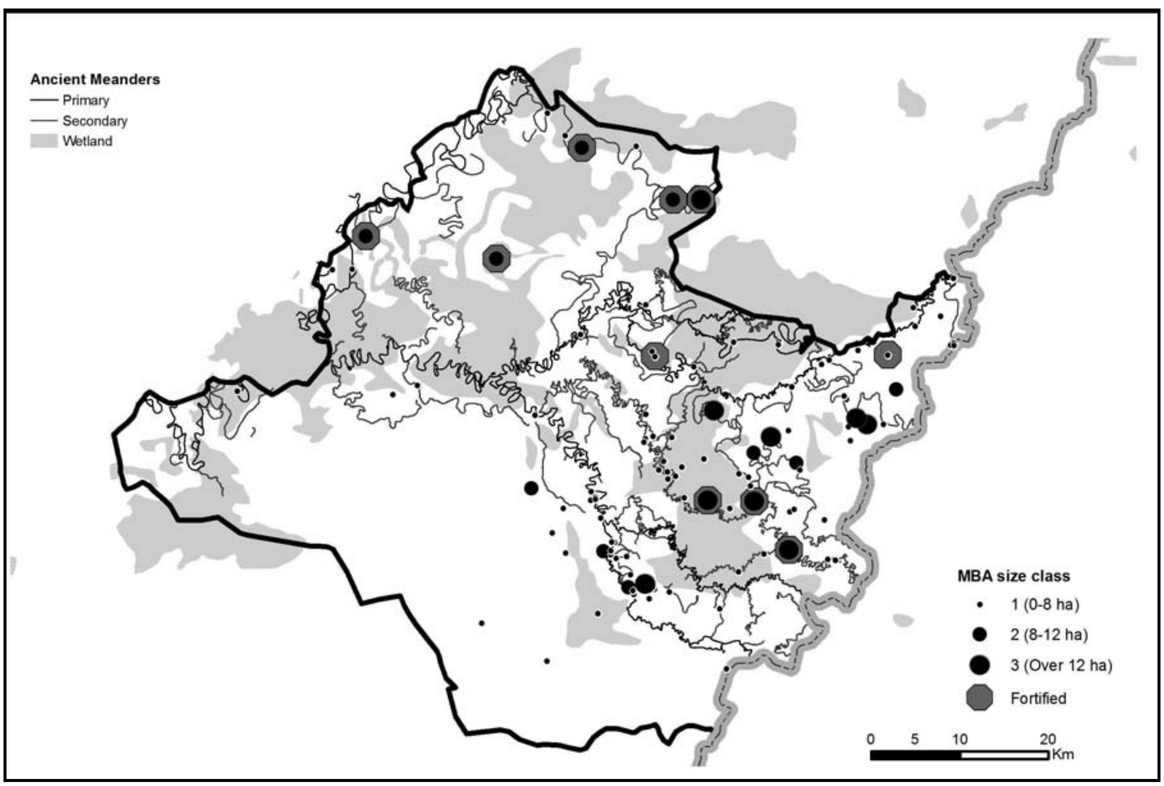

Figure 10.9. Middle Bronze Age (Gyulavarsánd) sites in the survey area.

	Fortified			Open			
Size class	***1***	***2***	***3***	***1***	***2***	***3***	***SUM***
LN (f)	4	0	2	50	2	4	62
LN (%)	**6.3**	**0.0**	**3.1**	**78.1**	**3.1**	**6.3**	**100.0**
MBA (f)	2	4	4	86	6	6	108
MBA (%)	**1.9**	**3.7**	**3.7**	**79.6**	**5.6**	**5.6**	**100.0**

Table 10.12. Comparison between fortified and open settlements, by class, for the LN and MBA periods (Biharugra1 and Köröstarcsa 7 considered 'open' tells in this table). All Late Neolithic tells are assumed to be fortified.

In both periods, fortified settlements are much more likely to be second or third tier sites than open settlements. The strongest difference between the two periods is the tendency for fortified settlements to be larger in the Gyulavarsánd period than in the Late Neolithic. There are 4 first and 2 third order fortified sites in the Late Neolithic, while there are only 2 small fortified sites in the Middle Bronze Age, and four in both the second and third tier size classes.

Sorting the Gyulavarsánd, and especially Tisza sites into the second or third size classes is probably not terribly accurate given the coarse methods used to establish them. The relevance of this comparison, however, is not to evaluate the differences in these categories between periods, but simply to point out that regardless of exactly how they are measured, both periods have site size hierarchies in the MRT region with a similar size range. It is this basic similarity that I argue justifies the cluster comparison that follows, using the fortified sites as the common basis.

Clustering of open settlements to fortified sites

Parkinson (2002b, 2006) found that Late Neolithic open settlements usually cluster around a tell or large open site within 7 km: a tendency toward aggregation (see Chapter 6). Regional political hierarchies have tighter boundary maintenance than this, increased levels of warfare, and an interest in efficient tribute collection (Chapter 3 and 6). To measure whether there was more clustering around fortified sites in the MBA, 7 km buffers were extended around them in both the Late Neolithic and the Middle Bronze Age and the flat sites in their environments were counted and measured as a percentage of all open settlement sites (Figures 10.10 and 10.11)[100]. I do not include large open settlements as Parkinson did (adding them would certainly increase clustering).

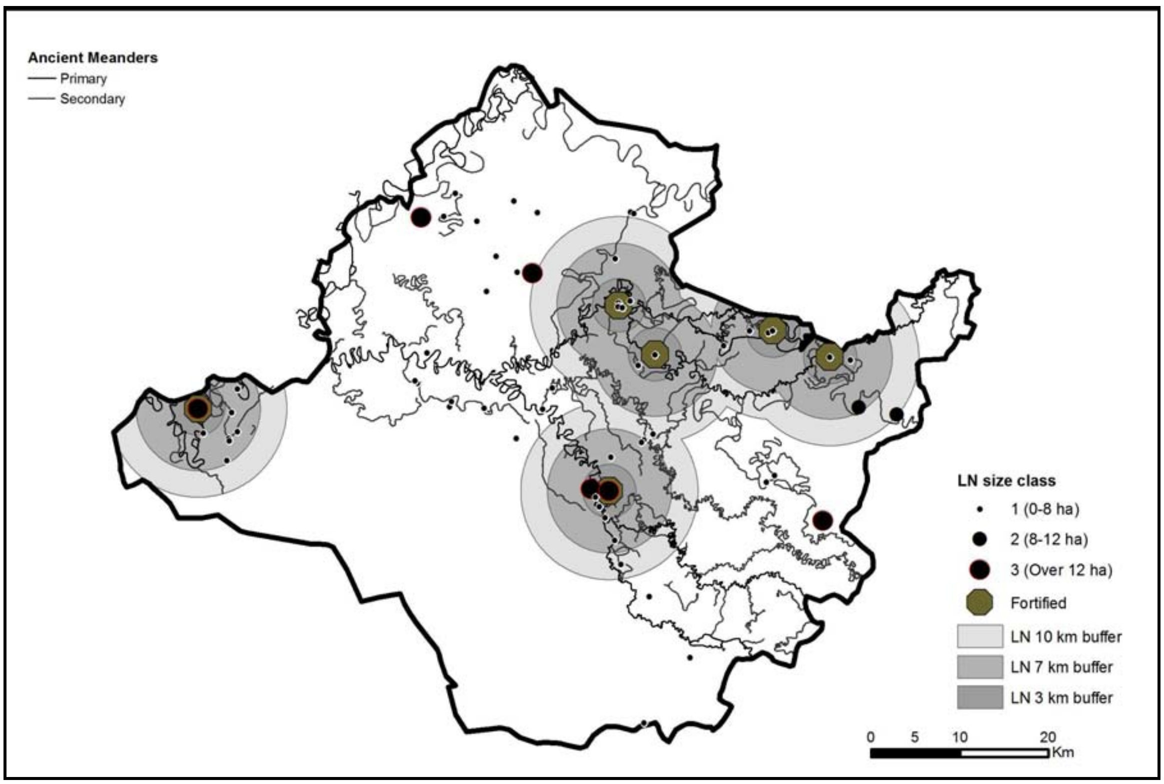

Figure 10.10. Buffers around Late Neolithic sites.

[100] To achieve this number, first buffers were created around fortified sites from point files for each period (that is, X/Y coordinates rather than polygon) (Figure 10.35 and 10.36).

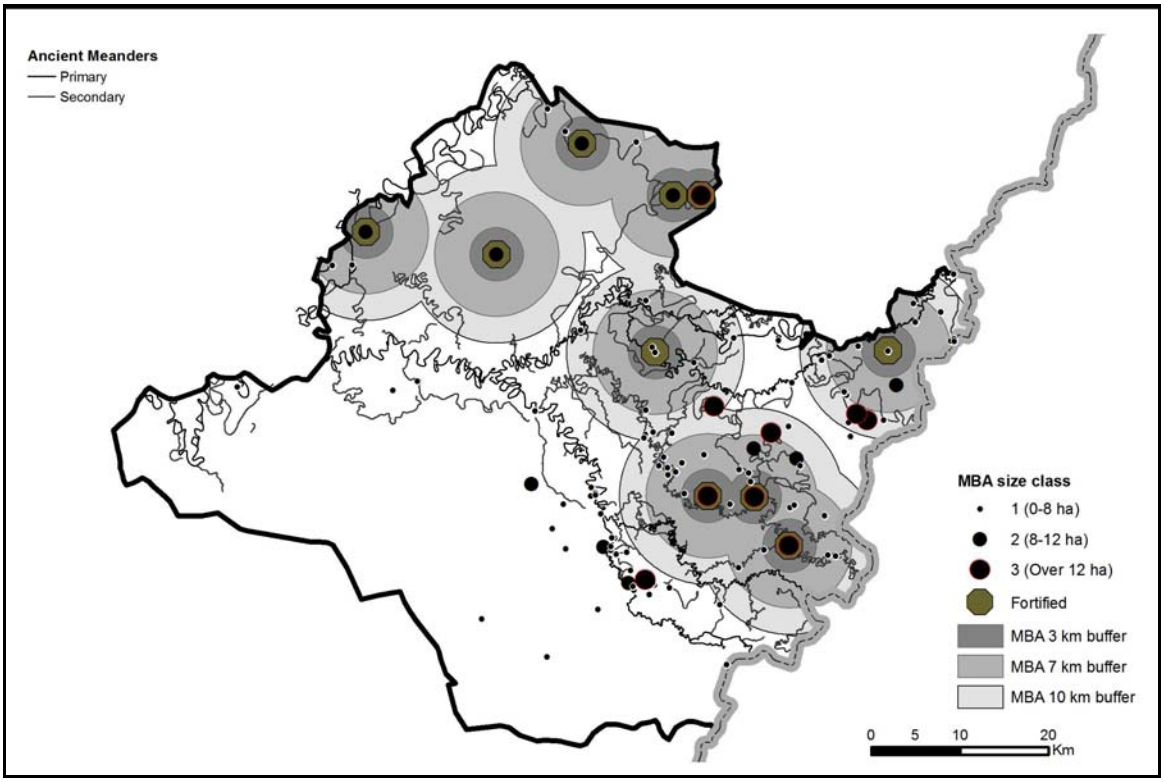

Figure 10.11. Buffers around MBA sites.

The amount of site buffer that occurs outside of the MRT boundary affects the reliability of the percentage calculated because potential candidates within the buffer, but outside of the survey area, are being excluded. To help correct this bias, the area within the MRT boundary was established as a percentage of total buffer area for each period for comparison. A corrected clipped buffer percentage was then obtained using the following simple formula:

$$\sum 2 \cdot (1-A) \cdot C + C$$

where C is the percent of open sites clustering to fortifications and A is the quotient of buffer area in MRT divided by buffer area. As the buffer area outside the MRT perimeter grows (i.e., as A decreases), the percentage of open sites in the buffer becomes more and more deflated. Therefore, this formula takes 1-A and adds on the missing site density lost due to the edge effect. These values are listed in Tables 10.13 and 10.14.

	No. open Sites	*C* (% of all open sites)	Buffer area (km2)	Buffer Area in MRT (km2)	*A* (% of buffer in MRT area)	∑ 2·(1-*A*)·*C* + *C* (corrected for clipped buffer)
3 km buffer	12	21	170	156	0.92	24.98
7 km buffer	26	46	802	673	0.84	61.31
10 km buffer	29	52	1435	1143	0.80	72.82

Table 10.13. The number of open sites found within a given distance from Late Neolithic tells or fortifications, expressed as a percentage of the total number of flat sites, and adjusted by the buffer area falling within the MRT region.

	No. open Sites	*C* (% of all open sites)	Buffer area (km2)	Buffer Area in MRT (km2)	*A* (% of buffer area in MRT	∑ 2·(1-*A*)·*C* + *C* (corrected for clipped buffer)
3 km buffer	7	7	271	260	0.96	7.74
7 km buffer	40	41	1272	1059	0.83	54.47
10 km buffer	58	59	2288	1724	0.75	88.38

Table 10.14. The number of open sites found within a given distance from Middle Bronze Age tells or fortifications, expressed as a percentage of the total number of flat sites, and adjusted by the buffer area falling within the MRT region.

In the Late Neolithic, 61 percent of all open sites occur within a 7 km buffer of the fortifications. In the Gyulavarsánd period, 54 percent occur within a 7 km buffer. Within a 3 km buffer, clustering is even stronger in the Late Neolithic: 25 percent of open settlements cluster to the fortifications compared to about 8 percent for the Gyulavarsánd. The basic pattern is nonetheless one of similarity, with differences attributable to sampling error or *less* clustering in the Middle Bronze Age.

There is a bias inherent in this measure when the number of fortified sites in the comparison is different but the area remains the same. As fortified sites are added, as long as open settlements are added in a similar proportion (and in this case they are), all else being equal there is a greater probability of open settlements falling within fortified site buffers. As the Middle Bronze Age sites are more numerous in this comparison, the results are therefore inconsistent with the regional hierarchy hypothesis.

The obvious difference between the settlement patterns not captured by this measure is the concentration of MBA settlement south of the Sebes Körös, and the isolation of several fortified sites in the Dévaványa Plain. These occurrences raise interesting questions about the significance of regional differences within the Gyulavarsánd phase of the MRT area. I now turn to a qualitative assessment of these differences.

MBA Modularity in the MRT region

As I reviewed in Chapter 6, site size hierarchies representing regional political hierarchies in space share certain similarities. The first is in the placement of the higher order centers for effective tribute collection or other functionally specialized tasks. The MBA settlement pattern has larger sites, which are almost always fortified. Although I assume that my coding of these large sites may represent variation meaningful for understanding political groupings, I believe it is premature at this point to talk about class 2 and 3 sites as first and second order centers. The second similarity between regional political hierarchies in middle-range societies is distinction between settlement clusters in space representing autonomous, often competing, political modules. The third similarity is the emergence of large or fortified sites at the boundaries between political modules serving defensive roles.

To identify any modularity, the scale of observation must change in order to recognize potentially interacting regional polities. I introduce major sites outside the study region to broaden the geographical scope and force a consideration of political territories during the Gyulavarsánd phase. Major settlements known in both Hungary and Romania are added to the map in Figure 10.12. In Romania, these include Socodor, Gyulavarsánd, Tulca, Sîntion, and the fortified sites of the Berettyó discussed in Chapter 5 and 7.

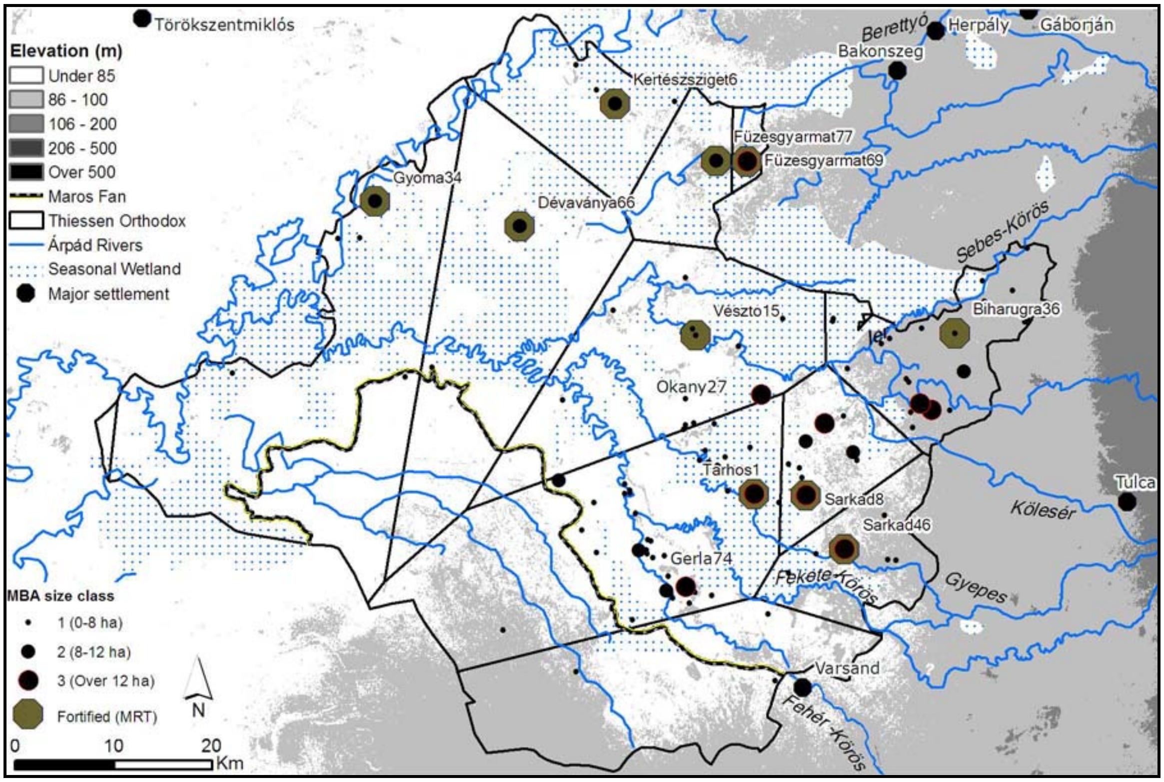

Figure 10.12. Thiessen polygons built for fortified sites in the MRT region.

Figure 10.12 builds Thiessen polygons around all fortified sites in the MRT region using these outside sites to create boundaries that might approximate the extents of real spatial modality. The polygons in the micro-region create sharp angles due to the proximity of the Tarhos 1, Sarkad 8 and Sarkad 46 clusters. Small polygons formed from the close spatial association of the fortified sites in Füzesgyarmat. If proximity is an indicator of interaction, these small polygons probably suggest a closer relationship between fortified settlements. If the settlements in these clusters were contemporary, they were likely bound in a social alliance because they form their own module of similar size to other polygons. The ‘sister sites’ phenomenon of two mound complexes one next to the other in the Mississipian is explained by one village physically migrating next to any ally for protection, and assuming a subservient relationship, during a time of war (Blitz 1999). It is possible that some similar alliance was involved in the Füzesgyarmat and Tarhos 1 / Sarkad 8 proximity. Sarkad 46 may also be anomalous because of the short amount of time it was likely occupied (late Gyulavarsánd).

'Reformed' Thiessen polygons were re-created using these observations (Figure 10.13). When Füzesgyarmat 69 and Sarkad 8 become the sole center of these clusters, the ensuing polygons are smaller and more similar to the others in the MRT region. There is a final feature of political relevance for this landscape. The lower Fekete Körös is almost totally empty of settlement near the confluence with the Fehér Körös and probably represents a buffer zone. I suggest the cluster of sites on the Fehér Körös can be considered a social module centered on the major site of Gerla 74, an association similar to that identified for the Late Neolithic. If this open settlement is treated like a fortified site, the territories in Figure 10.13 now make sense.

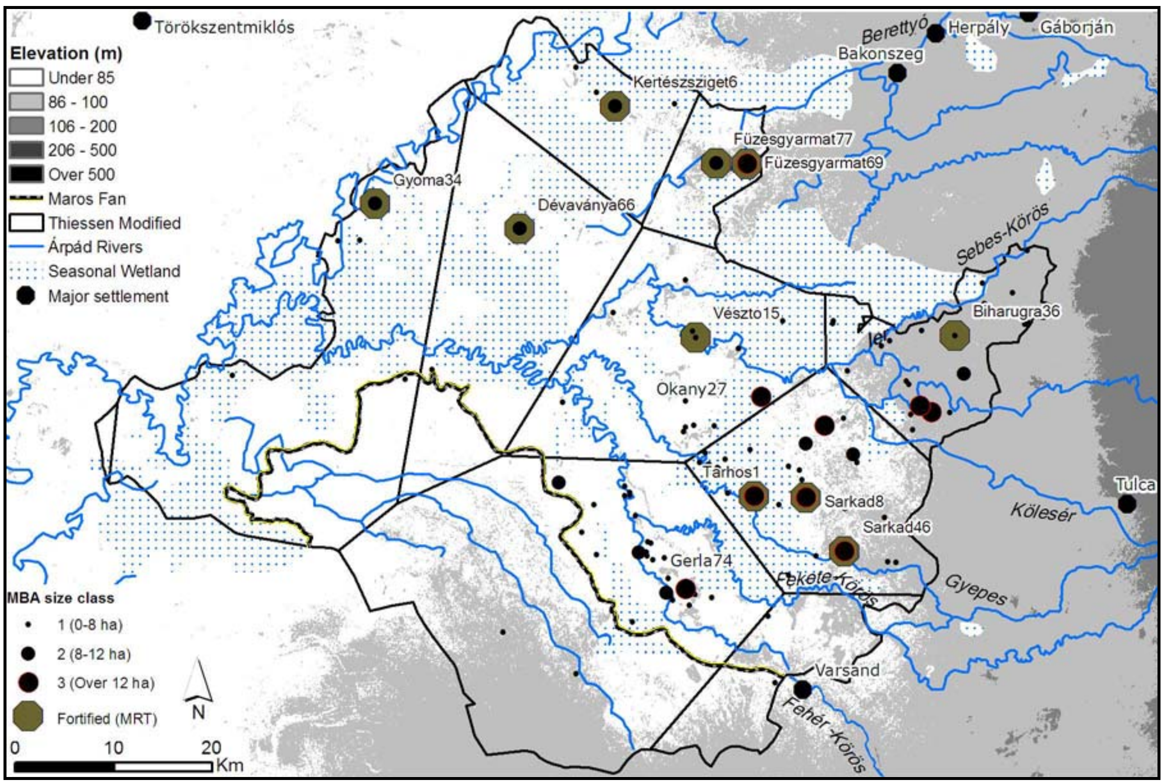

Figure 10.13. Reformed Thiessen polygon settlement clusters in the Middle Bronze Age MRT area.

The largest site cluster is in the micro-region, centered around three fortified sites of the Fás Ér. The northern boundary may be Okány 27, a Class 3 site. The two Class 3 sites on the north-eastern perimeter may form a boundary across the marsh in association with Biharugra 36. A third cluster is found along the Sebes Körös around Vésztő-Mágor (Vésztő 15) before it drains into the Berettyó. The sites of the Dévaványa Plain are clearly anomalous in terms of interactive units, but similar to one another as fortified isolates. The overall modularity is otherwise not unlike that found in the Late Neolithic and Early Copper Age (Parkinson 2002b, 2006).

Modularity among settlement clusters in the greater Körös region

Broadening the regional perspective further leaves behind the epistemic security of the region systematically surveyed and identification of spatial patterning becomes more tentative. In Figure 10.14, the Theissen polygon boundaries of the previous figure remain, but more of the region is provided to illustrate two additional potential settlement clusters: the Ier and the lower Berettyó valleys. Another series of single sites occur along the foothills: Sîntion, Tulca, and Socodor. Their precise sizes are unknown, but there is a potential modularity here certainly worthy of further investigation. The location of known sites near the river bottlenecks of anabranching rivers (those that split apart and then reconnect) is especially interesting. Tulca, Sîntion (Szentjános), and Esztár are all found at about 100 m.a.s.l. before rivers split up into the mountains, or split down into the plain.

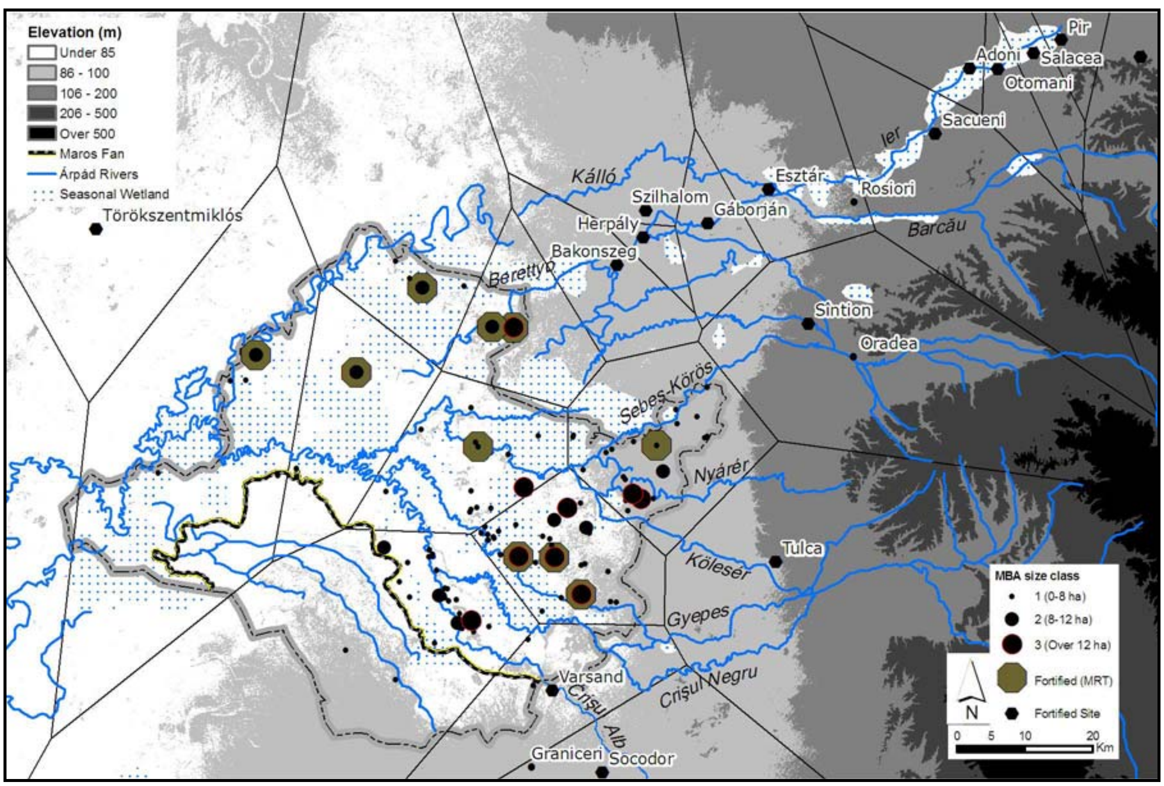

Figure 10.14. Thiessen polygons corresponding to hypothetical territories centering around fortified sites (in the MRT area) and major sites outside.

Esztár is a major site dating to the Late Gyulavarsánd phase – it is the largest enclosure in the lower Körös basin, although little is known of the area outside the fortification (Sz. Máthé 1988; Chapter 7). Sîntion is the site that Childe (1929:214) used to define the Eastern Hungarian Group II (Alexandru 1955). The bronze hoard of Oradea (Nagyvárad) is about ten kilometres further upriver (Bóna 1975:136; Cséplő 1910; Popescu and Rusu 1966). Tulca is the only known Middle Bronze Age site on the Crişul Negru (Dumitrescu 1983:144), although no details are published at this time.

Roşiori (Biharfélegyháza) is the first fortified late Ottomány/Gyulavarsánd site encountered moving up the Ier valley, but the dating of it is uncertain (Németi and Molnár 2002:159). Other major fortified sites occupied in the Ottomány and Gyulavarsánd, such as Săcueni (Székelyhíd) and Otomani (Ottomány) are then found at 5 or ten kilometre intervals in the Ier valley after the confluence with the Barcau (Berettyó) valley (Bader 1978:128; Németi and Molnár 2002:162; Ordentlich 1971)[101]. In the southeast on the Fehér Körös, Socodor is a major fortified site excavated by Roska in the 1920s (Popescu 1956a). The only known site nearby is the gold hoard from Graniceri, 12 kilometres south of Vărşand and about the same distance west.

Systematic survey around these sites leading into the Romanian foothills will help establish whether the settlements were small and fortified (ca. 10 ha) such as those on the Dévaványa Plain, larger fortified site clusters (ca. 20 ha) like those in the micro-region, or a different scale of site still, perhaps even larger, potentially with a different kind of interaction with open settlements around them than those observed in the micro-region and MRT areas. Their position at what are potentially 'control points' of the river network raises this interesting possibility.

[101] Although there are also sites known closer to the confluence, but they are small open settlements: Mihai Bravu (Németi and Molnár 2002:143); Diosig (Bihardióség) (Bader 1978: 124); Cadea (Nagykágya) (Németi and Molnár 2002:117; Ordentlich 1971:21; Bader 1978:121).

CONCLUSION: REGIONAL CONSOLIDATION IN THE KÖRÖS BASIN

In the previous chapter I provided a view of Bronze Age society built from a higher resolution, yet restricted set of data from the micro-region. The chapter has provided a greater regional context for these results.

The chronology of the Ottomány and Gyulavarsánd needs to be understood at a higher resolution before the differences in their settlement patterns can be fully understood, but they are presented in a simplified form in Figures 10.15 and 10.16. Three obvious patterns emerge. First, the wide spacing between fortified sites in the Dévaványa Plain is a feature of both Ottomány and Gyulavarsánd. Second, in the Gyulavarsánd there is a clear movement of settlements upriver. The Fehér Körös area has much more occupation, as does the area near the confluence of the Kölesér and the Sebes Körös. A more detailed chronology will help us sort these long phases into more synchronous patterns, and a better understanding of their economies will enable hypotheses concerning the importance of micro-environmental variation. Third, there is no site size hierarchy in the micro-region in the Ottomány phase, although there are fortified sites across the MRT landscape. Large settlements do emerge to form one in the Gyulavarsánd phase of the Middle Bronze Age.

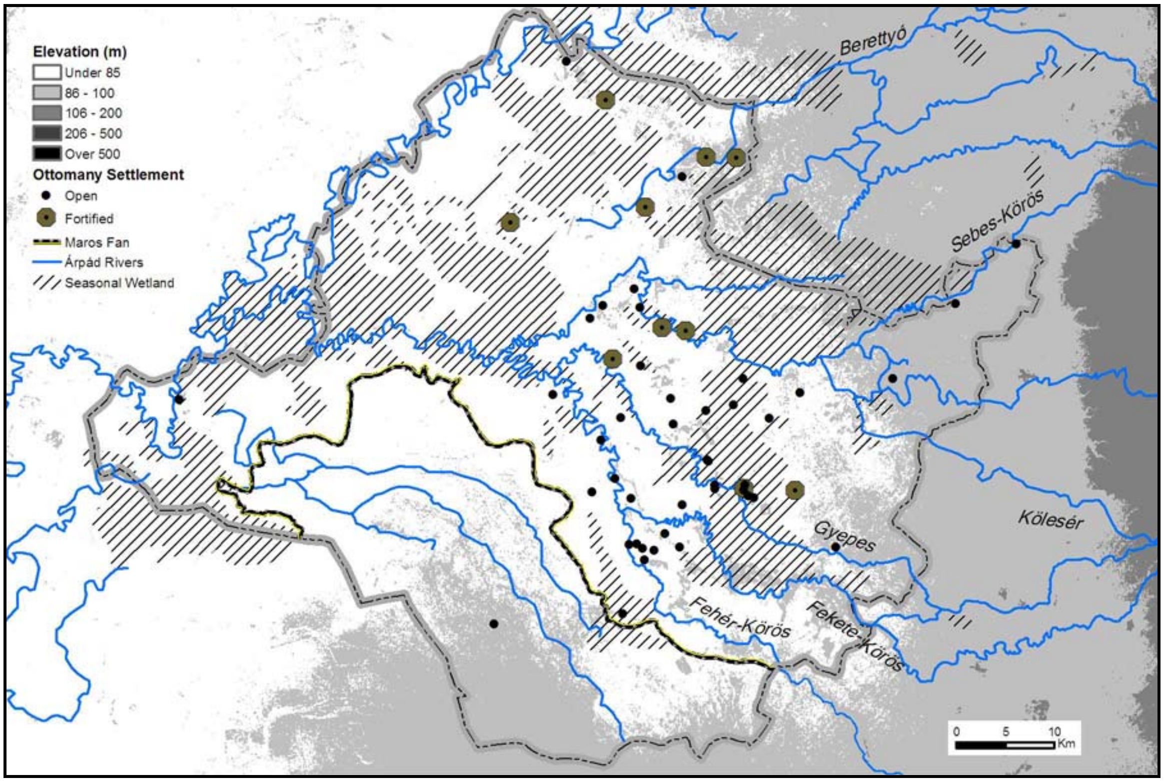

Figure 10.15. Ottomány settlement in the MRT area (fortified and un-fortified).

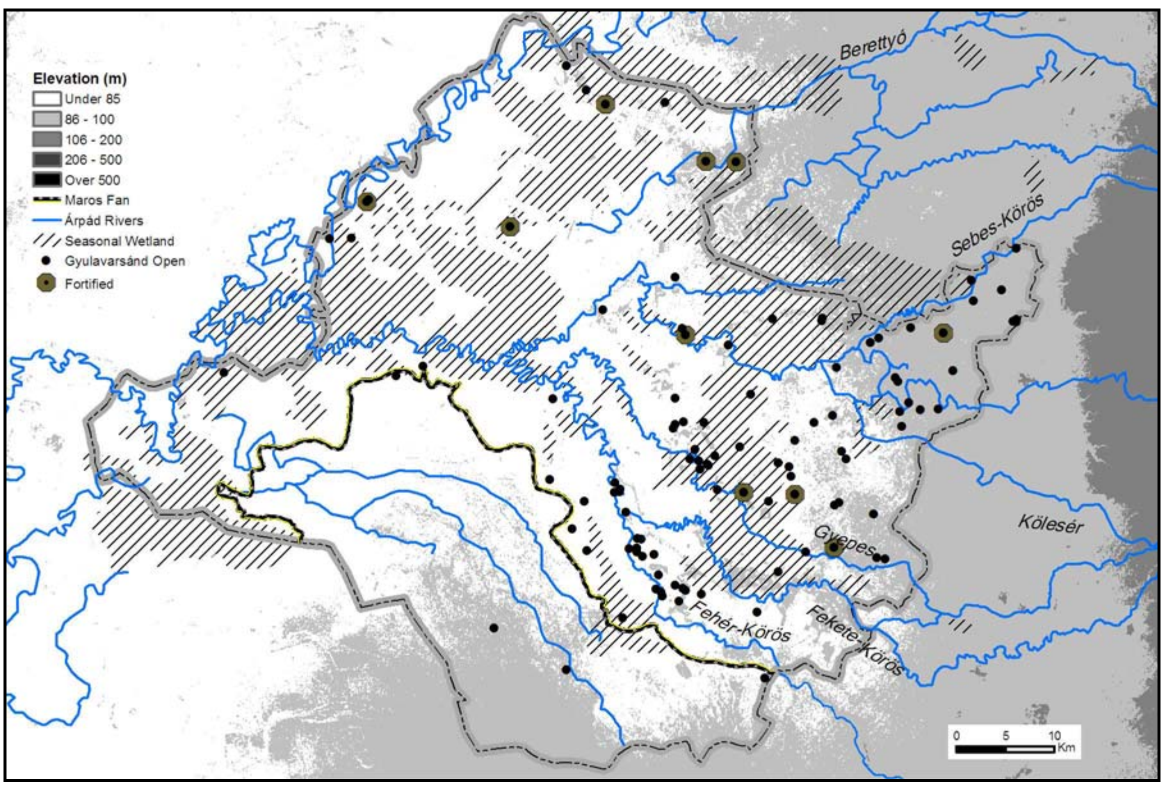

Figure 10.16. Gyulavarsánd settlement in the MRT area (fortified and un-fortified).

What might be the relationship between the apparent simultaneous increase in site size and number in the Gyulavarsánd? During the emergence of regional centers, all else being equal, there should be an actual decrease in the number of sites while the sizes of a few – the centers – increase. This is due to the attraction of followers by charismatic leaders employing people's labour, war clubs, and commitment (Stanish 1999; Steponaitis 1991). If that is the case, we are not only looking at the aggregation of people at large sites in response to leadership calls from the fortifications in the survey area. The greater site numbers in the MBA also indicate a larger population.

In light of this, it is worth further considering Bóna's early argument for a migration into the area. In Figure 10.33, settlement can be seen to be concentrated in a small area, not extending past the Sarkad 8 Cluster. Radiocarbon dates indicate the evolution of the Füzesabony group in the northwest 200 years before the emergence of the Gyulavarsánd group. The co-occurrence of Ottomány and Gyulavarsánd ceramics in equal parts at fortified sites in the Dévaványa Plain may indicate more integrated participation in the evolution of the Gyulavarsánd style. South of the Sebes Körös, population replacement seems less plausible since the ceramics here contain many points of continuous development. The patterns of virtual mutual exclusion observed during fieldwork, however, cannot be explained simply by population growth or migration and replacement in the micro-region. Although the migration hypothesis is difficult to prove, the fieldwork and analyses undertaken in this dissertation do not rule it out.

If the fortified clusters were attracting settlement for political reasons they were not 'chiefly' centers in Oberg's (1955) sense. A more detailed, systematic comparison of the Tisza-Herpály and Gyulavarsánd periods is beyond the current scope of inquiry, but the overall similarities in the site size hierarchies between the two phases and the lack of evidence for virtually *any* site asymmetries or social distinctions between large fortified sites and open settlements in the Gyulavarsánd phase suggests three things. Site size hierarchies at this scale cannot be used as a proxy for 1) settlement inequalities; 2) regional political consolidation; or 3) control of trade and craft production by the largest sites.

Despite the settlement autonomy observable in almost all of the indicators visited by this point, there *is* settlement modularity observable within the surveyed MRT region during the Gyulavarsánd phase, quite possibly extending out of it into the lower foothills of the Apuseni mountains. These may have been segmented political groups united by kinship or warfare, although a closer study of variability in material culture and potential alliances between these settlements would have to establish this independently. Figure 10.17 sketches what I think are plausible candidates for such social modules in the MRT region, and further up the Körös tributaries into the Apuseni mountains. Simply because we lack evidence for regional political hierarchy in this area so far does not mean that region political alliances between autonomous villages were not important, nor that there were no such asymmetries in the system.

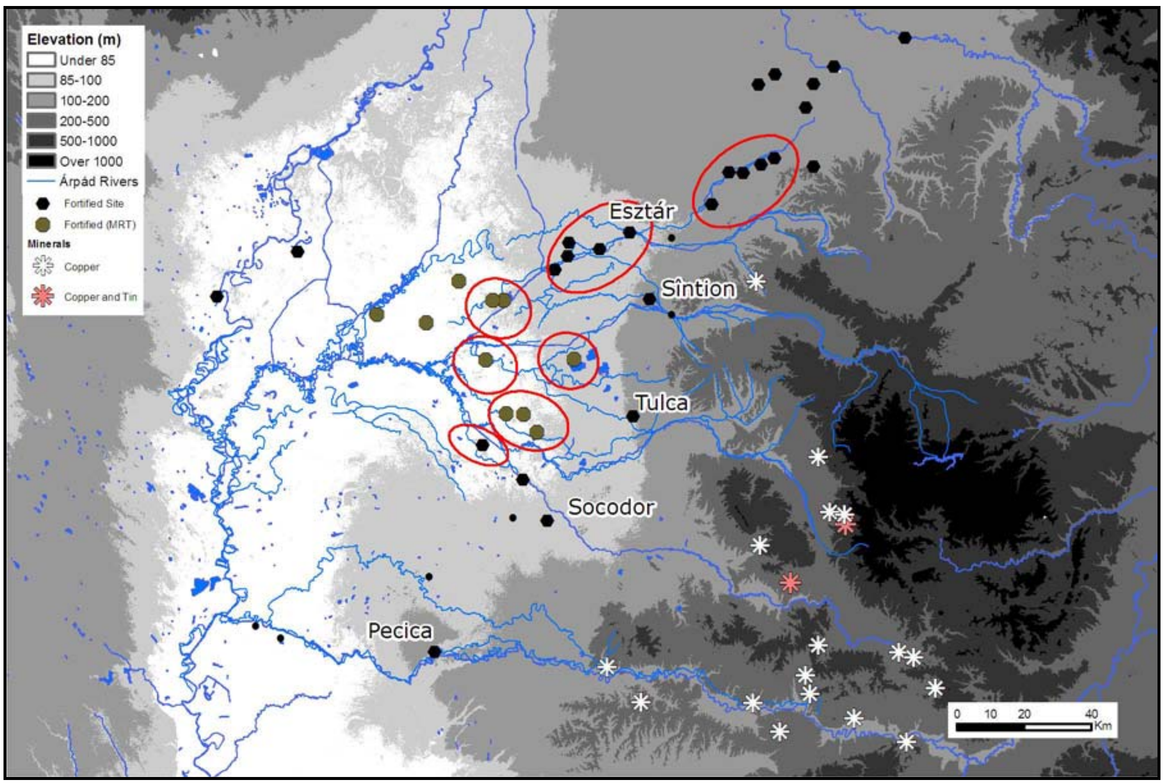

Figure 10.17. Distribution of ores and some suggested regional units in the Gyulavarsánd phase. Ore locations are from Papalas (2008).

I have also overlaid in Figure 10.17 the better known copper and tin deposits of the region found in these upper tributaries (Papalas 2008). Given the decline in stone tool production over the course of the Middle Bronze Age, and the disproportionate amount of evidence for bronze production and consumption in the southwestern part of the basin, it seems likely that proximity to these ore sources contributed to the metallurgical florescence. Although settlements in the micro-region show evidence for primary reduction of ores (smelting), it is unclear whether these were travelling unprocessed as down-the-line trade items in the Gyulavarsánd phase, or whether smiths are boating upriver to obtain them. At the moment, it is unknown if the lack of sites on the Crişul Alb (Fehér Körös) on the Romanian side of the border, closest to the high quality sources of copper and tin, is due to socio-cultural conditions in the Bronze Age or simply a lack of survey.

Bronze Age researchers of the Great Hungarian Plain note that major Bronze Age tells occur at important 'choke points' or 'overlooks' of confluences or large rivers (Kovács 1988). The Maros is an interesting example in this respect because it was likely a major trade corridor for ores, metals and other goods (O'Shea 2010). O'Shea notes that there is a string of large settlements along the river around 2000 BC. By 1700, however, many of these sites are abandoned just as metal production intensifies at Pecica and a few other major sites. Some choke points, such as the area on the Maros around Lipova, have the appearance of two cultural groups jockeying for control. Although the differences in elevation at the foothills of the eastern Carpathians in Figure 10.17 are exaggerated, it is possible that the Gyulavarsánd emergence of large fortified settlements such as Sîntion, Esztár and Socodor higher up in the river systems represent similar 'choke points' on in these anabranching rivers.

It must be admitted however that the geometry of the Körös river system is quite different from the Maros. Although the Maros branches into the Száraz Ér at Lipova, and bifurcates for a twenty kilometre stretch east of Pecica, it is fundamentally a single major river, unlike the several very slow moving tributaries that make their way into the anabranching network of the lower Körös basin. It is possible that control of the Maros trade network could effectively be achieved due to the concentration of river traffic along this one channel, whereas in the Körös area, beyond the several gateways to the foothills of Romania serving the lower Körös basin, no such consolidation could take place. Although I think the social conditions of strongly autonomous villages I reconstructed for the MRT area are probably typical of Bronze Age societies, the fracturing of river channels across the lower Körös landscape could have been particularly accommodating for such anarchical tendencies.

This concludes the exhaustive tour of Körös villages in the Middle Bronze Age. From the corner of an individual house to the interaction and integration of communities over the entirety of the basin, the picture that emerges at each level is one of a relatively equal and autonomous society. It is now left to discuss some more general issues that emerge from studying the Körös trajectory. I turn to the comparison of other Bronze Age sequences, and the implications for explaining change in middle-range societies in other times and places.

Chapter 11: The Bronze Age Körös among Middle-Range Societies

A nemzetközi helyzet fokozódik
- Comrade Virág, *The Witness*

In Péter Bacsó's classic 1969 film *A tanú* (*The Witness*), Comrade Virág, a high ranking member of the Hungarian national communist party, recruits József Pelikán, an ordinary dike keeper, to play a part in a mock-up show trial. The satirical film was banned after its release for its candid, outspoken criticism of the incompetent post-WWII communist regime in Hungary. In assuring the clueless Pelikán of the importance of testifying against an enemy of the state, Comrade Virág often repeats the ominous paranoid words that the world is not what it once was - *a nemzetközi helyzet fokozódik,* that is, "the international situation is intensifying."

As in Bacsó's world of mystic politico-economic change, some components of social life during the Bronze Age may have been 'intensifying,' but all is not what it seems. Some things were certainly different in comparison with the preceding Neolithic and Copper Age, but the Bronze Age social situation in the Körös area, what Stuart Piggott called the period of 'high barbarian Europe,' was characterized by many of the same basic tendencies: village autonomy, long-distance trade, and regional decentralization. Before advancing to broader comparisons, a recapitulation of this trajectory in the lower Körös basin is warranted.

THE KÖRÖS TRAJECTORY

The Great Hungarian Plain is one of the flattest plains in Europe and fills half of modern Hungary. It is surrounded by an arc of mountains – the Carpathians – that are rich in mineral resources such as copper, gold, and obsidian. The Plain, however, has no naturally occurring mineral resources, so everything had to be shipped in, or travelled to.

The rivers of the area, the Tisza, Maros and Körös network, were the major axes of trade during prehistory.

Farmers arrived around 6500 BC, following the major rivers and settling on their banks. By the Late Neolithic – 5000 BC – segments of the population were living in fortified settlements. These settlements built up stratified living debris several meters high, prompting early archaeologists to call them 'tells,' a convention that remains to this day. There were nonetheless many small, open settlements in the landscape, probably with rectangular wattle and daub houses like the ones we find behind the fortifications. There are few recognizable social inequalities at this time – burials are near settlements and contain few if any grave goods. Still, most archaeologists consider these fortified sites to be regional centers of activity and trade.

At the beginning of the Copper Age (ca. 4500 BC), there was a radical change in settlement. The fortified tells were mostly abandoned and small sites in-fill the landscape. By all accounts, an increase in interaction took place, with people moving more often in an expansive rather than restricted social network. Formal cemeteries also appeared for the first time. It is here in these mortuary sites that we recover the bulk of the copper tools and ornaments, jewellery and axes. Cemeteries like Tiszapolgár-Basatanya have burials showing social difference – this grave has six pots, this grave has one; this grave has three axes, this grave has none – but it above all indicates a couple of 'leading individuals' per generation (Bognár-Kutzián 1963). Houses were smaller than they were in the Late Neolithic. Around 1500 years later, however, recognizable houses disappear from visibility.

Something new happened at the end of the Late Copper Age (ca. 3000 BC). The landscape became speckled with burial tumuli, suggestive of material culture from the Russian steppe. The pattern is classically attributed to an invasive militaristic culture of Indo-Europeans. This assertion aside, over the next 500 years, specifics in the ceramic inventory are most similar to contemporary ceramics in Transylvania but also share stylistic motifs common across a large part of Hungary and Western Romania. By 2500 BC although there were settled communities on the Maros and in the Ier valley of Romania, the lower Körös basin in the area visible with systematic survey seems to have remained very sparsely inhabited or was home to people who did not leave significant settlement remains for another five hundred years.

A recognizable settlement pattern in the lower Körös basin emerges to mark the beginning of the 'classical' Bronze Age around 2150 BC and persists until 1400 BC. In the later half of this sequence the Gyulavarsánd culture was characterized by elaborately decorated ceramics, remarkably detailed engravings on horse bridle accessories, and fine incising on difficult to produce bronze swords. In neighbouring cultural entities outside of the basin at this time, formal cemeteries show hereditary inequalities. Not long after it had begun, however, the cultures of the Middle Bronze Age submerge back into the landscape to be reorganized under an entirely different cultural pattern.

A new social model of the Bronze Age Körös

How do we describe the societies involved in this trajectory, and how do we account for the changes we see in the Bronze Age? The emphasis on wealth, differences in burial inclusions, and fortified sites has traditionally prompted the use of Iron Age analogies or the idealized hierarchy of Indo-Europeans. But using these sources to help reconstruct the prehistoric past introduces its own problems. Tacitus and Caesar, like the French, English and Portuguese during the colonial period, used the language of states ('kings', 'taxes', and 'nations') to describe the stateless people they encountered. Like the Europeans of the colonial era, they inflated decentralized societies into political entities they were not. This needs to be undone not only for Iron Age societies, but also for the Bronze Age. Similarly, the structural Marxist tendency to conclude there is social hierarchy – when there are only observed *differences* – is often premature.

As an alternative to these models for the Bronze Age, I have suggested we employ the rich tradition of anthropological archaeology to reconstruct one social dimension at a time. Using this approach, and taking only the published literature in the Körös basin, a comparison between fortified sites does not show a signature of concentrated wealth production and trade. There is certainly evidence for metallurgy and the consumption of exotics, but metal production is regionally skewed to the southeast. Horse rearing may have been less restricted, but is everywhere uncommon. Some extensively excavated tell sites, such as Túrkeve and Herpály, barely have any evidence at all for the consumption and production of metal. They do not easily conform to a model of regional importance in this respect.

My fieldwork began with the settlement typology developed for the Ottomány and Gyulavarsánd culture area dividing sites into fortified and small open settlement classes. Investigation around Békés-Várdomb and Sarkad-Peckesi-domb, two sites in an area moderately high in metal production, revealed a three to four fold increase in population over the course of the Middle Bronze Age. The percentage of the population at the fortified sites went down over the course of the MBA however, from around 50 to 20 percent. What archaeologically detectable activities took place at the open settlements, involving half or most of the people on the Bronze Age landscape? Surface collection and excavation leads me to believe activities similar to those attested at the fortified sites: farming, exchange for exotics, and the production and consumption of metals.

Looking at Middle Bronze Age cemeteries outside the lower Körös basin one is likely to argue that bronze consumption was about status signalling. Looking at the settlements, one might suggest it was about the tools used every day. Either way, settlements were producing their own metal; it doesn't seem that anyone was reliant on the fortified sites for access. Over the course of the MBA, bronze production increased and chipped stone production became very rare at fortified and unfortified sites. This suggests that the technological change was being felt by everyone, not only a small fraction of the population. Everyday tools such as knives and awls were made out of bronze, but probably were so heavily curated that they rarely made their way into the archaeological record. The low absolute quantities of bronze at settlements in the Körös area should therefore not be taken as an indication that bronze use was minor compared to other regions.

Excavation at an open settlement indicates that people lived in slightly different houses, probably relating to the surface they were building on. With few other apparent differences, surface collection and site visits indicate that the principal distinction between fortified sites and open settlements in the Gyulavarsánd phase is *size*. Most settlements are only a couple of hectares in extent. By contrast, the fortified sites are 20 hectares, an order of magnitude larger. Estimating the number of people that lived at one of these sites obviously depends on how much of the site was occupied at one time. The density of houses within the enclosures was certainly four to five times the density outside of it. Still, my estimates suggest populations living in settlement clusters numbered maximally 500 people, the upper limit in which we find societies with no permanent decision making hierarchies. The areas outside were segmented in space, which certainly would have reduced the scalar stress of interaction.

Nonetheless, the increase in population in addition to the growth of fortified settlements in the Gyulavarsánd phase understandably rouses the 'inner Childe' of Bronze Age archaeologists. Europe's Grand Synthesizer argued long ago that tribal wars occurred over land shortages and that the introduction of the plough was a solution to land scarcity. Even before him, Marx and Engels had identified land scarcity and aggregation as the fundamental driver of inequality and the changing modes of production. In their minds, a growing population begat competition for land, producing heightened warfare, a landless class and, eventually, the devaluation of labour.

Despite the increase in population, however, by my calculations there would have been no need for regional competition over arable land or pastures. Using only the highest quality land to estimate availability, there was probably more than twice the amount required by the population at any given time. At this level, there may have been little change from the intensive gardening strategy of the Neolithic, where *labour* was scarce, not land. In this sense, it is more like the African production pattern described by Goody (1976), even if Bronze Age people were the descendants of the first Indo-Europeans.

This possibility must nonetheless be tempered by the strong likelihood that intensification to plough agriculture did take place locally at the more populous fortified sites. Still, one needn't invoke HRAF correlations to suggest that on-site hierarchies defined local interactions and that labour was controlled by a minority. The size of these villages and their organization in space suggests that labour could have as easily been organized by social segments. Given there was no regional land scarcity and aggregation wasn't to protect the region's only metal production areas, the question of why these fortified sites aggregations emerged to spur 'local intensification' must be reiterated.

Although I don't have an answer to this question at the moment, one might consider a broader scale of interaction. A closer look at the relationships between fortified sites and open settlements indicates that there was no necessary dependency or asymmetry between them. Yet there is a modularity to suggest that there are interactive units south of the Berettyó on the landscape on the Hungarian side of today's national border during the Gyulavarsánd phase.

We clearly have a settlement hierarchy in the Gyulavarsánd phase, but it wouldn't be the first time we have a settlement hierarchy in the region. Given the broad comparability between the MBA and Late Neolithic and the little evidence of social inequalities in either of them, this is clearly not a good measure of regional political hierarchy despite its use as such by many archaeologists.

Even so, the spatial clustering of these site hierarchies probably indicate some form of social integration, whether it was kinship related or only political unification for defensive purposes. The social clusters I have suggested here are groups that have a spatial logic intuitive to the naked eye, but more careful study may reveal them to be real entities. The suggestion that large Middle Bronze Age sites at the central nodes of branching rivers at the foothills of the Carpathians may look different than those of the lower basin, and were potentially more controlling, is an additional hypothesis that might merit further consideration.

Despite this possibility, the existing evidence for house form and limited evidence for segmentation outside of the fortified sites suggests that MBA societies of the Körös region could have been strongly autonomous. Household data, coupled with the lack of centralization in craft production at the fortified sites, provides no compelling reason to believe that any village or domestic unit was subservient to, or lower ranked than, any other. Perhaps the development of segmentation didn't greatly exceed that found in the Late Neolithic 3000 years before. If anyone is interested in drawing a political comparison between European societies observed by the Romans, then, my suggestion would be more German, less Gaul.

Neighbouring groups on the Great Hungarian Plain

Current work in two particular regions of the Great Hungarian Plain are especially well suited to comparison with the Körös sequence: the Nagyrév-Vatya cultures of the Middle Danube, and the cultures of the Maros river. The impressive cemeteries of the Vatya culture have hundreds of cremation urns and unequally distributed bronze wealth (Bóna 1975; Vicze 2003). Like the Körös area, the fortifications of the Vatya sites reveal a regional site size hierarchy, now being studied in the Benta Valley (Vicze 2000; Vicze, et al. 2005). The scale of tell sites in the Vatya area nonetheless seems to be much larger. Systematic excavations at the fortified site of Százhalombatta suggest that the economies may have been similar to the Körös in some ways, but different in others. On the one hand, there is direct evidence of draft animals that may indicate similar productive strategies inferred for populous sites like Békés-Várdomb (Vretemark and Sten 2005). There is evidence for older cattle and sheep at Százhalombatta, however, suggesting a greater use of secondary products. Who controlled these products, how production and consumption differed between fortified and outlying sites, and the strength of the social distinctions between them is now a primary focus of investigations (Kristiansen 2000; Vicze 2005).

The sites of the Maros group in the Tisza-Maros confluence and new research further upriver are also an obvious comparison. The mortuary program of Maros communities is well understood, indicating a consistent and distinctive inter-community character over time and the presence of hereditary social positions (O'Shea 1996). It also demonstrates an interest in the display of exotic wealth, though this decreases over time. O'Shea suggests the absence of these exotics in mortuary contexts at the end of the Middle Bronze Age may indicate a growing acceptance of the display of wealth inequalities during life. The mortuary program of the Körös area is yet to be deciphered, so this comparison is not possible to make.

One interesting similarity that can be drawn with this area, however, is that despite the hereditary inequalities, Maros settlements were small and autonomous. O'Shea (1996:347) suggests they were self-contained communities of small social segments totalling 40-50 people, active in metal production, warfare, and trade. Similar to the houses of the Körös, their storage was internal, though household aggregation and mortuary evidence for inter-community sodalities indicates horizontal ties. Although this is the scenario envisioned for most of the settlements in the Körös area, something different is going on at the fortified site clusters in the Gyulavarsánd phase. Site sizes are less well studied on the Maros, but if both areas did have autonomous villages but the Maros lacked large aggregations, this is another feature to be explained.

In many ways, the emerging evidence from Pecica *Şanțul Mare* contrast with settlements of the Körös region and lower Maros sites such as Klárfalva and Kiszombor (O'Shea 2010; O'Shea, et al. 2006; O'Shea, et al. 2005). This site and its rich bronze inventory have been the chronological yardstick for southeastern Europe since Roska's (1912) excavations in the early twentieth century. Cores indicated six metres of stratified deposit and a ditch potentially eight metres in depth, with multiple construction episodes. Although the area enclosed by the ditch is still less than one hectare, the halo of settlement around it is four metres in depth, and potentially extends out quite far. In this sense, Pecica is more similar in size to Százhalombatta on the Danube. In contrast to the current evidence for the Körös area and the lower Maros, the potential that Pecica actually was a regional center unlike any other in its surroundings, is also currently under investigation.

COMPLEXITY IN BRONZE AGE EUROPE

In addition to local comparisons, the development of a new model for the Körös Bronze Age invites comparisons with other trajectories in Bronze Age Europe. There are many areas of Europe with copper bearing deposits, site hierarchies and mortuary traditions with inequalities. Although these are archaeological similarities at a broad level, a closer look is required to see in anthropological terms how similar they really are. I focus here on only two cases; my interest is not to provide an exhaustive comparison, but simply to highlight some features that I think merit further investigation.

Southern Spain

The first set of trajectories of particular interest is that of southern Spain (Chapman 2008). The transition to the Argaric Bronze Age is one of several distinct sequences in Spain beginning around 2250 BC, just before the emergence of the Ottomány culture in the Körös area, and terminating just before the end of the Gyulavarsánd (1550 BC). There are both commonalities and differences between these trajectories. Similar advances in metallurgical production, magnificent weapons and jewellery are found in both traditions. Like the Körös area, Argaric settlements can be divided into more populated fortified sites (5-6 ha), and more common, open settlements (under 1 ha). Like the Körös Bronze Age sites, scholars typically believe that the larger fortified sites were home to an elite class controlling labour and the circulation of wealth. As in the Körös area, use of stone tools declines over the course of the Bronze Age, with a growing emphasis on metal not only for display, but as the rudimentary means of production. Methodologically, there has also been an overemphasis in the Spanish Bronze Age on the excavation of one site type (large fortified ones) at the expense of others. Consequently, characterization of the extent of craft specialization, division of labour, and the dependency and inequalities between different types of settlements may be exaggerated.

Still, there seem to be important differences between the Körös and Spanish trajectories. Some of the largest sites in the Argaric area do in fact seem to exceed the productive ability of their catchments (Castro 1999). There is therefore a strong possibility that the fortified sites received tribute in grain or livestock, although simple economic specialization and exchange should not be ruled out. Economic specialization in horse breeding and metal production may have been common in the Spanish sequence while such evidence is almost absent in the Körös (Harrison 1985; Nocete, et al. 2008). Moreover, at sites such as Fuente Álamo, there is also a strong correlation between the weight of metal in a grave offering, close proximity to metal producing areas, and storage and consumption (Risch 2002:267-274). In sum, although inter-settlement inequalities are not social features of the Körös area, they may very well characterize Argaric Spain.

Southern Greece

Southern Greece is currently the only likely case of Bronze Age state formation in Europe. The Palatial period in Greece and the trajectory leading up to it is therefore an interesting contrast to the Körös sequence (Dickinson 1994; Galaty and Parkinson 2007; Renfrew 1972). The Aegean Bronze Age also has multiple trajectories, although they overlap in dramatic ways. The sequence of continued occupation is longer, beginning in 3100 BC with the Early Helladic. Although the radiocarbon data for the Maros sequence begins not long after this (ca. 2700 BC), the Early Bronze Age settlement pattern of the Körös basin is extremely sparse until 2150 BC. Both the mainland and Minoan Crete show evidence for autonomous political development beginning between 2100 and 1900 BC. There is strong evidence for an invasion of the Minoan island by mainlanders around 1350 BC, just before the end of the Late Bronze Age (ca. 1200 BC).

As with the Spanish trajectories, there are both similarities and differences with the Körös area. One of the most interesting features is that household differentiation took place early here, even as far back as the Late Neolithic, identified as the emergence of a 'megaron elite' in Thessaly (Halstead 1994:203). By the Early Bronze Age in the southern mainland, monumental 'corridor-houses' with tiled roofs distinguish a minority set of households from the rest (Rutter 1993). During the Early and Middle Bronze Age in the south, closer ties between households and asymmetrical growth may have led to the 'banking of surplus' by some households, contributing to increasing distinction between them and the aggregation at what would become the palatial estates in the Late Bronze Age (Halstead 1994:207). The question emerging from this possibility is how important these different starting conditions were for the subsequent development of complexity, and how rare these conditions might be.

Another interesting comparison is between site size hierarchies. Late Bronze Age palatial settlements such as Mycenae and Pylos may have been between 20-25 hectares (Bennet 2007:34; Small 2007:49; Wiener 1990:129-31). The functional specialization at the fortified centers of Late Bronze Age Greece – storage, taxation and the distribution of goods – is entirely unknown in Hungary. Despite similar site sizes in the Körös MBA and the LBA Aegean, the scale of the political entities in the Late Bronze Age of Messenia exceeds that observed in the Gyulavarsánd phase of the Körös area by an order of magnitude. The LBA IIIB kingdom of Pylos, for example, may have had an expanse of 2000 km^2 and a radius of 25 kilometres – a half a day's march of troops at quick time (Bennet 1995, 2007).

Discussion

Accounting for differences between these trajectories would obviously require a more careful and thorough comparison. In this brief overview of the Körös Bronze Age to two other European sequences, I draw attention to only two issues before I move on to more general topics. Each of them is relevant for the development of the theory and method for studying middle-range societies.

The first is the duration of the sequence and the question of tempo, a comparison only now possible due to absolute chronologies for each region. The local periodization of the Bronze Age certainly depends on idiosyncratic scholastic definitions of culture-history, but the overall recognition of a cultural tradition with a certain degree of continuity – the Helladic, the Argaric, or the Ottomány-Gyulavarsánd – offers a broad degree of comparability. In this sense, Spain and Hungary have a similar duration, but the preceding Copper Age in Spain did not have a settlement hiatus like the Körös area around 3000 BC. Greece had a much longer Bronze Age trajectory than either of them (900 years earlier, and 200 later). Beyond the possibility of important differences in starting conditions, is there a required duration for the development of inter-settlement asymmetry and regional political consolidation once certain basic preconditions are met (cf. Ames 2005)? The potential for studying tempo of change and the effect of cultural interruption (e.g. invasive migration or devastating climatic fluctuations) is now possible in a way it never has been before.

The second issue emerging from this broad comparison is the lack of relationship between site size hierarchy and functional specialization in the highest tier. Fortified sites in the Gyulavarsánd Körös are bigger than the largest fortified sites in Spain. The sum of the enclosed tell and the settlement halo at Békés-Várdomb may be similar in size to LBA Palatial sites, although the density of settlement at the latter was certainly higher. The strong evidence for functional specialization in southern Greece during the LBA however, represents the legitimate identification of a social hierarchy, not only locally, but potentially two tiers above the producers (Bennet 1995, 2007). There is no such evidence in the Körös Bronze Age, even if the site size hierarchy may be broadly comparable.

I now turn to how these issues extend into the broader literature on middle-range societies, and how they might contribute to developing improved theory and method.

STUDYING COMPLEXITY IN MIDDLE-RANGE SOCIETIES

Anthropological archaeology has reached a point of maturity enabling the comparison of long prehistoric sequences (Blanton, et al. 1996; Drennan and Peterson 2006; Earle 1997; Feinman 1991; Spriggs 2008; Wright 1986). The methodological improvements and depth afforded by focusing on specific topics such as the household or craft production greatly enhance our understanding of stateless societies. Using improved individual methods in unison will allow us to better understand the diversity and similarities in social trajectories all over the world. Broad explanations for social change become testable only once manageable units are similarly packaged for comparison. For this reason, I have broken down the study of social complexity into several key social dimensions broadly amenable to archaeological inquiry.

In this final section, I draw attention to three aspects of middle-range societies that I think archaeologists might pay closer attention to in studying cultures in Bronze Age Europe and elsewhere: the social distribution of production and consumption, regional political consolidation, and the place of public ritual and architecture in trajectories of increasing complexity.

Social distribution of production and consumption

Community based production and consumption means shared production, communal storage, broad equalities and decision making involving most members of the local group. It is found among the Kalahari San and Israeli kibbutzim, and does not automatically collapse when production intensifies, leadership is institutionalized, or technological capabilities increase. The egalitarian ethic is not easily erased; indeed, the 'communal mode of production' dies hard (Keene 1991; Lee 1979; Cashdan 1980).

The nuclear family may be a similarly stable unit of production and consumption. Archaeologically, we see this in small houses, internal storage, and few community features in the built environment. In the Körös region, despite cultural change and differences in aggregation, the small independent household cluster is attested over a period of more than 4000 years. For the most part, these households show a distinct lack of interest in intensifying production. This may result from no cultural impetus for, or potentially no shared acceptance of, these activities. Broadly shared cultural norms with strong self-determination at the household level may be a combination hard to break.

Self-determination at this level may be more important than common models of middle-range societies recognize, and the literature on the political importance of exotics and craft production is a case in point. In many research traditions, an excavation focus on the largest, most impressive sites in a region yields evidence for craft production or imported goods. The next step has often been to assert that these sites are regional centers controlling the importation, production, and distribution of goods. In more recent years, an intellectual movement to explore the sources of power has led some archaeologists to focus more on the *symbolic* importance of rare or exotic goods. Thus, models of craft production have been tied up in notions of power.

A step back from the 'regional centers' and evidence for what happened at smaller settlements is required to evaluate the possibility that some sites had privileged access to exotics or direct control of craft production. This is not only evident in the Bronze Age Körös, but is an increasingly common conclusion in the study of other complex middle-range societies, such as Moundville (Davis 2008), and even Mycenaean Greece in the Palatial period (Parkinson 2007). Increases in craft production and the movement of exotics may certainly be a marker of complexity, but the lack of necessary attachment to an elite means that it need not be a marker of inequalities.

The intensification of food production is another aspect of middle-range societies that requires special attention. On the one hand, there may be cultural incentives to raise productive output in the absence of any broader regional requirement such as land scarcity or population pressure. In the Pacific Northwest, asymmetrical household growth may have been partly in response to growing labour needs for evolving technologies related to resource capture (e.g. reef net fishing), itself related to the growing importance of intra-community ranking based on surplus and generosity. In southern Greece however, intensification may have occurred only *after* changes in household size. The initial thrust for the growth of larger households and asymmetrical surplus pooling may have resulted from attempts to reduce the effects of inter-annual productive variance (Halstead and O'Shea 1982; Halstead 1994). The growing importance of the palaces and the utilization of labour and traction animals present a level of intensification likely unknown in earlier parts of the sequence. In sum, while the regional conditions of productions must be a starting point for understanding local trajectories, decision making at the household level and consequent growth due to different strategies or accumulation in the long term means that the location of intensification of food production in trajectories of middle-range societies may rarely be consistent.

Regional political consolidation

Throughout this dissertation I have often circled back to the emergence of regional political hierarchy, the *chiefdom* as originally defined by Oberg (1955), as a key feature in the development of complex societies. In my attempt to identify this feature in the Körös region, I often relied on the identification of *tributary relationships* between one settlement and another. Although tribute is an important component of recognizing regional political hierarchy archaeologically, tributary relationships are not confined to inter-community bonds. A tributary relationship between lower and higher ranked segments existed among the Nootka in a single settlement, for example, and these groups never achieved regional consolidation (Drucker 1951:246-256). The highest ranked household of a winter village owned a defined territory and the resources within it, allotting rights to lower ranked households for use. The first catch of the season, first berry harvest, and other important resources were the property of the highest ranked and were collected as tribute, even if much of it was circulated back to the villagers in feasts. Regional hierarchies therefore do not necessarily precede tributary economies, nor do tributary economies have to precede regional political hierarchies. Interestingly, few theorists make the claim that one of these trajectories is cross-culturally more common than the other[102].

Regional political hierarchies, where all villages are subservient to the leadership of a dominant village, are well documented in the ethnographic record, but their emergence is still poorly understood. Because there are extremely few circumstances in which this process has been observed ethnographically, future documentation and study of it must necessarily come from the archaeological record. In order to do so requires sharpening our methodological tools.

I suggest that the archaeological use of *site size hierarchies*, in the absence of explicit reference to scale and evidence for functional specialization, be abandoned as a common indicator for regional political hierarchy. In the Körös region, I identified two site size hierarchies: one in the Late Neolithic, and one in the Middle Bronze Age. Neither period has independent evidence for regional inequalities or inter-site asymmetries. Moreover, the range of site sizes in these hierarchies is not so different from that observed in the 'Early State Module' (ESM) of Mycenae (under 1 ha to 25 ha).

The *scale* is of course different. Renfrew (1975) identified ESMs to be polities approximately 1500 km^2 in size, which is born out in Greece by Bennet's (1995, 2007) recent summary of the Pylian trajectory (ca. 2000 km^2). The 'polities' identified in the Körös region may be 300 km^2. In *Peer Polity Interaction*, Renfrew and Cherry (1986) rightfully note that while interacting polities may be equally well defined in chiefdoms, their scale is an order of magnitude smaller. Therefore, *at this scale*, the significance of an archaeological site size hierarchy is ambiguous. The 'polity' may be a regional political hierarchy, a loosely formed confederacy or a group sharing kinship affiliations.

If the site size range is not necessarily different between ESMs in Greece and autonomous village societies in the Gyulavarsánd phase, the functional specialization in the highest tier of the size hierarchy certainly is. Sites such as Pylos and Mycenae are highly specialized, in architectural layout, storage components, and activities, while the only archaeologically visible difference between Gyulavarsánd tells and open settlements is fortification and population aggregation. It is unclear exactly how this functional

[102] But see Carneiro (1998), who argues for the emergence of regional hierarchies without any tributary basis.

specialization changed in the pre-palatial era, but these changes most likely occurred when the 'modules' were of sizes much more comparable to the Late Neolithic or Gyulavarsánd phase in the Körös area. Identifying functional specialization at the large sites in a module is therefore critical to documenting political integration and asymmetry.

The final problem with assuming regional political hierarchy through site size hierarchies lies in a particularly common sampling error. The power, ability and unique quality asserted for the dominant site in a size hierarchy is sheer speculation until other settlements in the settlement hierarchy have been investigated. Unfortunately, this is exceedingly rare in archaeological traditions studying middle-range societies. The largest, most complex sites get the lion's share of excavation because they have deeper stratified sequences usable for regional chronologies and the 'nicer stuff' because they were the centers of economic importance and trade. This research strategy, and its self-fulfilling conclusions, can now be abandoned in part because of the autonomous radiocarbon chronology, but also because where settlements away from the centers *have* been studied, they often indicate that the control of production and exchange assumed for the centers is not borne out by the evidence. If we take the archaeological record and pull out site size hierarchies without demonstrated functional specialization at the largest sites, the number of 'chiefdoms' currently identified in the literature would drop dramatically.

It may in fact be that regional political hierarchies are quite rare in Bronze Age Europe in comparison to trajectories in other parts of the world. There are two common sources for the identification of chiefdoms in Bronze Age Europe: settlement patterns and wealth inequalities in cemeteries. Comparisons between cemeteries in a given region rarely identify hierarchies across space. One of the most commonly identified settlement patterns is the distinction drawn between fortified 'center' and the outlying settlements. As was the case for the Gyulavarsánd area before size quantification in this dissertation, the distinction was a settlement typology, not a size distribution. Even if such size distributions could be produced, however, I suspect that it would be only in rare instances that strong settlement asymmetries and control of exotics and craft production would be identified. Some work at open settlements even in the Iron Age suggest that the control often assumed for the massively fortified Iron Age enclosures may be not real (Wells 1986, 1996). If this is the case, it would mean that vast amounts of the European landscape in prehistory may have been ungoverned, and structurally much less complex than the interacting 'pre-state political formations' known to cycle for hundreds of years previous to primary state formation (Wright 1986,1994). The logical alternative would be that horizontal alliances such confederacies and sodalities were far more commonly the mechanisms of integration in Europe.

Emphasis on public ritual and architecture

Above I argued that identifying pre-state political formations in the archaeological record requires not only a focus on site size hierarchy, but also the identification of functional specialization and control at the regional centers. Beyond storage and re-distribution (or mobilization) of products lies another kind of specialization: ritual. In a recent paper, Drennan and Peterson (2006) compare three areas with trajectories of regional political hierarchy: the Valley of Oaxaca (Mexico), the Alto Magdalena, (Colombia), and Northern China. They note a strong degree of variation in demographic scale, spatial organization, economic specialization, extent of hierarchy, and degree of exotic materials imported into each system. Perhaps one of the greatest commonalities between them is their focus on supralocal ceremonialism. Plazas in the Hongshan tradition of North China, and the burial monuments of the Alto Magdalena could easily accommodate large aggregations of people for public rituals. A stone masonry platform at the regional center of San José Magote in the Valley of Oaxaca is also a testament to the importance of ritual in the emerging cosmology of regional hierarchy. The Oaxaca Valley was the only trajectory to combine supralocal ceremonialism with strong degrees of economic specialization and inter-dependence; it was also the only one to develop into a state.

In each of these examples it is easy enough to identify site size hierarchies, and in each one there is monumental architecture associated with public rituals at the highest tier. The same can be said for other well known examples in North America such as the 'great towns' of Cahokia and Moundville (Neitzel and Anderson 1999). Regardless of the specific form of regional political integration in these examples, there is perfectly believable functional specialization identified at each of them. In sum, beyond economic (or political economic) functions, a focus on public ritual and aggregation may characterize regional political hierarchies more than any obvious archaeological trait; the striking absence of such features in many traditions of the European Bronze Age is worth noting.

There are certainly examples of monumental architecture in autonomous village societies, so the simple presence of it does not indicate a regional political hierarchy (Barth 1987; Strathern 1971). The patterning of monumental architecture in non-hierarchical societies is nonetheless somewhat different. Earthworks or causeway camps were certainly central places, but did not have year round occupation of ritual specialists (e.g.Howey 2007). In the absence of a nomadic seasonal pattern (Flannery 1999a), the reason for the association between settlement, monumental construction, and regional hierarchy therefore remains an interesting topic.

CONCLUDING THOUGHTS

In Chapter 3, I presented a general evolutionary sequence of socio-economic conditions as a low-level hypothesis for the evolution of middle-range societies. I argued that archaeological sequences were needed to establish its overall validity. In the Körös trajectory, we observe oscillation between different forms of integration from the Neolithic to the end of the Middle Bronze Age. As in neighbouring areas, over the course of four thousand years some inter-personal inequalities probably became introduced into mortuary display. Some individual settlements may have reached their maximum potential for growth. Yet there are few indications that production was qualitatively different between houses, and no suggestion that some settlements received tribute or had full time craft production. The social reconstruction therefore indicates that none of the most basic thresholds of a low-level system state of complexity had been breached.

Of course this need not hold for all of Europe, or even all of the Carpathian Basin. As we saw in the brief review of the Spanish and Greek trajectories, as well as in the contrasting patterns in adjacent portions of the Great Hungarian Plain, organizational form differed across the Bronze Age landscape despite some superficial similarities. A mosaic pattern of social variability is therefore the more likely scenario. Now that an absolute chronology is available for Bronze Age Europe, how these social entities interacted, maintained their cultural identities, or changed to form new ones are all questions that can be answered in a way that used to be nearly impossible. Although it is more difficult and time consuming to build a detailed sequence according to the social dimensions I have used in this study, it has value for cross-cultural comparison and the potential for gaining insights into general evolutionary features is greatly enhanced. I have described the Hungarian Bronze Age Körös sequence here, but many more trajectories are needed to identify what really *was* new about the Bronze Age, and how intense the situation was for the people living through it.

Appendices

Appendix A:Radiocarbon Dates for the Great Hungarian Plain

A radiocarbon chronology for the Great Hungarian Plain focusing on the Late Copper Age and Bronze Age only began to emerge in the early 1990s (Bankoff and Winter 1990 ; Forenbaher 1993; O'Shea 1991, 1996; Raczky, et al. 1994). The uncalibrated dates are presented alphabetically by site in Table A.1, with calibrations calculated using the free on-line software OxCal (v. 4.1.1)[103]. Those omitted from the production of Figure 5.4 are explained in footnotes. The Slovak tradition uses cultural labels somewhat differently that the Hungarians, and I have left their cultural labels in the table below. I have changed one Hungarian site culture name for Figure 5.3, and note the discrepancy in a footnote. Most recently, Dani and Nepper (2006) have published three dates relevant for the Late Copper Age-Early Bronze Age transition from the site of Sárrétudvari-Őrhalom in the lower Körös basin. Although these dates are included in the Figure 5.3 chronology in Chapter 5, they are not included in the table because only the calibrated dates at one sigma were published in the text of their article.

Table A.1. Radiocarbon dates for the Great Hungarian Plain.

RC Number	**Un-Cal bp**	**+/-**	σ (68%)	2σ (95%)	**Site**	**Culture**	**Source:**
Bln-1645	3625	40	2034-1927	2132-1889	Bakonszeg-Kádárdomb[104]	Nyírség	Raczky et al. 1994
Bln-2499	3400	100	1877-1538	1951-1456	Bakonszeg-Kádárdomb	Ottomány	Raczky et al. 1994
Bln-340	3735	79	2283-2028	2456-1927	Baracs	Nagyrév	Raczky et al. 1994
Bln-1705	3740	60	2274-2036	2341-1958	Battonya - canal of Laposér	Ottomány / Maros	Raczky et al. 1994
Bln-1222	4235	100	2885-2632	2921-2488	Békés-Városerdő[105]	Gyulavarsánd	Raczky et al. 1994

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[103] See https://c14.arch.ox.ac.uk/oxcal/OxCal.html.

[104] For Bakonszeg-Kádárdomb, the inclusion of a *Nyírség* component sample in Razcky, et al. (1994) is odd because there is no *Nyírség* component mentioned in the original publication (Sz. Máthé 1988). There is, however, an Ottomány B phase, which still contained 'Nyírség style' ceramic forms (Ibid, p. 30). I therefore assume this is an Ottomány date.

Bln-2491	3490	60	1891-1741	1972-1644	Berettyóújfalu-Herpály	Ottomány	Raczky et al. 1994
Bln-2485	3485	50	1881-1750	1937-1688	Berettyóújfalu-Herpály	Gyulavarsánd	Raczky et al. 1994
Bln-2490	3470	60	1881-1697	1939-1635	Berettyóújfalu-Herpály	Ottomány	Raczky et al. 1994
Bln-2492	3455	55	1878-1692	1909-1630	Berettyóújfalu-Herpály	Ottomány	Raczky et al. 1994
Bln-2488	3450	45	1876-1691	1888-1641	Berettyóújfalu-Herpály	Gyulavarsánd	Raczky et al. 1994
Bln-3973	3440	100	1885-1631	2019-1510	Berettyóújfalu-Herpály	Gyulavarsánd	Raczky et al. 1994
Bln-2484	3430	45	1871-1682	1881-1629	Berettyóújfalu-Herpály	Gyulavarsánd	Raczky et al. 1994
Bln-2659	3430	50	1873-1669	1884-1622	Berettyóújfalu-Herpály	Gyulavarsánd	Raczky et al. 1994
Bln-2487	3400	100	1877-1538	1951-1456	Berettyóújfalu-Herpály	Gyulavarsánd	Raczky et al. 1994
Bln-2486	3340	60	1689-1531	1771-1461	Berettyóújfalu-Herpály	Gyulavarsánd	Raczky et al. 1994
Bln-3982	3270	50	1614-1496	1614-1496	Berettyóújfalu-Herpály	Gyulavarsánd	Raczky et al. 1994
Bln-1649	3950	70	2569-2343	2831-2206	Bölcske-Vörösgyír	Nagyrév	Raczky et al. 1994
Bln-1648	3855	50	2457-2212	2470-2152	Bölcske-Vörösgyír	Nagyrév	Raczky et al. 1994
Bln-1647	3820	40	2341-2155	2459-2141	Bölcske-Vörösgyír	Nagyrév	Raczky et al. 1994
Bln-1646	3620	40	2031-1927	2131-1886	Bölcske-Vörösgyír	Vatya	Raczky et al. 1994
Bln-1681	3410	60	1865-1625	1884-1536	Bölcske-Vörösgyír	Vatya	Raczky et al. 1994
Bln-1221	4235	100	2927-2632	3262-2496	Budapest, Csepel-Háros	Bell Beaker	Raczky et al. 1994
Q-1122	4170	90	2885-2632	2921-2488	Budapest, Csepel-Rue Hollandi	Bell Beaker	Raczky et al. 1994
Bln-1404	4165	60	2877-2671	2891-2580	Budapest, Csepel-Rue Hollandi	Bell Beaker	Raczky et al. 1994
Bln-1335	4160	60	2876-2667	2889-2580	Budapest, Csepel-Rue Hollandi	Bell Beaker	Raczky et al. 1994
Bln-1334	4030	60	2831-2471	2864-2350	Budapest, Csepel-Rue Hollandi	Bell Beaker	Raczky et al. 1994
Bln-1333	3960	80	2576-2341	2849-2203	Budapest, Csepel-Rue Hollandi	Bell Beaker	Raczky et al. 1994
Bln-1406	3945	60	2565-2345	2618-2211	Budapest, Csepel-Rue Hollandi	Bell Beaker	Raczky et al. 1994
GrN-6900	3945	40	2561-2349	2570-2301	Budapest, Csepel-Rue Hollandi	Bell Beaker	Raczky et al. 1994
Bln-1336	3943	60	2565-2344	2618-2210	Budapest, Csepel-Rue Hollandi	Bell Beaker	Raczky et al. 1994

[105] The date from Békés-Vársoserdő (Tarhos2) is presumably from Bóna's (1974) trenches in the 1950s or early 1960s. This date is clearly inconsistent with other Gyulavarsánd dates (between 1750-1400 BC), and is not included in Figure 5.3.

GrN-6901	3770	50	2287-2064	2400-2031	Budapest, Csepel-Rue Hollandi	Bell Beaker	Raczky et al. 1994
Bln-341	3505	80	1937-1740	2035-1624	Dunaújváros-Kosziderpadlás	Vatya	Raczky et al. 1994
GrN-1944	3270	50	1614-1496	1668-1436	Dunaújváros-Kosziderpadlás	Koszider	Raczky et al. 1994
Bln-1641	3145	60	1496-1323	1599-1263	Esztár	Gyulavarsánd	Forenbaher 1993
Bln-1906	3520	50	1912-1771	2010-1696	Füzesabony-Öregdomb	Füzesabony	Raczky et al. 1994
Bln-1904	3450	55	1877-1691	1903-1625	Füzesabony-Öregdomb	Koszider	Raczky et al. 1994
Bln-1905	3420	50	1866-1639	1883-1613	Füzesabony-Öregdomb	Koszider	Raczky et al. 1994
BLn-1643	3690	40	2140-2026	2199-1960	Gáborján-Csapszékpart	Ottomány (early)	Raczky et al. 1994
Bln-1642	3620	75	2131-1887	2199-1771	Gáborján-Csapszékpart	Ottomány (early)	Raczky et al. 1994
BLn-1644	3605	40	2024-1915	2130-1829	Gáborján-Csapszékpart	Ottomány / Gyulavarsánd	Raczky et al. 1994
LJ-5262	3500	90	1941-1694	2127-1609	Gánovce	Ottomány (late)	Forenbaher 1993
Bln-2011	3445	40	1871-1691	1884-1666	Gánovce	Ottomány (late)	Forenbaher 1993
GrN-7319	3415	35	1755-1665	1875-1621	Gánovce	Ottomány (late)	Forenbaher 1993
Bln-1020	3790	60	2339-2065	2459-2038	Jászdózsa-Kápolnahalom	Hatvan (early)	Raczky et al. 1994
Bln-1220	3790	100	2433-2044	2486-1946	Jászdózsa-Kápolnahalom	Hatvan (early)	Raczky et al. 1994
Bln-1853	3636	65	2131-1917	2201-1781	Jászdózsa-Kápolnahalom	Hatvan	Raczky et al. 1994
Bln-1847	3595	50	2023-1891	2131-1776	Jászdózsa-Kápolnahalom	Koszider	Raczky et al. 1994
Bln-1852	3570	85	2030-1774	2190-1691	Jászdózsa-Kápolnahalom	Hatvan	Raczky et al. 1994
Bln-1849	3550	60	1965-1774	2113-1698	Jászdózsa-Kápolnahalom	Hatvan (late)	Raczky et al. 1994
Bln-1844	3525	50	1922-1772	2014-1698	Jászdózsa-Kápolnahalom	Hatvan (late)	Raczky et al. 1994
Bln-1845	3480	50	1880-1746	1934-1686	Jászdózsa-Kápolnahalom	Hatvan (late)	Raczky et al. 1994
Bln-1851	3480	48	1880-1747	1928-1687	Jászdózsa-Kápolnahalom	Hatvan (late)	Raczky et al. 1994
Bln-1846	3450	58	1877-1691	1916-1622	Jászdózsa-Kápolnahalom	Koszider	Raczky et al. 1994
Bln-1897	3390	70	1862-1541	1881-1523	Jászdózsa-Kápolnahalom	Koszider	Raczky et al. 1994
Bln-1850	3330	50	1682-1533	1739-1501	Jászdózsa-Kápolnahalom	Koszider	Raczky et al. 1994
Bln-1620	3240	55	1605-1444	1660-1412	Jászdózsa-Kápolnahalom	Koszider	Raczky et al. 1994
Bln-1217	3105	100	1496-1221	1612-1057	Jászdózsa-Kápolnahalom	Koszider	Raczky et al. 1994
Beta-	4110	110	2872-	2919-	Kiszombor-Új	Maros (Perjámos)	O'Shea 1991

34450			2505	2348	Élet		
Beta-34449	3990	90	2831-2345	2866-2210	Kiszombor-Új Élet	Maros (Perjámos)	O'Shea 1991
Beta-34442	3980	160	2852-2235	2901-2039	Kiszombor-Új Élet	Maros (Perjámos)	O'Shea 1991
Beta-30493	3960	190	2852-2203	2927-1921	Kiszombor-Új Élet	Maros (Perjámos)	O'Shea 1991
Beta-34443	3920	100	2568-2213	2850-2059	Kiszombor-Új Élet	Maros (Perjámos)	O'Shea 1991
Beta-34445	3880	100	2477-2202	2621-2036	Kiszombor-Új Élet	Maros (Perjámos)	O'Shea 1991
Beta-34444	3640	140	2205-1776	2459-1688	Kiszombor-Új Élet	Maros (Perjámos)	O'Shea 1991
Beta-23099	3820	90	2457-2143	2560-1984	Klárafalva-Hajdova	Maros (Perjámos)	O'Shea 1991
Beta-30498	3670	110	2202-1900	2435-1750	Klárafalva-Hajdova	Maros (Perjámos)	O'Shea 1991
Beta-23098	3660	110	2200-1892	2431-1744	Klárafalva-Hajdova	Maros (Perjámos)	O'Shea 1991
Beta-30495	3660	120	2271-1883	2457-1741	Klárafalva-Hajdova	Maros (Perjámos)	O'Shea 1991
Beta-23103	3590	140	2136-1755	2432-1562	Klárafalva-Hajdova	Maros (Perjámos)	O'Shea 1991
Beta-23100/1	3523	81	1952-1745	2123-1638	Klárafalva-Hajdova	Maros (Perjámos)	O'Shea 1991
Beta-30494	3400	120	1877-1536	2016-1436	Klárafalva-Hajdova	Maros (Perjámos)	O'Shea 1991
Beta-30497	3400	180	1933-1497	2205-1293	Klárafalva-Hajdova	Maros (Perjámos)	O'Shea 1991
Beta-23105	3380	60	1750-1541	1877-1521	Klárafalva-Hajdova	Maros (Perjámos)	O'Shea 1991
Beta-30500	3370	100	1771-1524	1909-1442	Klárafalva-Hajdova	Maros (Perjámos)	O'Shea 1991
Beta-30501	3340	240	1973-1323	2292-1019	Klárafalva-Hajdova	Maros (Perjámos)	O'Shea 1991
Bln-1225	3270	100	1664-1440	1873-1316	Klárafalva-Hajdova	Maros (Perjámos)	O'Shea 1991
Bln-1942	3280	45	1611-1506	1678-1452	Mende-Leányvár	Vatya-Koszider	Raczky et al. 1994
GrN-14179	3690	30	2135-2033	2196-1977	Mokrin	Perjámos	O'Shea 1991
GrN-14178	3655	30	2124-1973	2135-1944	Mokrin	Perjámos	O'Shea 1991
GrN-14180	3650	35	2113-1830	2137-1929	Mokrin	Perjámos	O'Shea 1991
GrN-7977	3650	50	2131-1946	2193-1893	Mokrin	Perjámos	O'Shea 1991
GrN-14181	3595	35	2013-1902	2113-1830	Mokrin	Perjámos	O'Shea 1991
GrN-8809	3500	35	1883-1771	1922-1740	Mokrin	Perjámos	O'Shea 1991
Bln-1945	3900	60	2468-2299	2566-2203	Nagyárpád	Somogyvár-Vinkovci	Raczky et al. 1994
Bln-1634	3885	40	2459-2309	2472-2210	Nagyárpád	Somogyvár-Vinkovci	Raczky et al. 1994

Beta-207591	3600	80	2127-1784	2196-1746	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
Beta-207595	3580	40	2011-1886	2035-1775	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
Beta-207597	3560	40	1972-1783	2024-1772	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
Beta-207589	3550	60	1965-1774	2113-1698	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
06-116	3520	40	1906-1772	1952-1742	Pecica-Şanţul Mare	Maros	O'Shea et al 2006
Beta-207598	3510	40	1890-1771	1943-1740	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
Beta-207602	3510	50	1894-1756	1964-1692	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
Beta-207593	3500	40	1883-1771	1931-1696	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
Beta-207588	3490	50	1881-1754	1937-1690	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
Beta-207600	3490	40	1880-1757	1919-1693	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
Beta-207592	3480	40	1878-1749	1900-1691	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
Beta-207590	3450	40	1874-1692	1886-1666	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
06-133	3450	40	1874-1692	1886-1666	Pecica-Şanţul Mare	Maros	O'Shea et al 2006
06-105	3440	40	1871-1689	1882-1641	Pecica-Şanţul Mare	Maros	O'Shea et al 2006
06-115	3430	40	1870-1683	1879-1633	Pecica-Şanţul Mare	Maros	O'Shea et al 2006
Beta-207596	3410	40	1752-1639	1877-1613	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
06-136	3400	40	1745-1637	1875-1541	Pecica-Şanţul Mare	Maros	O'Shea et al 2006
Beta-207601	3370	40	1736-1616	1750-1531	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
Beta-207603	3360	40	1735-1609	1743-1531	Pecica-Şanţul Mare	Maros	O'Shea et al 2005
06-129	3240	40	1603-1450	1612-1433	Pecica-Şanţul Mare	Maros	O'Shea et al 2006
Deb-1489	3580	60	2028-1786	2131-1751	Polgár-Kenderföld	Hatvan (late)	Raczky et al. 1994
Deb-1490	3490	60	1891-1741	1972-1644	Polgár-Kenderföld	Hatvan (late)	Raczky et al. 1994
Deb-1491	3490	60	1891-1741	1972-1644	Polgár-Kenderföld	Hatvan (late)	Raczky et al. 1994
Deb-1492	3440	60	1877-1685	1918-1611	Polgár-Kenderföld	Hatvan (late)	Raczky et al. 1994
Deb-1488	3410	60	1865-1625	1884-1536	Polgár-Kenderföld	Hatvan (late)	Raczky et al. 1994
Deb-1487	3360	60	1739-1536	1871-1500	Polgár-Kenderföld	Hatvan (late)	Raczky et al. 1994
Bln-1224	3545	100	2021-1749	2192-1631	Rétközberencs-Paradomb	Ottomány	Raczky et al. 1994
Bln-1640	4000	15	2565-	2570-	Szava	Somogyvár-	Raczky et al.

			2480	2473		Vinkovci	1994
Bln-1941	3265	60	1616-1461	1685-1429	Szazhalombatta-Földvár	Vatya-Koszider	Raczky et al. 1994
Bln-3765	3930	60	2549-2307	2576-2209	Szeghalom-Környe	Makó	Raczky et al. 1994
Bln-1639	4030	60	2831-2471	2864-2350	Szigetcsép	Bell Beaker	Raczky et al. 1994
Bln-1638	3970	45	2573-2410	2617-2309	Szigetcsép	Bell Beaker	Raczky et al. 1994
Beta-240765	3580	40	2011-1886	2035-1775	Tarhos 26	Ottomány	
Beta-240764	3420	40	1858-1666	1878-1623	Tarhos 26	Ottomány	
Beta-240763	3320	70	1686-1521	1756-1438	Tarhos 26	Ottomány	
Bln-1930	3620	50	2111-1907	2140-1786	Torokszentmiklos-Terehalom	Hatvan	Raczky et al. 1994
Bln-1931	3510	50	1894-1756	1964-1692	Torokszentmiklos-Terehalom	Hatvan	Raczky et al. 1994
Bln-1900	3810	65	2398-2141	2466-2043	Tószeg-Laposhalom	Nagyrév	Raczky et al. 1994
Bln-1987	3765	60	2287-2051	2456-1982	Tószeg-Laposhalom	Nagyrév	Raczky et al. 1994
GrN-6653	3685	35	2136-2028	2196-1960	Tószeg-Laposhalom	Hatvan	Raczky et al. 1994
Bln-1899	3625	59	2120-1903	2195-1780	Tószeg-Laposhalom	Nagyrév	Raczky et al. 1994
Bln-1898	3595	65	2113-1832	2136-1770	Tószeg-Laposhalom	Hatvan	Raczky et al. 1994
Bln-1923	3490	45	1880-1756	1927-1691	Tószeg-Laposhalom	Koszider	Raczky et al. 1994
Bln-5560	3710	38	2191-2036	2266-1977	Vcelince	Hatvan	Görfdorf et al. 2004
Bln-5561	3518	37	1897-1772	1941-1746	Vcelince	Hatvan/Ottomány	Görfdorf et al. 2004
Bln-5559	3328	30	1662-1535	1687-1526	Vcelince	Koszider	Görfdorf et al. 2004
Bln-5557	3225	44	1528-1437	1609-1421	Vcelince	Piliny	Görfdorf et al. 2004
Bln-5558	3200	32	1497-1441	1523-1416	Vcelince	Piliny	Görfdorf et al. 2004
Bln-1394	4290	60	3013-2876	3093-2696	Vésztő-Mágor[106]	Gyulavarsánd	Raczky et al. 1994
Bln-1629	3700	60	2198-1982	2285-1926	Vésztő-Mágor	Gyulavarsánd	Raczky et al. 1994

[106] The two dates from Vésztő-Mágor are from the Makkay and Hegedűs excavation in the 1980s; one was even published by Raczky et al. (2004) with a question mark next to it. The Mágor excavation took place very quickly (in the interest of building a tourist site) and these very early dates for the Gyulavarsánd style and are certainly the result of contamination or mixed contexts.

Appendix B: Technical Terms for Middle Bronze Age Ceramics

The definitions here are used to describe ceramics collected during fieldwork. Vessel forms are less well known in the Körös area because there are no excavated cemeteries, and therefore few whole pots that can be used to formulate vessel typologies (but see Németi and Molnár 2002 and Sz. Máthé 1988). Although distinct vessel forms are found in the Ottomány and Gyulavarsánd, surface treatment and changes in technique and style are more useful for providing an indication of Bronze Age phasing using single sherds from surface collection. These changes are also discussed in Chapter 5.

Burnishing

To burnish is to rub the surface of the vessel with a pebble or bone after the clay has dried, but before it is fired. When held up to the light, if it reflects light, it is probably burnished. If the light diffuses over the surface, it is wiped. Sometimes ridges, created on the surface by the burnishing tool, can be seen. There is a range of burnishing, from light reflectivity in the light to highly polished, obvious fine ware (Figure B.1). This broad category captures all of it. Although most 'fine wares' are burnished, burnishing also lowers vessel wall porosity and is desirable for some liquid holding vessels that may not be intended for display.

Brushing

Brushing is a surface treatment technique in which plant material is used to wipe the vessel exterior while the clay is still wet. The roughening may be functional (grip), stylistic, or both. There is a range of brushing, from fairly thin strokes to thick strokes, more characteristic of the early Nyirség and early Ottomány (Figure B.2). Brushing lines usually criss-cross in directions, rather than going in a uniform direction. It is usually found on the vessel exterior usually, near the base, on the belly, or below the rim. This can be contrasted with *combing* (see below).

Burnished / Brushed

Occasionally, sherds are brushed on the outside, and burnished on the inside.

No burnishing or brushing

This category of surface treatment is wiping, from lightly wiped to well wiped while the clay is still wet. The most well wiped surface will be smooth, but not reflective (Figure B.3).

Figure B.1. A burnished pot from Békés-Várdomb (Munkácsy Mihály Museum, Cat No. 57.841).

Figure B.2. Sherds from Tarhos 26 with brushed surfaces.

Figure B.3. Sherds from Tarhos 26 with wiped surfaces.

Decorations

I use 'decoration' here as a descriptive term for different techniques, without a specific functional argument. The most common bases for decorative treatment in this period are incising, engraving, and appliqué. *Incising* uses a pointed tool to displace clay, usually once it is dry, before firing (Figure B.4). Lines are a common decoration using incising. *Combing* is a form of incising that uses a tool (probably fish bone) that creates uniform, parallel incised lines (Figure B.5). This should be distinguished from the brushing of a vessel with plant material while the clay is wet. *Engraving* is the removal of clay while the clay is drying, usually to create wide channels, or vessel ridges that add a pleasant geometry and distinction (Figure B.6). Decorative patterns with this technique are often straight or curved linear features, spirals, or triangles. *Impressing* is pushing the clay into the vessel while it is drying or wet. Usually these are dots or short lines. The *appliqué* is a prepared clay piece that is added to the vessel before drying. The most common of these is the 'ribbed' appliqué found on storage vessels (Figure B.7). There are a lot of variations in ribbed appliqué decorations. *Lugs* are another class of common MBA appliqué (Figure B.8). They can be pierced, have false piercing, pointed or flat. There are also 'double-lugs' in the BA. Lugs and some other decorations (notably spirals) also are sometimes *embossed*. This is a bas-relief technique creating projecting features or topography, but without an appliqué. Instead, the vessel body is modified by applying pressure from the inside while it is still wet. This is a feature of the latest stage of the Middle Bronze Age. *Perforation* is creating a hole through the entire vessel body wall (Figure B.5).

Figure B.4. Incised sherds from Tarhos 26. The zigzag is a common Ottomány motif.

Figure B.5. Combed (center-left) and perforated (center-right) sherds from Tarhos 26.

Figure B.6. An engraved mug from Békés-Várdomb (Munkácsy Mihály Museum, Cat. # 57.1014).

Figure B.7. Vessel with appliqué 'ribbing' from Békés-Várdomb (Munkácsy Mihály Museum, Cat # 57.867).

Figure B.8. Lugs on a sherd from Tarhos 26.

Appendix C: Volumetric Calculations for Tell Excavations in the Lower Körös Basin

In producing volume estimates, I exclude ploughzone and assume that the maximum depth is representative of the depth in all areas of the excavation. This is of course not true, and will consistently provide overestimates[107]. A more precise number might be achieved by using profiles, more precise depth of deposits, and subtracting intrusive features, but these data are not always available. The chosen method nonetheless provides a broad comparability, without the false sense of precision potentially achieved by more laborious methods.

Bakonszeg-Kádárdomb

Zoltai opened three 5x2 and a 5x1.5, between 1.5-1.8 m deep (Sz. Máthé 1988:27). No records remain though Zoltai published some finds in the Debrecen museum almanac in 1922. These data were unavailable at the time of volumetric calculation and therefore excluded. In 1974 another excavation carried out a 5x5. Deepest part of excavation at 190 cm, but the Bronze Age layers were only 180-190 cm (Kovács 1988: 21). Using the higher estimate, the total volume excavated from both the Ottomány and Gyulavarsánd layers is 47.5 m^3.

Békés-Várdomb (Tarhos 1)

Three kinds of exposure took place on this site: horizontal excavation on the tell, horizontal excavation in the 'northern village', on the bank of the meander directly across from the tell, and a series of 6 m test trenches in the greater environment designed to locate a cemetery (Chapter 7). Only the horizontal exposures are included in the calculation because they represent the areas of greatest density and comparability to excavation at other tell sites. 347.5 m^2 were opened on the tell proper with a maximum depth of 310 cm depth (Banner 1974:19). If we subtract the most disturbed 50 cm of topsoil (looter pits and heavy animal burrowing), the deposit totals 903.5 m^3. 113 m^2 was exposed in the 'northern village' (Bona 1974:133, Abb. 1). Deposits in the northern village went down 180 cm, and were similar to the tell (Bona 1974:134), though included more than a dozen intrusive graves. Subtracting 30 cm of ploughzone (estimated from profile), this area produced a volume of 169.5 m^3. The combined volume from these two excavations is 1073 m^3.

[107] In none of the tell excavations was there a deep *sondage* such as Crisan's (1978) trenches at Pecica *Santul Mare*, whose aim was only to uncover the lowest depths.

Berettyóújfalu-Herpály

A total of 850 m^2 was excavated at this site in three large blocks over five years, reaching a total depth of 400-500 cm, although a significant Late Neolithic occupation formed part of this (Kalicz and Raczky 1984; Kovács 1988:21; Sz. Máthé 1984). The Bronze Age layers only comprised 120-130 cm. The total volume is estimated at 1105 m^3 if we include only the Bronze Age components.

Berettyóújfalu-Szilhalom

Excavations at Szilhalom began with an 8x5 m area and were extended another 8x3 m to total 64 m^2. The maximum depth reached was 230 cm, although the Bronze Age layers were only 80 cm thick. Using only the latter, the amount is 51.2 m^3 (Sz. Máthé 1988:33: Kovács 1988:21**)**.

Esztár-Fenyvespart

A 4x5 m block was opened on the west slope, and then another 4x5 m block opened on the east slope, to total 40 m^2. The excavation reached a depth of 250 cm, although the Bronze Age layers are only 70-80 cm thick. Using the higher figure, we reach 32 m^3 (Sz. Máthé 1988:36; Kovács 1988:21).

Gáborján-Csapszékpart

An initial 5x5 m block was opened north of the tell center and two contiguous 4x4 m blocks opened after that. In total, 57 m^2 were excavated over two years, comprising 140-200 cm of Bronze Age occupation. By the deepest level, we arrive at 114 m^3 (Sz. Máthé 1988:38; Kovács 1988:22).

Sarkad-Peckesi-domb (Sarkad 8)

Although the direct center of the tell was avoided, all excavation took place on the interior of the fortification. Two large horizontal blocks and six narrower trenches made up 150 m^2. In Block 1, a 3 x 10, the lowest ending depth was 131 cm. I subtract 30 cm of estimated ploughzone, yielding a multiplying depth of 1.01 m. The total volume comes out to 30.3 m^3. A depth of 138 cm was reached in Block 2, 7 x 6m in size, subtracting the ploughzone yields an estimate of 45.36 m^3. There is an additional series of trenches around the edge of the tell, with cultural layer depth averaging about 40 cm between them. Trench 1 (1x10) yields 4 m^3, Trench 2 (6x1) yields 2.4 m^3, Trench 3 (5x2) yields 4 m^3, Trench 4 (2x10) yields 8 m^3, Trench 5 (7x1.5) yields 4.2 m^3, and Trench 6 (1x15) yields 6 m^3. All trenches together contain a volume of 28.6 m^3. Added to the two blocks totals 104.26 m^3.

Túrkeve-Terehalom (Gyoma 34)

Six campaigns took place between 1985 and 1995. The stratigraphic sequence is 5.8 m deep, and two large blocks, 10x 20 and 10 x 10 m area have been opened for a total of 300 m^2 (Csányi and Tárnoki 1994, 2003). The entire sequence is Early and Middle Bronze Age. If we suppose 40 cm of humus, then we are left with 5.4 m of deposit excavated, and a volume of 1620 m^3.

Vărşand (Gyulavarsánd-Laposhalom)

Beginning in 1930, Roska (1941) excavated at the site. A long trench bisecting the entire tell, touching the interior of the ditch on either side, was removed, totalling 97.2 m (Roska 1941:57). Deposits were disturbed up to 80 cm by agricultural practices in some places but in general only 60-70 cm. There were intrusive graves from the 11th century down 2 m. The lower layer was mostly intact, however, between 1-1.1 m thick. I will assume that 1.05 m of deposit was excavated from a 2 m by 97.2 m block, yielding 204.12 m^3.

Popescu's (1956b) excavation took place in 1949. Trench A was 3 m wide and 127 m long. A significant portion of this (ca. 40 m, according to Figure 5.9, and Figure 80, Popescu 1956b:105, 127) was within the ditch and unexcavated. I estimate 261 m^2 for Trench A, and 209 m^3, based on an lower depth of 60-80 cm of cultural deposit (Popescu 1956b: 106-7, estimated for Trench B). Trench B extended at a perpendicular from Trench A on an exterior ditch bank. It was 40 m long by 5 m wide, yielding 160 m^3. Finally, Trench C was 10x3 m at approximately the same depth on the central mound, yielding 24 m^3 of excavated deposit. In total then, Popescu's team moved about 391 m^3 of earth.

I include only the central mound in adding Popescu's excavations to the volumetric calculation for two reasons. First, it is the most comparable settlement component to those other excavations in this sample, and second, there were a significant number of intrusive burials (n=58) in these outer trenches, strongly influencing the volumetric estimates. Moreover, the artifacts used in creating indexes in Chapter 7 were all found in the central mound (Popescu 1956b:78). The addition of the Trench A central mound component is approximately 50x3 (120 m^3) and Trench C (24 m^3) to Roska's excavation equals 348 m^3.

Appendix D:Process of Data Creation in the GIS

This appendix describes the digitization of topographic maps with site boundaries for their incorporation into a GIS. The Békés county MRT project has over two hundred 1:10,000 topographic maps, each with hand drawn site numbers and boundaries. They are in a Hungarian stereographic projection using a military coordinate system from the 1950s. The maps are now declassified, and the parameters for transformation of this projection into UTM can be found in Timár et al. (2003). These maps, approximately 60 x 60 cm, were obtained between 2004 and 2006.

The process of MRT site conversion into the GIS comprised several steps. First, I reduced each map by approximately 50% using an oversized scanner. This reduced size map was scanned on a flatbed scanner at 400 dpi and saved it as a .tiff file. The map was then rotated to square and cropped in Microsoft Photoshop, excluding all but the projected data frame, and saved as a new file. The projection of the cropped file was defined using the 'Projections and Transformations / Define Projection' tool in the ArcGIS 9 toolbox.

With the projection of the map defined, the map could be georeferenced using the Hungarian Stereographic Projection coordinates from each 1:10 000. Eight points were used for each map in georeferencing, making use of the intersections of 1 km grid lines.

Once all the maps were georeferenced, a new mosaic file was created from the ESRI grids using the 'Data Management / Raster / Mosaic to New Raster' tool in the ArcGIS toolbox. This tool creates a single, seamless projected raster file out of a multiplicity of others and is very useful in toggling between layers when many overlays are involved. According to comparison from GPS points taken in the field, the error was rarely greater than 10 m.

The primary advantage of having the MRT in a real world coordinate system such as a UTM projection is that it allows for efficient site re-location using a GPS unit and GOTO function. Five points (center, north, south, east and western boundaries) of each site could be saved and uploaded to the GPS unit (Garmin 12XL) using the Waypoint Plus program. I assigned each site for re-visitation a letter, which would then be appended a qualifying letter such as 'C' (center) or 'S' (southern border), resulting in a GOTO point such as 'DC', which would take me to the center of site D as defined by the site polygon generated from the MRT maps. These waypoint designations were the conventions also used for recording the location of artifacts collected outside of transect units.

Appendix E: Description of Collected Sites

In this appendix, I describe the open settlements and then the fortified clusters collected during field work. For each entry, I first review the location of the site with respect to modern features on the landscape, and the hydrological reconstruction outlined in Chapter 4[108]. I also include any relevant information that can be gleaned from inspecting the location of the site overlaid with aerial images and the First and Second Habsburg military surveys (Arcanum 2006a, 2006b). The MRT findings are summarized and field conditions during re-visits in 2006-7 described. A general guide to periods in the greater Hungarian culture chronology can be found in *Hungarian Archeology at the Turn of the Millennium* (Visy 2003).

I present data in summary table form for the systematically collected sites. Although the location of individual transects is not highly discriminating, they are listed individually to give a general sense of the density of surface material on different sides of a site. Material culture collected and now curated at the Munkácsy Mihály Museum in Békéscsaba is marked with (C), and material that was counted but left in the field is marked with (NC). The ceramic descriptions in the main body of the text and the tables follow the definitions in Appendix B. The relevance of the surface treatment and designs is discussed in Chapter 5.

OPEN SITES IN THE MICRO-REGION

Békés 178

The site is about 250 m northeast of the modern Kettős Körös. The ancient meandering Fekete Körös lies a kilometre to the northeast. The river was active during the first Habsburg military survey, and the surrounding area of the site appears dry at that time, although it and three other sites to the north flank a meander scar running southwest-northeast (now a straightened canal). Corn had just begun to sprout out of the ground when this site was collected, and visibility was excellent (Figure E.1). The site polygon on the MRT was slightly misplaced, likely due to an error in the topographic map used in survey. The site is named 'Lápos domb', or 'flat mound', and still occurs on a rise in the landscape that is not well represented in the 1:10 000 maps.

The MRT reported a few Neolithic and Copper Age sherds, but the majority of the diagnostics belonged to the Ottomány phase (Jankovich et al. 1998:115). This was our experience as well, and we put in 6 transects totalling 95 units, spaced 2 meters apart. Although young, densely packed wheat surrounded the field in which the site lay, an abrupt falloff in material culture was clear on three sides before reaching the canals and wheat to the NW, NE, and SE. To the SW lies another site, Békés 202. There was an obvious drop in material in between the two clusters. The low size estimate comes to 0.3 ha, and the high boundary estimate, including all of the sherds noted on the surface and

[108] Some of this information is omitted for the Tarhos 1 and Sarkad 8 Cluster as they are discussed in Chapter 7.

extending somewhat into the southeast, is 0.8 ha. Waypoints were collected in an area just about 10% larger than the upper limit, 0.9 ha.

The ceramics show a surface treatment ratio of 1 brushed to 9 untreated (Table E.1). Decorations include impressed dots, engraved channelling, deeply incised triangles bound by parallel lines, combed incised lines, thin ridged appliqué with parallel hatched lines, and lugs of many different shapes. Rims, like most ceramics collected at this site, are thick with large inclusions. Most seem to be water worn and covered with a strong calcification. In addition to the lack of painfully executed decoration, there are no burnished ceramics. Only a couple of slags occur at this site, but there is overwhelming number of chipped stone, animal bones (often burnt), and shell.

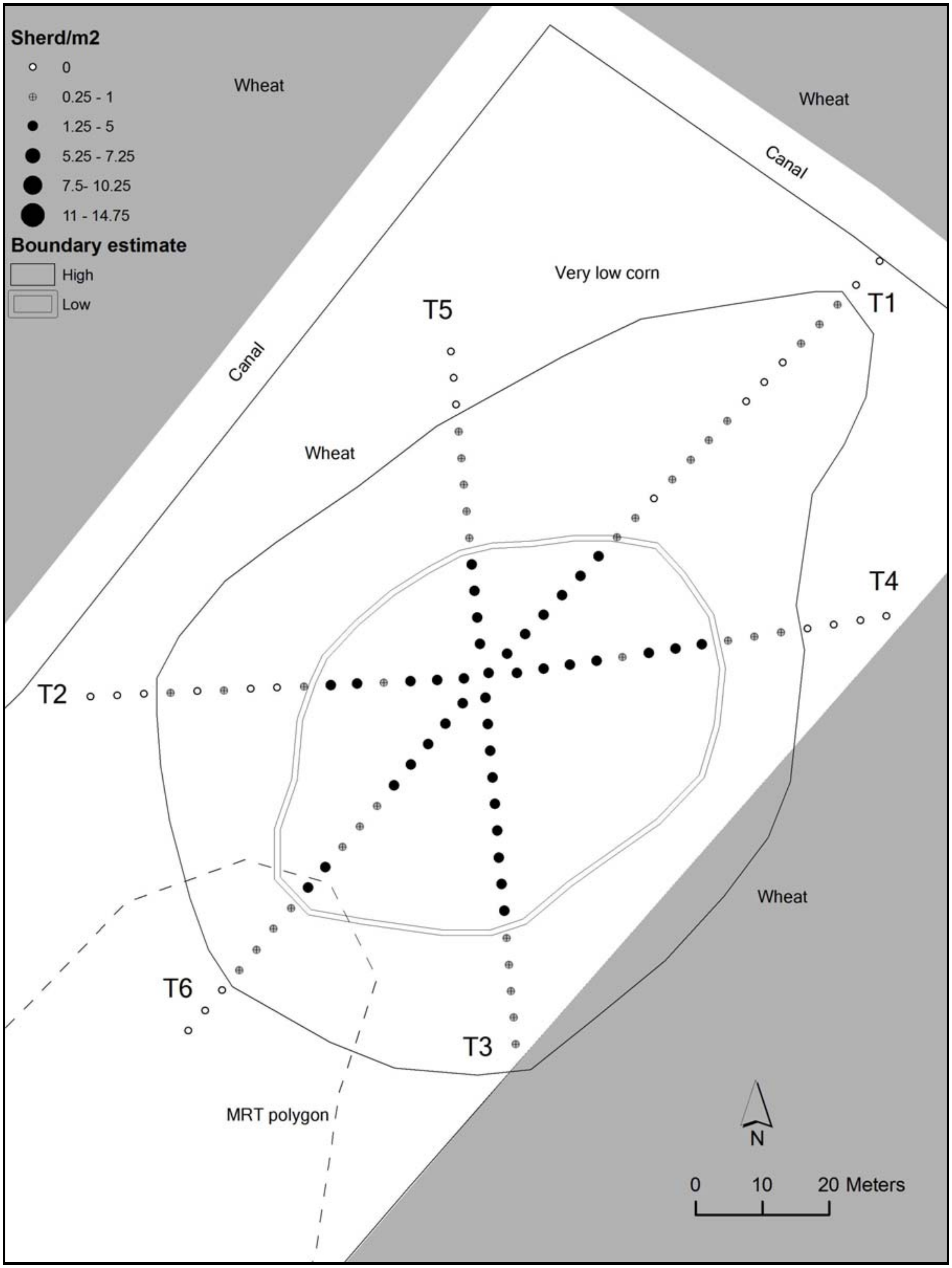

Figure E.1. Site map of surface collection at Békés 178.

Békés 178

Unit collected: 380 m^2 Waypoint collected: 0.9 ha Size estimate: 0.3-0.8 ha

Overview of Collected Material by Transect

Transect	Num. of Units	Non-Diag Pot	Diag Pot (C)	Non-MBA Diag (NC)	Bone	Daub	Chipped and ground stone	Slag	Other
1	22	73	12	0	49	5	7	0	0
2	15	54	3	0	66	6	2	0	0
3	14	111	12	0	118	14	1	0	0
4	15	71	11	0	55	6	3	0	0
5	12	50	3	0	65	4	4	1	0
6	17	67	12	0	75	14	4	1	0
SUM	**95**	**426**	**53**	**0**	**428**	**49**	**21**	**2**	**0**

Identifiable Ceramics by Transect (N)

Neolithic	0	Late-Bronze Age / Iron Age	0
Copper Age	0	Later	3
Early-Middle Bronze Age	52	**Total**	55

Summary of Surface Treatment for MBA ceramics in Transect

	Burnished	Brushed	Burnished and Brushed	No Treatment	Total
N	0	6	0	46	52
%	0	11.5	0	88.5	100

Distribution of Diagnostic Ceramics by Transect

	Brushed				No Burnishing or Brushing				Total MBA Diag	Non-MBA Diag (C)	Non-MBA Diag (F)	Total Identifiable
Transect	Rim	Base	Handle	Body	Rim	Base	Handle	DecoBody				
1	0	0	0	0	7	3	0	2	12	0	0	**12**
2	0	0	0	0	2	0	0	1	3	0	0	**3**
3	0	0	0	0	5	4	1	3	13	0	0	**13**
4	1	0	0	2	5	2	0	0	10	2	0	**12**
5	0	0	0	0	1	2	0	0	3	0	0	**3**
6	0	0	0	3	6	1	0	1	11	1	0	**12**
SUM	***1***	***0***	***0***	***5***	***26***	***12***	***1***	***7***	***52***	***3***	***0***	***55***
Wpts	0	0	0	4	12	0	1	14	**31**			

Table E.1. Material culture at Békés 178.

Békés 179

This site lies two kilometres southeast of Békés 178, and immediately adjacent to the Kettős Körös, also under a kilometre from the ancient Fekete Körös. Yet the topography and aerial imagery clearly suggest that this site was bisected by a river meander at one time (Figure E.2). This was confirmed during field survey as a topographic depression lacking cultural material. The MRT reported a couple of Körös, Árpád, and Medieval Period sherds, but mostly Ottomány material. The ground had just been ploughed before our first visit, and very young corn was sprouting when we surface collected a couple of weeks later. Very sporadic material was found on the eastern side of the old meander, although a few Ottomány sherds clustered in the SE. Just across the old meander on the western side, the prehistoric material was denser. It was here that we collected 3 transects in 34 units. To the south of the collected area lies the artificial levee of the Kettős Körös, construction of the levee could have destroyed part of the site. To the west lies forested land and beyond it to the north, a marshy area. The low site boundary estimate is 0.1 ha, but if the site extends into the vegetation and levee, and we include the low density scatter across the meander, it might have totalled 2.2 ha. Waypoints were collected over both of these areas.

Békés 179 had a low density of ceramics and prehistoric diagnostics compared to other collected sites (Table E.2). The high number and great diversity of chipped stone and the virtual absence of other prehistoric sherds made collection worthwhile. The transects returned only 7 MBA diagnostics; waypoints provide a larger range of Bronze Age diagnostics. The ratio of brushed to untreated surfaces is about the same as that at Békés 178, though the water damage and wear on these ceramics is even more abysmal, sometimes making it difficult to identify. Rims are everted or straight, with or without hatching at the lip. Decorations include small lugs and occasional wide incised lines. A strainer pot fragment was also identified – the oxidation suggests Körös period but could easily be Bronze Age as well.

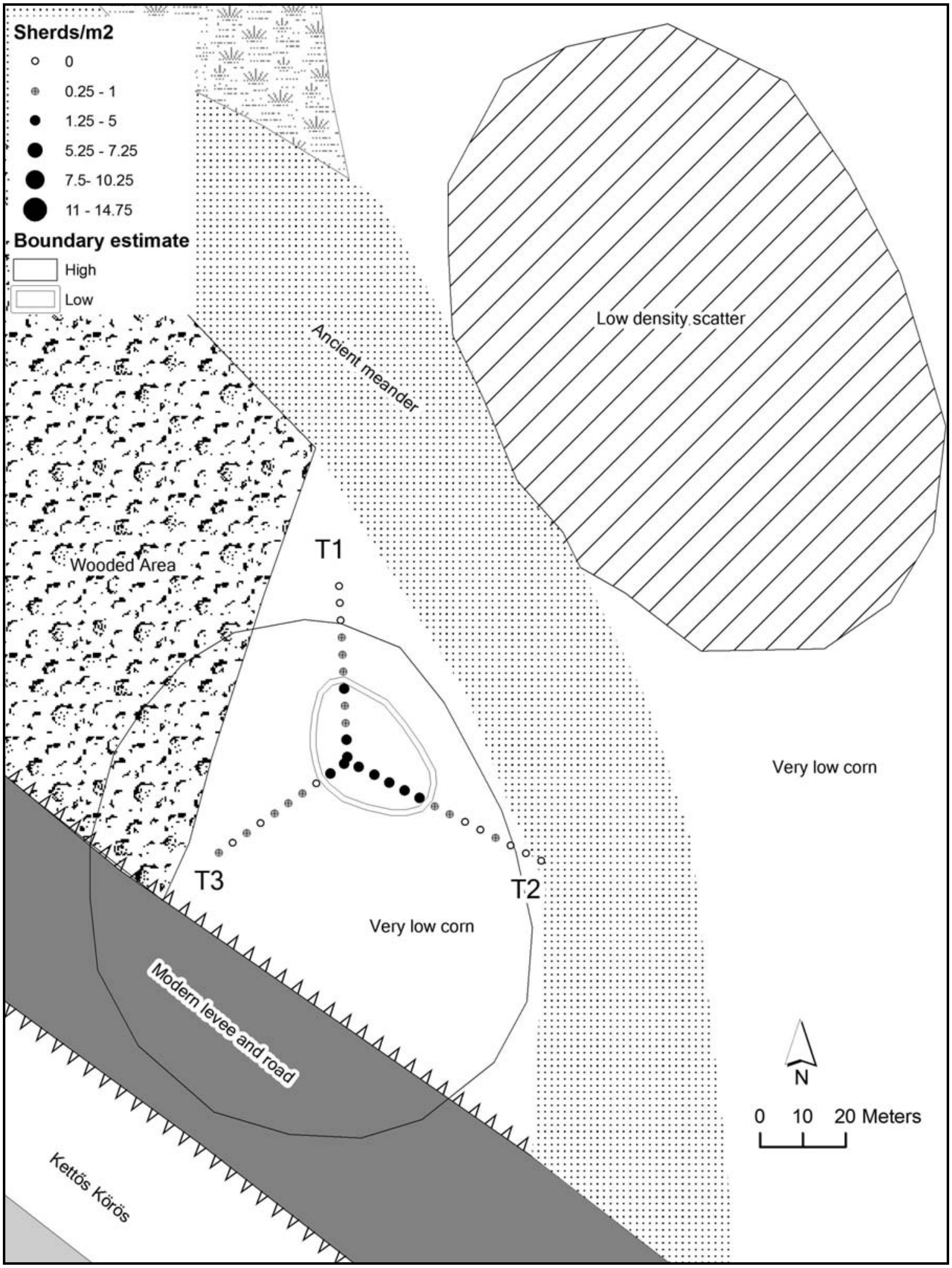

Figure E.2. Site map of surface collection at Békés 179.

Békés 179

Unit collected: 136 m^2 Waypoint collected: 2.2 ha Size estimate: 0.1-2.2 ha

Overview of Collected Material by Transect

Transect	Num. of Units	Non-Diag Pot	Diag Pot (C)	Non-MBA Diag (NC)	Bone	Daub	Chipped and ground stone	Slag	Other
1	11	30	4	27	12	1	0	0	0
2	13	34	2	8	13	3	0	0	0
3	10	21	1	6	15	5	1	0	0
SUM	**34**	**85**	**7**	**41**	**40**	**9**	**1**	**0**	**0**

Identifiable Ceramics by Transect (N)

Neolithic	0	Late-Bronze Age / Iron Age	0
Copper Age	0	Later	41
Early-Middle Bronze Age	7	**Total**	48

Summary of Surface Treatment for MBA ceramics in Transect

	Burnished	Brushed	Burnished and Brushed	No Treatment	Total
N	0	1	0	6	7
%	0	14	0	86	100

Distribution of Diagnostic Ceramics by Transect

	Brushed				Burnished and Brushed				No Burnishing or Brushing							
Transect	Rim	Base	Handle	Body	Rim	Base	Handle	Body	Rim	Base	Handle	DecoBody	**Total MBA Diag**	**Non-MBA Diag (C)**	**Non-MBA Diag (F)**	**Total Identifiable**
1	0	0	0	1	0	0	0	0	1	1	1	0	4	0	27	**31**
2	0	0	0	0	0	0	0	0	1	0	0	1	2	0	8	**10**
3	0	0	0	0	0	0	0	0	0	1	0	0	1	0	6	**7**
SUM	***0***	***0***	***0***	***1***	***0***	***0***	***0***	***0***	***2***	***2***	***1***	***1***	***7***	***0***	***41***	***48***
Wpts	0	1	0	5	1	0	0	0	8	1	2	5	**23**			

Table E.2. Material culture at Békés 179.

Bélmegyer 2

In the southernmost part of the parish, this site lies just north of the confluence of two modern canals, the Hosszú-foki- and the Gyepes- into the Hosszú-foki-főcsatorna. According to the hydrological reconstruction, the site lies on the eastern bank of the Fás-ér, a stream that was perhaps seasonal in prehistory (Figure E.3). During the first Hapsburg survey, it is placed on the western edge of a marsh of significant extent. The MRT site polygon allotted is 13 ha, most of which is Gáva material. MRT surveyors also identified a few Baden sherds, a large amount of Ottomány sherds, and a couple of Gyulavarsánd diagnostics (Jankovich et al. 1998:331). Only the northern extent of the site had material earlier than the LBA. Fortunately, this area was visible during survey. In the area of the site that was not wooded, the ground was recently ploughed and visibility was excellent. The only compromising feature was a thin strip of grassy area (1.5-2 m) running at a perpendicular to the dirt road, and a lot of *tanya*[109] debris scattered among the artefacts. Three transects were laid out from the highest point, including 71 units total with 2 m spacing. If the area that drops off to the south and east is an indicator of the MBA site's extent as is suggested by the MRT and re-visitation, the total extent is likely between 1.4 and 2.3 ha. The total area in which waypoints were taken is the upper limit.

The ceramics from Bélmegyer 2 show an interesting distribution of surface treatment, with over half brushed (some burnished on the other side), a third untreated, and the remainder burnished (Table E.3). Although none appear in the transect units, a couple of LBA sherds were noted during survey which could account for the inflated percentage of burnished sherds in otherwise generic bases or rims. The high percentage of brushed surface treatment suggests a preponderance of the Ottmány period over a Gyulavarsánd component, and is re-enforced by other diagnostics. Decorations include channelling, combed incised lines, dot or shape impressing, and appliqué ribbing along rims. One sherd had a 'Hatvan style' textile impression. Rims have thin outward flaring lips on neckless jars, and the zig-zag group of incised lines. Daub was difficult to identify because of the *tanya* debris, but was in any event not very common.

[109] A *tanya* is a rural, agricultural, livestock-raising homestead characteristic of the Great Hungarian Plain with roots back to the 15th century (Becsei 1998). These generally compose a small amount of built space (0.25 ha) and until recently dotted the landscape. Many *tanyas* illustrated on the stereographic maps made in the 1950s were torn down, and only had archaeological signatures when fieldwork was undertaken.

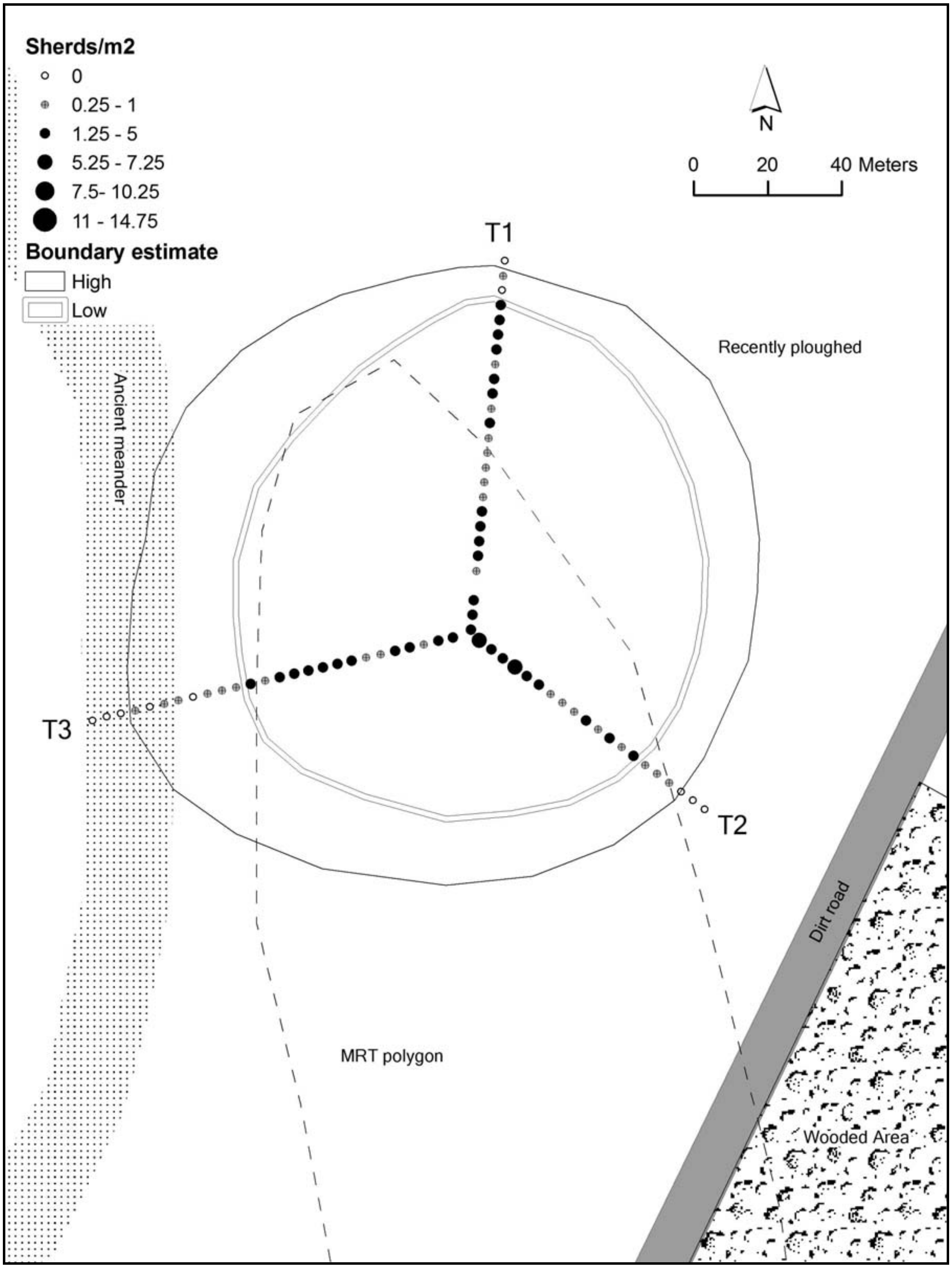

Figure E.3. Site map of surface collection at Bélmegyer 2.

Bélmegyer 2

Unit collected: 284 m^2 Waypoint collected: 2.3 ha Size estimate: 1.4-2.3 ha

Overview of Collected Material by Transect

Transect	Num. of Units	Non-Diag Pot	Diag Pot (C)	Non-MBA Diag (NC)	Bone	Daub	Chipped and ground stone	Slag	Other
1	25	121	39	0	46	1	0	0	2
2	20	99	35	0	39	35	0	0	0
3	26	85	24	0	56	2	0	0	0
SUM	**71**	**305**	**98**	**0**	**141**	**38**	**0**	**0**	**2**

Identifiable Ceramics by Transect (N)

Neolithic	0	Late-Bronze Age / Iron Age	0
Copper Age	1	Later	3
Early-Middle Bronze Age	92	**Total**	95

Summary of Surface Treatment for MBA ceramics in Transect

	Burnished	Brushed	Burnished and Brushed	No Treatment	Total
N	10	43	7	31	91
%	11	47	8	34	100

Distribution of Diagnostic Ceramics by Transect

	Burnished				**Brushed**		**Burn-Brush**	**No Burnishing or Brushing**				**Total MBA Diag**	**Non-MBA Diag (C)**	**Non-MBA Diag (NC)**	**Total Identifiable**
Transect	Rim	Base	Handle	DecoBody	Rim	Body	Body	Rim	Base	Handle	DecoBody				
1	3	2	0	1	0	11	5	7	1	0	7	37	1	0	38
2	3	0	0	1	0	17	1	5	1	1	4	33	1	0	34
3	0	0	0	0	1	15	1	1	1	0	3	22	1	0	23
SUM	***6***	***2***	***0***	***2***	***1***	***43***	***7***	***13***	***3***	***1***	***14***	***92***	***3***	***0***	***95***
Wpts	2	0	0	0	1	4	0	6	0	0	2	15			

Table E.3. Material culture at Békés 179.

Bélmegyer 45

This site lies in the eastern part of the parish on a high ridge of agricultural land. According to the hydrological reconstruction, it stood less than 50 m east of an ancient meander. According to the first Habsburg survey, the site lies in the middle of an extended marshy area. Reeds mark the area of topographic sinks, which probably held very slow moving water. The entire area was planted with corn during survey, and the shoots had just sprung from the surface, providing excellent visibility. The MRT had reported only Gyulavarsánd diagnostics (Jankovich et al. 1998: 350). During survey we also found a few isolated Sarmatian and Árpád sherds but the large quantity of BA material warranted systematic collection. This took place using 5 transects and 120 units spaced every 2 meters (Figure E.4). With no impediments to visibility, this settlement couldn't have been larger than 6 hectares, but certainly wasn't smaller than 2.2 hectares. The area in which waypoints were collected is the upper site limit.

An Árpád sherd notwithstanding, the ceramics from Bélmegyer45 strongly confirm this as a single component Gyulavarsánd site (Table E.4). There are no brushed ceramics at all, though not nearly as many burnished sherds as one might expect in a late Middle Bronze Age site. Engraved channelling is much more common than incising. When incising does occur, it is more refined than that seen at Ottomány sites. Stick impressed appliqué ribbing still occurs on the thicker rims (presumably storage jars) as it does in Ottomány assemblages, however. Lugs also occur in the assemblage, with a similarly large range stylistic range as in the preceding period. Given the high number of units collected, the bone count is surprisingly low, especially since there is so much daub. More chipped stone than this also might be expected, but there were a number of slags encountered in the transects.

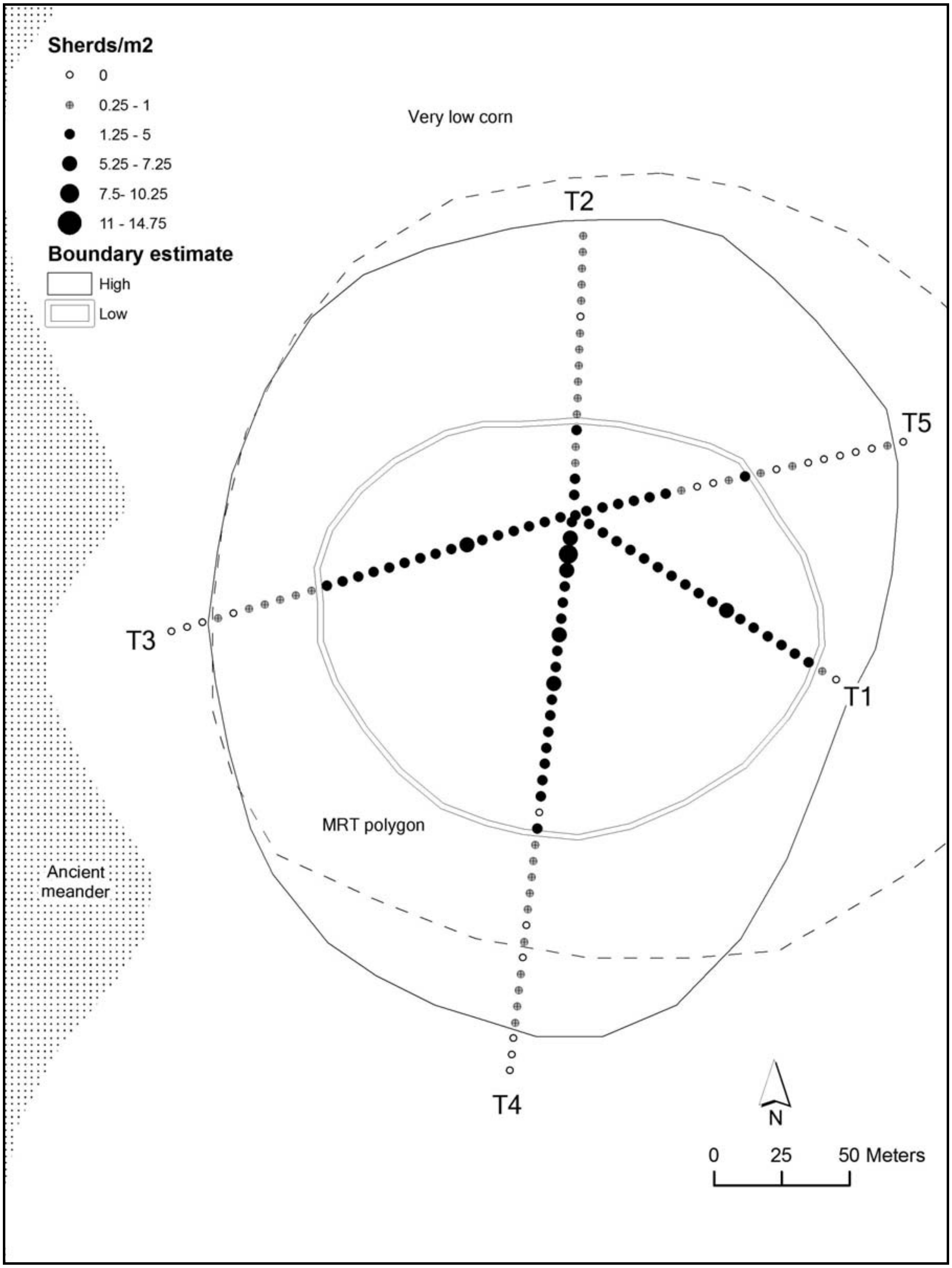

Figure E.4. Site map of surface collection at Bélmegyer 45.

Bélmegyer 45

Unit collected: 476 m^2 Waypoint collected: 6 ha Size estimate: 2-6 ha

Overview of Collected Material by Transect

Transect	Num. of Units	Non-Diag Pot	Diag Pot (C)	Non-MBA Diag (NC)	Bone	Daub	Chipped and ground stone	Slag	Other
1	20	200	33	0	17	98	1	0	0
2	17	53	8	0	3	27	0	0	0
3	26	151	37	0	9	88	0	0	0
4	35	292	42	0	15	188	0	4	0
5	21	93	12	0	6	32	1	9	0
SUM	**119**	**789**	**132**	**0**	**50**	**433**	**2**	**13**	**0**

Identifiable Ceramics by Transect (N)

Neolithic	0	Late-Bronze Age / Iron Age	0
Copper Age	0	Later	1
Early-Middle Bronze Age	127	**Total**	128

Summary of Surface Treatment for MBA ceramics in Transect

	Burnished	Brushed	Burnished and Brushed	No Treatment	Total
N	3	0	0	124	127
%	2	0	0	98	

Distribution of Diagnostic Ceramics by Transect

	Burnished				**Brushed**				**No Burnishing or Brushing**				**Total MBA Diag**	**Non-MBA Diag (C)**	**Non-MBA Diag (NC)**	**Total Identifiable**
Transect	Rim	Base	Handle	DecoBody	Rim	Base	Handle	Body	Rim	Base	Handle	DecoBody				
1	0	0	0	0	0	0	0	0	15	1	5	11	32	0	1	32
2	0	0	0	0	0	0	0	0	5	0	1	2	8	0	0	8
3	0	0	0	1	0	0	0	0	17	1	2	14	35	0	0	35
4	1	0	0	0	0	0	0	0	18	5	4	12	40	0	0	40
5	1	0	0	0	0	0	0	0	8	0	1	2	12	0	0	12
SUM	***2***	***0***	***0***	***1***	***0***	***0***	***0***	***0***	***63***	***7***	***13***	***41***	***127***	***0***	***1***	***128***
Wpts	0	0	0	0	0	0	0	1	13	1	1	12	28			

Table E.4. Material culture at Bélmegyer 45.

Tarhos 26

This site is in the north central part of the parish, on the south side of the Gyepes canal. Both this site and Tarhos 25 (a few meters to the northwest), follow the eastern bank of an old meander (Figure E.5). During survey in the 1960s Nándor Kalicz visited the area and suggested that there were two distinct sites, the small round one with a fortification ditch around it (Tarhos 25), separated from a larger, broader settlement (Tarhos 26). The MRT site polygon for Tarhos 25 includes the dam keeper's (*Gátőr*) house, his fields and animal pens. The site polygon for Tarhos 26 covers what is now still an active *tanya* and several small agricultural plots between it and the *Gátőrház*. Their long axes are between the dirt road and the ancient meander. When we visited Tarhos 26, approximately 20% of the site identified by the MRT was built space or in close association with habitation and could not be evaluated. Another 50% or so was in high wheat during initial survey with very low visibility. Another 30%, however, the north-western section of the site, had recently been ploughed and had excellent visibility.

The MRT had reported very dense Ottomány component material and a smaller part as Gyulavarsánd, with only isolated Sarmatian and Árpád sherds (Jankovich et al. 1998:653-65). This is precisely what we found in the exposed area, so we set up 3 transects for 47 units with 2 meter spacing (Figure E.6). Subsequent visits after the harvest indicate additional material in the field between our transects and the *tanya* by the main road, but it is not as dense as it is in the west. It is perfectly believable that the site density extends all the way to the edge of the ancient meander in the north, however, including the polygon of Tarhos 25 and the *Gátőrház* (noted on Figure E.5). This area comes to 2.4 ha. By the southern end of the polygon, there was almost no material when we surveyed. My conservative estimate includes an additional 20% (3.3 ha), although it is unclear where this border would be exactly. Only the ploughed area was included for waypoint collection, approximately 0.7 ha.

The ceramics on the surface of Tarhos 26 show a great variety of decorations (Table E.5). Details of transect and excavation data are not produced below, as they will be published together at a later time. Although a moderate amount of brushed surface treatment occurs, burnishing is more common. Incised lines, combing, appliqué ribbing on storage jars, zigzags, strainer pots and other decorations occur on surface sherds. Yet despite the high number of diagnostics, very few of these are 'typical' Gyulavarsánd forms – the spirals and engraved channels only encountered in a couple of locations. Compared to other systematically collected sites, Tarhos 26 has the densest of all class of material except for chipped stone. Most spectacular of all, however, was the enormous amount of slag. In a few units we had to stop counting the pieces because the soil itself was saturated with it.

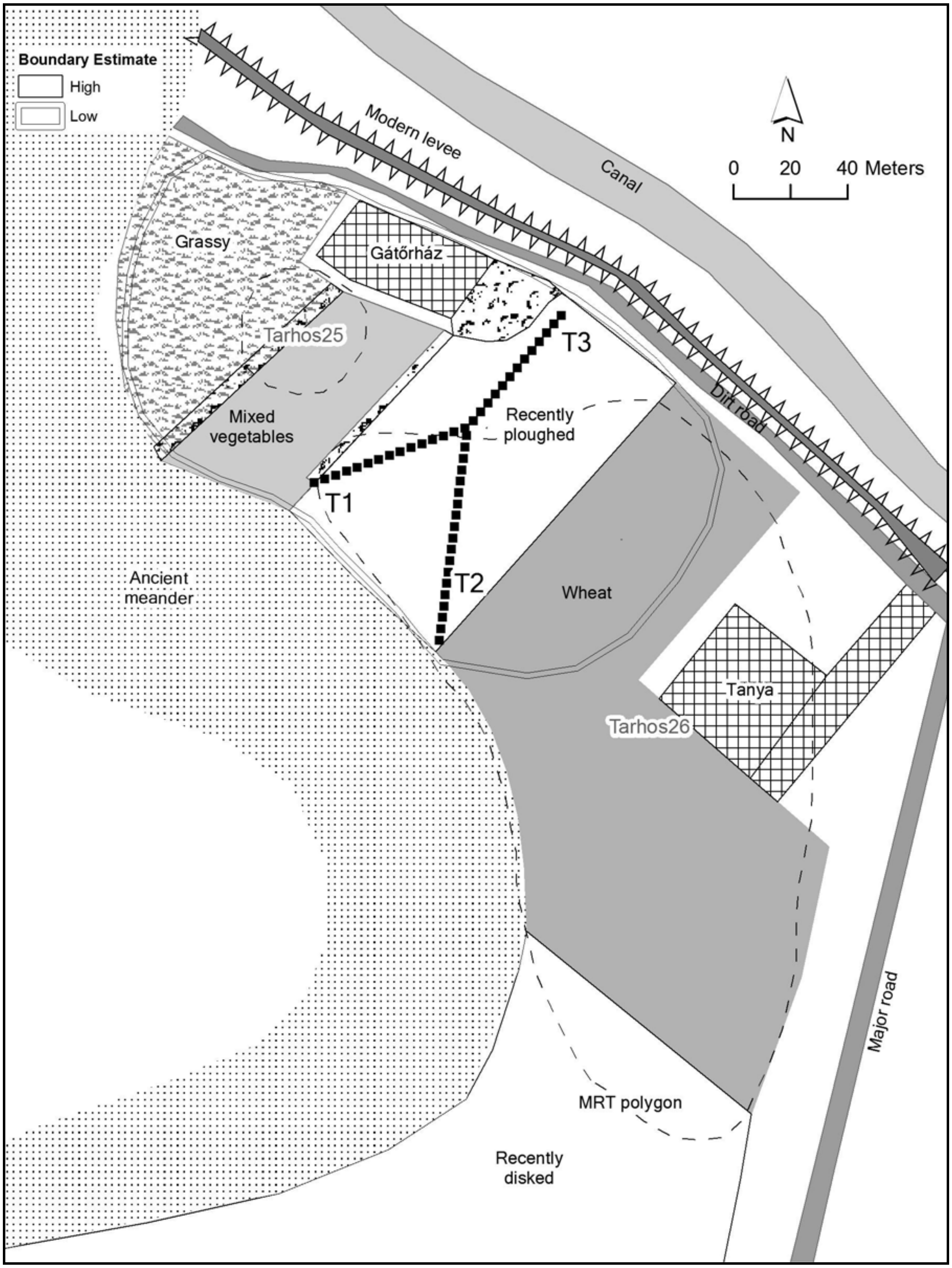

Figure E.5. Site map of conditions for surface collection at Tarhos 25 and 26..

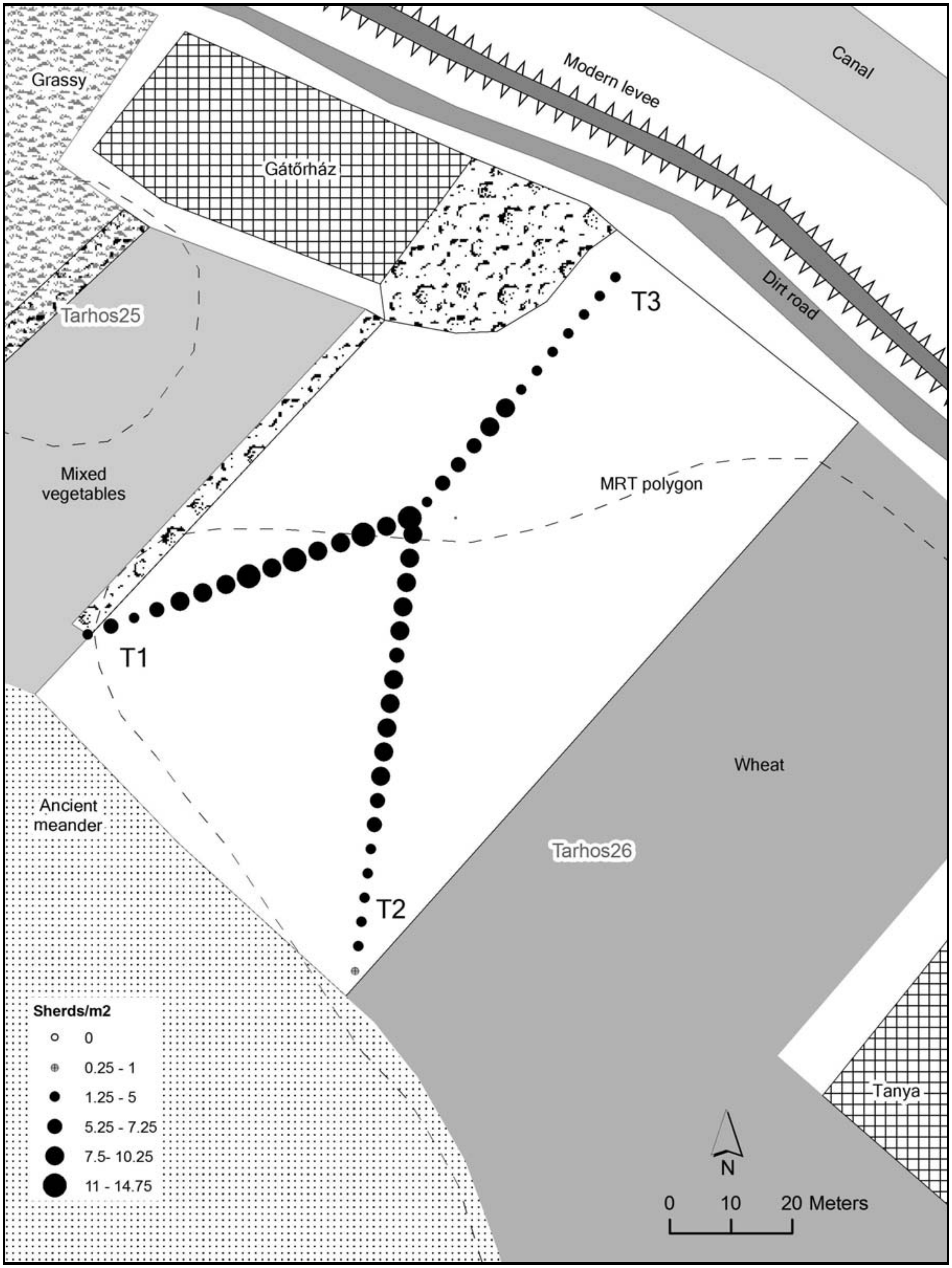

Figure E.6. Site map of surface collection at Tarhos 26.

Tarhos 26

Unit collected: 188 m^2 Waypoint collected: 0.7 ha Size estimate: 2.4-3.3 ha

Overview of Collected Material by Transect

Transect	**Num. of Units**	**Non-Diag Pot**	**Diag Pot (C)**	**Non-MBA Diag (NC)**	**Bone**	**Daub**	**Chipped and ground stone**	**Slag**	**Other**
1	15	409	102	3	142	301	1	752	0
2	19	363	128	2	177	319	0	239	0
3	13	206	66	2	58	85	0	6	0
SUM	**47**	**978**	**296**	**7**	**377**	**705**	**1**	**997**	**0**

Identifiable Ceramics by Transect (N)

Neolithic	0	Late-Bronze Age / Iron Age	0
Copper Age	0	Later	7
Early-Middle Bronze Age	289	**Total**	296

Table E.5. Material culture at Tarhos 26.

Tarhos 32

The site lies near the northern parish boundary on the south side of the Gyepes canal. Bisected by a modern road, the northern half is agricultural but the southern half is composed of agricultural plots, a working *tanya*, and a small modern cemetery. On the Habsburg survey maps, the site lies on the edge of a large marsh and the hydrological reconstruction puts it on the western bank, within 50 m of the Fás stream. During survey the northern half of the site was entirely under wheat cultivation, which had sprouted up to 30-40 cm rendering poor visibility. South of the road stood a modern *tanya* and cemetery. Fortunately, recently ploughed agricultural plot comprising the southernmost 25% of the site was accessible. The archaeological material reported by the MRT includes some of everything: a few Neolithic sherds, Gyulavarsánd, Koszider and Gáva, Sarmatian, Avar and sherds from the Middle Ages (Jankovich et al. 1998: 656-7). The MBA material was supposed to be concentrated on the southern part of the site. Our initial field walking confirmed a high number of MBA diagnostics especially in this area.

We put in four transects totalling 53 units (Figure E.7). The first two transects were spaced at 4 m intervals, but the final transect, in the area of highest MBA, had 2 m intervals to capture a higher number of relevant diagnostics (note: the change in density is not well captured in the legend category breaks). Although prehistoric sherds continued in the disked field to the south, we did not continue transect collection because conditions were different; the material appeared to peter out in this area, and MBA diagnostics were very few. Similarly, the fallow field north of our transects offered MBA sherds but poor visibility overall prevented systematic collection. In general the systematic collection of Tarhos 32 suggests that either major amounts of material had been moved due to ploughing (some 200 meters), or the southern boundaries were uncharacteristically inaccurate for the MRT. Considering the distribution of MBA diagnostics in both transects and waypoints, this site is minimally 1 ha, but a more conservative estimate including the potential for unrecognized material in the disked fields and the built environment of the *tanyas* and cemetery, the site might have extended up to 4 ha. Waypoints were collected over a 1.5 ha area, in both the recently ploughed and fallow fields.

Only 31 MBA diagnostics were identified in transects; two fifths of the diagnostics dated to the Sarmatian and Árpád periods or the Middle Ages (Table E.6). Although no diagnostics came from the Neolithic, a few body sherds towards the end of the first transect did look suspiciously orange and coarse. Both burnished and brushed sherds (one of each) were located using waypoints, but were also identified in transects. The diagnostics from transects are mostly represented by undecorated rims, generic forms that are more easily misplaced chronologically, so I do not claim with much confidence they are MBA. Waypoints collected include fine combing and incising, rounded or curving lines, engraved cups of the Gyulavarsánd style, and raised ridges with diagonal hatching. We also identified appliqué ribbing on thick rims, usually with finger or stick impressed knobs.

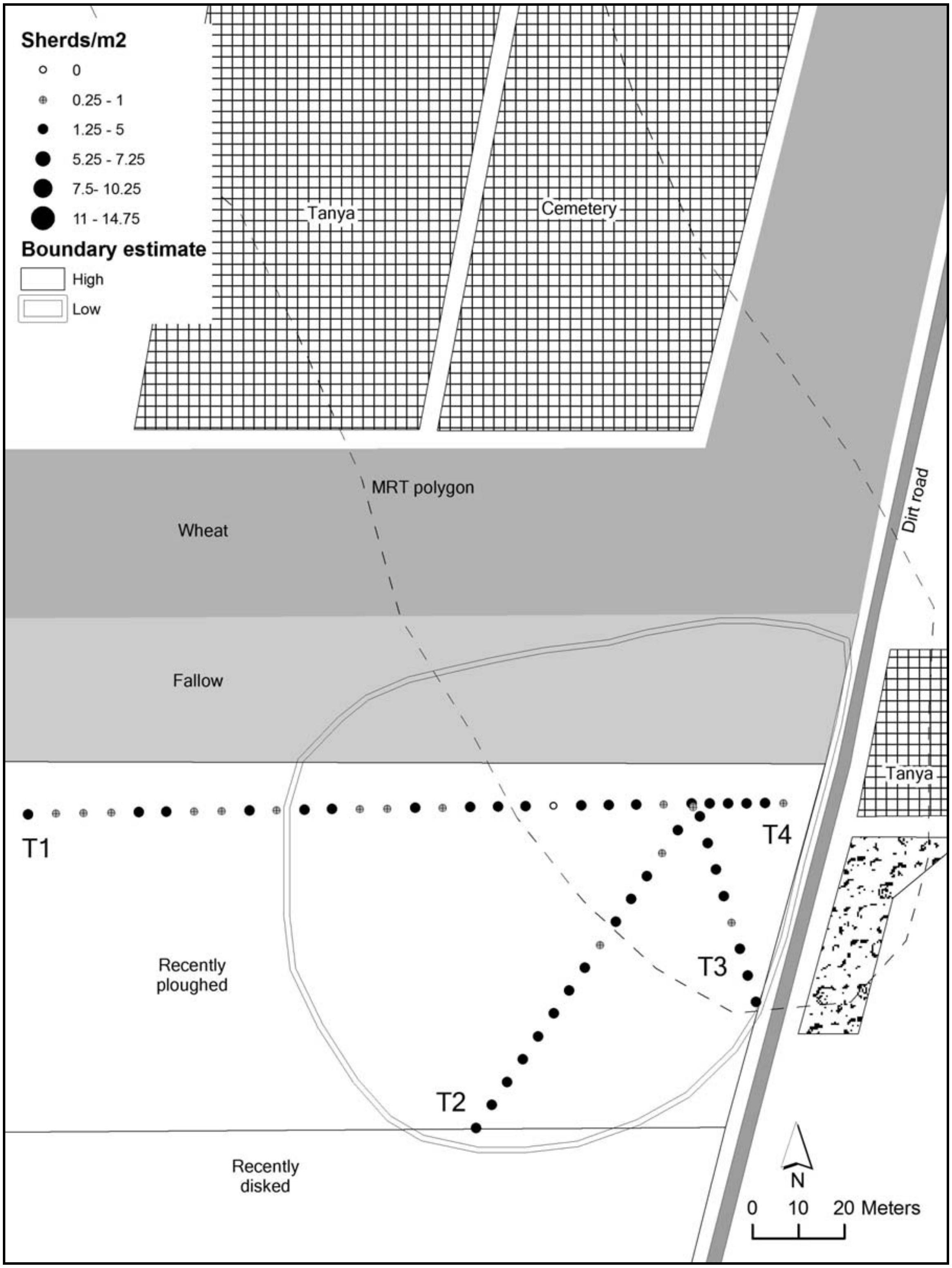

Figure E.7. Site map of surface collection at Tarhos 32.

Tarhos 32

Unit collected: 212 m^2 Waypoint collected: 1.5 ha Size estimate: 1-4 ha

Overview of Collected Material by Transect

Transect	Num. of Units	Non-Diag Pot	Diag Pot (C)	Non-MBA Diag (NC)	Bone	Daub	Chipped and ground stone	Slag	Other
1	25	109	12	16	47	86	1	0	0
2	15	98	11	14	23	58	0	3	1
3	8	45	5	9	15	49	1	1	1
4	5	28	6	3	29	35	0	0	0
SUM	**53**	**280**	**34**	**42**	**114**	**228**	**2**	**4**	**2**

Identifiable Ceramics by Transect (N)

Neolithic	0	Late-Bronze Age / Iron Age	0
Copper Age	0	Later	19
Early-Middle Bronze Age	31	**Total**	

Summary of Surface Treatment for MBA ceramics in Transect

	Burnished	Brushed	Burnished and Brushed	No Treatment	Total
N	0	0	0	31	31
%	0	0	0	100	100

Distribution of Diagnostic Ceramics by Transect

	Burnished				Brushed				No Burnishing or Brushing				Total MBA Diag	Non-MBA Diag (C)	Non-MBA Diag (NC)	Total Identifiable
Transect	Rim	Base	Handle	DecoBody	Rim	Base	Handle	Body	Rim	Base	Handle	DecoBody				
1	0	0	0	0	0	0	0	0	10	0	1	0	11	0	4	15
2	0	0	0	0	0	0	0	0	8	0	0	1	9	2	10	21
3	0	0	0	0	0	0	0	0	3	0	1	1	5	0	2	7
4	0	0	0	0	0	0	0	0	2	0	1	3	6	0	1	7
SUM	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***23***	***0***	***3***	***5***	***31***	***2***	***17***	***50***
Wpts	1	0	0	0	0	0	0	1	14	1	1	4	22			

Table E.6. Material culture at Tarhos 32.

FORTIFIED SITES IN MICRO-REGION

Békés-Várdomb (Tarhos 1) Cluster

Horizontal excavation took place on the fortified island and in an area across the meander Bóna called the 'northern village' (Figure 7.8). The area of the northern village (Tarhos 2) produced Sarmatian and Gepida period features during excavation in the 1960s, but test trenches on the eastern shores of the enclosure, Tarhos 19, did not (see Table 7.9). Therefore, surface collection in 2 x 2 m units focused on Tarhos 19.

Tarhos 19 follows the southern side of the Fás stream flowing east to west (Figure E.8). Although this meander was drained during the Habsburg levee-building campaign of the 19th century, it is still wet during part of the year today. Both field walking and shovel tests in this former meander confirmed the absence of cultural material. Half of the MRT site polygon was covered in wheat during survey, a small percentage (c. 10%) had been recently disked, and the rest had been recently ploughed. The MRT reports only Gyulavarsánd ceramics outside of a couple of Sarmatian sherds (Jankovich et al. 1998:652). We put in five transects, totalling 61 units, in the recently ploughed field with the densest amount of material. The first transect had no spaces between collection units, but all others used a 2 m interruption between units to cover more ground at a lower spatial resolution. Approximately 1.5 hectares were collected as waypoints.

The diagnostic ceramics collected in transects were exclusively Middle Bronze Age with untreated ceramic surfaces (Table E.7). One burnished sherd and seven brushed sherds were collected as waypoints, but all of the latter came from the far east of the site near *Kolbász Island*[110]. Decorations in the transects consist of wide spiral or curved engraved lines and fine combing on the body exterior, and appliqué ribbing along the tops of vessels. Some of the thicker vessels also have handles and square lugs. One flat topped rim has hatching on the flat top. Very little bone came up in transect collection, but there was a fair amount of daub.

The combined area for the Tarhos 1, 2, 19, and 72 polygons equals over 56 ha (Fig. E.9). The Tarhos 1 cluster is one of four sites systematically shovel tested for testing hypotheses related to productive catchment (the other three, outside the micro-region, follow below). Shovel testing in the Tarhos 1 Cluster was at 100 m intervals. In addition to handmade ceramics, quantities of bone, daub and other prehistoric objects were recorded for each shovel test (Table E.8). The interpolation of shovel tests, surface collection units and GPS spot points took place in Golden Globe's Surfer 8.05. In order to exclude the meander from the area calculation, a series of dummy points – X/Y coordinates with "0" values – were added along the 85 m topographic contour of the river (using the 1:10,000 topographic maps). The same was done along the extreme northern edge of Tarhos 2, where field walking revealed no surface material, because of the tendency for the interpolation to extend into empty space. There is a stereographic error in the topographic maps which misses the ditch creating *Kolbász Island* (obvious in field inspection and aerial imagery) – this was also corrected using dummy points. The data from transects at Tarhos 19 (point polygons) (Table 8.14) and waypoints isolating MBA sherd scatters taken during survey (Table E.9) were added to the list of coordinates for

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[110] *Kolbász* means 'sausage' in Hungarian.

interpolation in Surfer. All values were included in a single .txt file with UTM coordinates to create the grid. From this, a contour map was exported to, and georeferenced in, ArcGIS 9 (Figure E.10). A polygon shapefile was created from this image based on the contours delineating “2 or more sherds” per m^2 or 20 litre screened sample of ploughzone. The area interpolated to contain 2 or more sherds resulted in five polygons totalling 22.2 ha (Figure E.11).

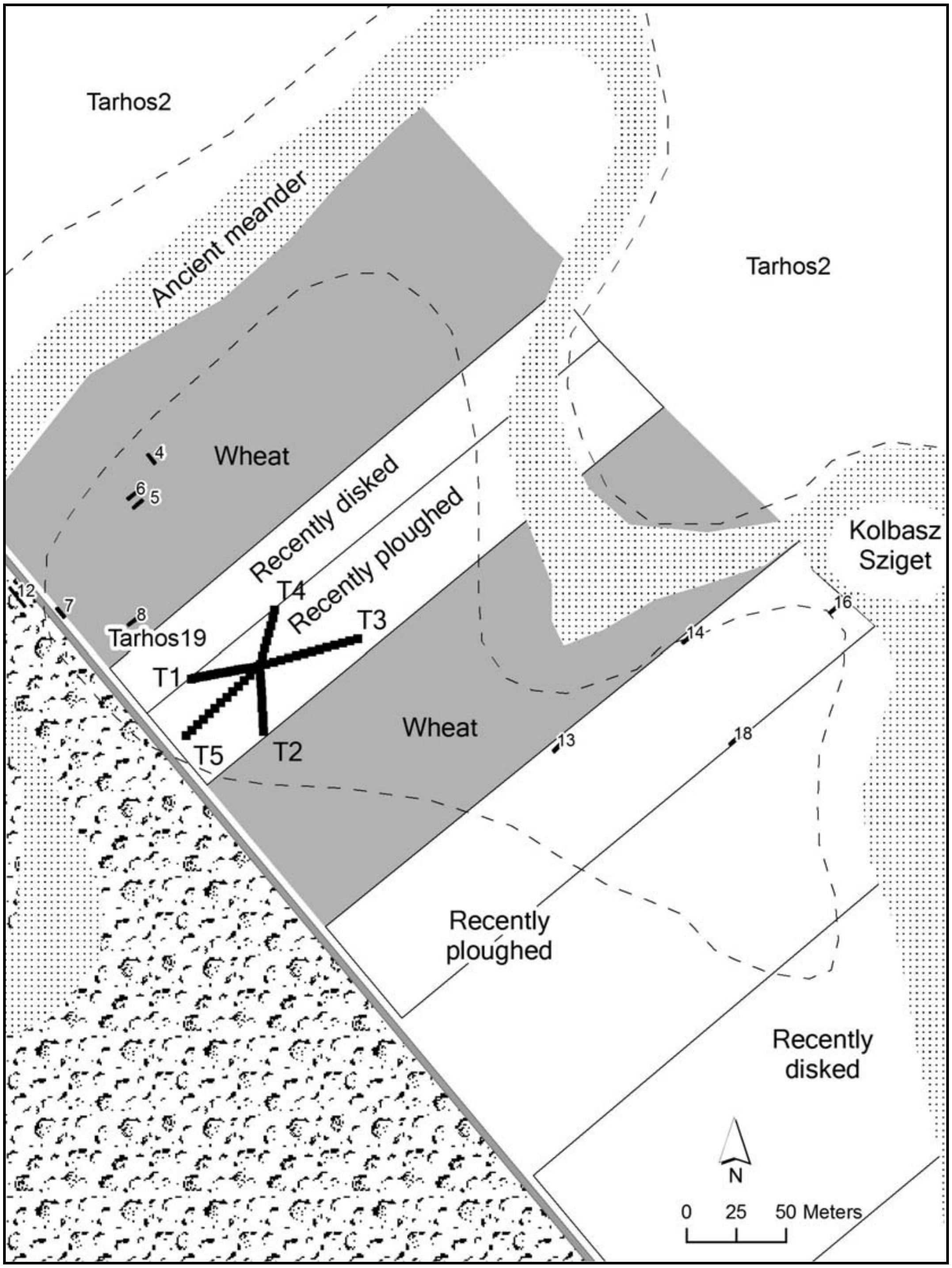

Figure E.8. Site map of surface collection at Tarhos 19. The numbered trenches are Bóna's excavations.

Békés Várdomb (Tarhos 1) Cluster

Unit collected: 244 m^2 Waypoint collected: 1.5/5 ha Size estimate: 22.2 ha

Overview of Collected Material by Transect (Tarhos 19)

Transect	Num. of Units	Non-Diag Pot	Diag Pot (C)	Non-MBA Diag (NC)	Bone	Daub	Chipped and ground stone	Slag	Other
1	18	135	26	0	3	0[111]	0	0	0
2	9	81	12	0	4	71	1	0	0
3	13	79	7	0	1	82	1	0	0
4	8	68	12	0	2	106	0	0	0
5	13	138	12	0	4	109	1	0	0
SUM	**61**	**501**	**69**	**0**	**14**	**368**	**3**	**0**	**0**

Identifiable Ceramics by Transect (N)

Neolithic	0	Late-Bronze Age / Iron Age	0
Copper Age	0	Later	0
Early-Middle Bronze Age	69	**Total**	69

Summary of Surface Treatment for MBA ceramics in Transect

	Burnished	Brushed	Burnished and Brushed	No Treatment	Total
N	1	0	0	68	69
%	1	0	0	99	100

Distribution of Diagnostic Ceramics by Transect

	Burnished				**Brushed**				**No Burnishing or Brushing**							
Transect	Rim	Base	Handle	DecoBody	Rim	Base	Handle	Body	Rim	Base	Handle	DecoBody	**Total MBA Diag**	**Non-MBA Diag (C)**	**Non-MBA Diag (NC)**	**Total Identifiable**
1	0	0	0	1	0	0	0	0	15	2	1	7	26	0	0	26
2	0	0	0	0	0	0	0	0	10	1	0	1	12	0	0	12
3	0	0	0	0	0	0	0	0	2	0	0	5	7	0	0	7
4	0	0	0	0	0	0	0	0	8	1	1	3	13	0	0	13
5	0	0	0	0	0	0	0	0	7	1	0	3	11	0	0	11
SUM	***0***	***0***	***0***	***1***	***0***	***0***	***0***	***0***	***42***	***5***	***2***	***19***	***69***	***0***	***0***	***69***
Wpts	1	0	0	0	0	0	0	7	1	0	0	0	9			

Table E.7. Material culture at Tarhos 19.

[111] During this first transect of the season, we weighed daub rather than counted it, with an imprecise scale it didn't measure on. We modified the plan to count instead.

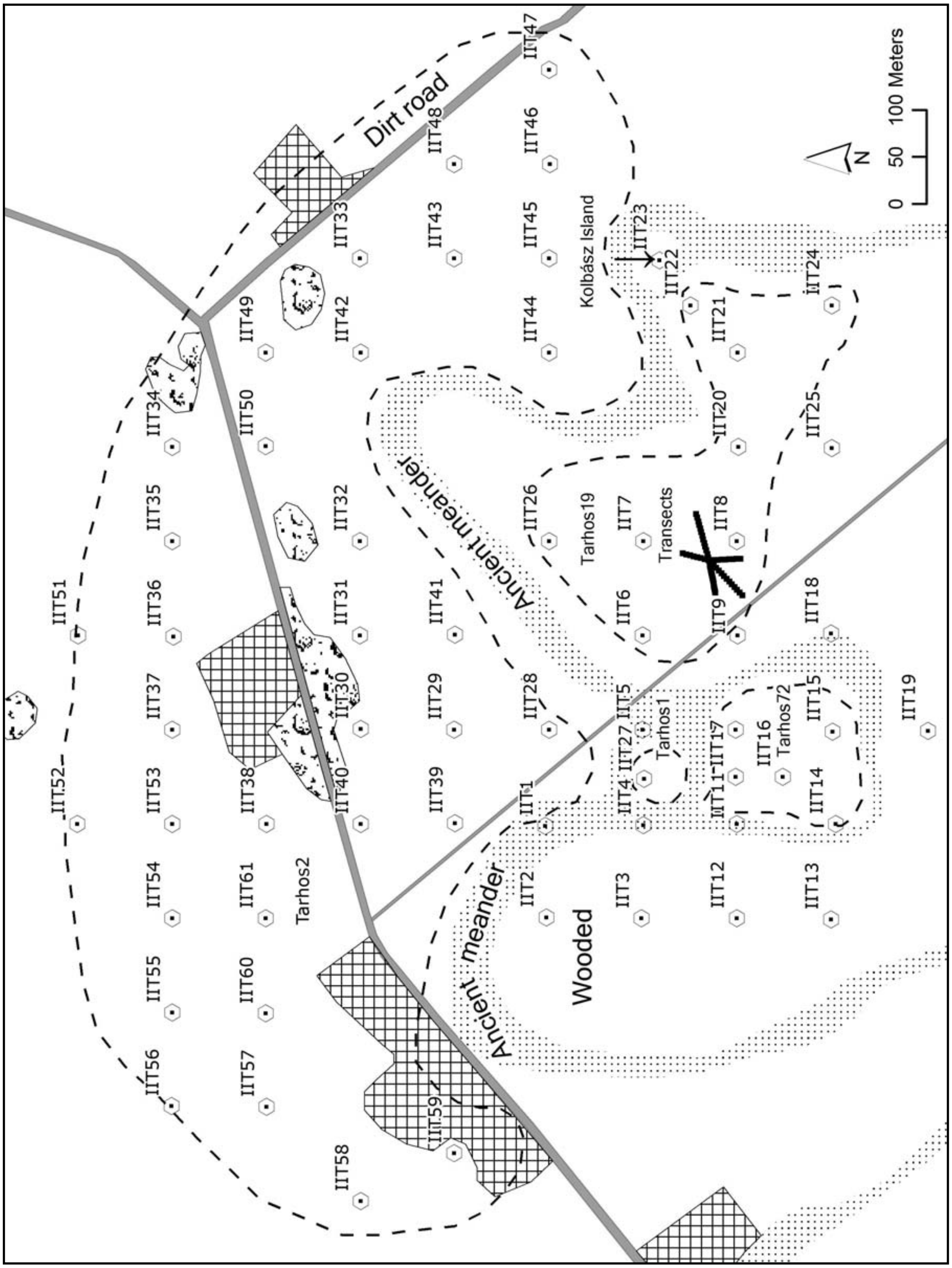

Figure E.9. Shovel test probes for the surroundings of Békés-Várdomb.

Table E.8. Shovel test probes for Békés-Várdomb and surrounding settlement

STP	Easting	Northing	Total Pot	Brushed	Burnished	Prehistoric Body	MBA Diag; no surface treatment	Total Prehistoric and MBA	Non-Pre-historic	Bone	Daub	Slag	Other
IIT01	521798	5182404	0					0		0	0	0	0
IIT02	521701	5182403	0					0		0	0	0	0
IIT03	521700	5182302	0					0		0	0	0	0
IIT04	521799	5182300	0					0		0	0	0	0
IIT05	521900	5182301	0					0		0	0	0	0
IIT06	522000	5182301	2			1	1	2		0	15	0	0
IIT07	522100	5182300	2			2		2		0	3	0	0
IIT08	522100	5182201	0					0		0	5	0	0
IIT09	522000	5182200	1			1		1		0	0	0	0
IIT10	521900	5182202	26			21	5	26		6	23	0	1
IIT11	521800	5182201	0					0		0	0	0	0
IIT12	521700	5182201	0					0		0	1	0	0
IIT13	521699	5182101	2			1		1	1	0	0	0	0
IIT14	521800	5182096	0					0		0	0	0	0
IIT15	521898	5182099	6			5		5	1	0	0	0	0
IIT16	521850	5182152	8			8		8		3	4	0	0
IIT17	521850	5182202	19			13	5	18	1	4	26	0	0
IIT18	522002	5182101	0					0		0	0	0	0
IIT19	521899	5181998	0					0		0	0	0	0
IIT20	522200	5182199	2			1	1	2		0	0	0	0
IIT21	522300	5182200	0					0		0	0	0	0
IIT22	522350	5182250	16		3	10	3	16		3	5	0	0
IIT23	522398	5182283	9	2		6	1	9		4	7	0	0
IIT24	522350	5182100	0					0		0	0	0	0
IIT25	522199	5182100	0					0		0	0	0	0
IIT26	522100	5182400	0					0		0	6	0	0
IIT27	521848	5182299	11			10	1	11		4	44	0	0
IIT28	521900	5182400	15		2	8	3	13	2	4	11	0	1
IIT29	521900	5182501	15		1	12		13	2	0	12	0	0
IIT30	521901	5182600	12		1	8	1	10	2	3	5	0	0
IIT31	522000	5182601	4		1	2		3	1	0	3	0	0
IIT32	522100	5182601	5			4	1	5		0	16	0	0
IIT33	522400	5182601	7		1	4	2	7		1	6	0	0
IIT34	522200	5182800	2			1		1	1	0	0	0	0
IIT35	522100	5182800	1			1		1		0	0	0	0
IIT36	521999	5182799	0					0		0	0	0	0
IIT37	521900	5182800	0					0		0	0	0	0
IIT38	521800	5182700	4		1	2	1	4		0	0	0	1
IIT39	521801	5182500	11		1	7	3	11		0	16	0	1

STP	Easting	Northing	Total Pot	Brushed	Burnished	Prehistoric Body	MBA Diag; no surface treatment	Total Prehistoric and MBA	Non-Pre-historic	Bone	Daub	Slag	Other
IIT40	521800	5182600	11			7	3	10	1	0	1	0	0
IIT41	522001	5182500	12			9	3	12		0	6	0	0
IIT42	522300	5182600	6			4	1	5	1	0	0	0	0
IIT43	522400	5182501	11			7	1	8	3	1	0	0	1
IIT44	522300	5182400	4			2		2	2	0	1	0	0
IIT45	522400	5182400	5			5		5		0	5	0	0
IIT46	522500	5182399	4			4		4		1	6	0	0
IIT47	522600	5182400	6		1	5		6		0	0	0	0
IIT48	522500	5182501	6		1	4	1	6		0	0	0	0
IIT49	522300	5182701	3			3		3		0	0	0	0
IIT50	522201	5182701	11			8		8	3	0	3	0	0
IIT51	522000	5182900	0					0		0	0	0	0
IIT52	521800	5182901	0					0		0	0	0	0
IIT53	521800	5182800	10			7	3	10		0	1	0	0
IIT54	521700	5182800	9			8	1	9		0	0	0	0
IIT55	521600	5182800	2			2		2		0	0	0	0
IIT56	521501	5182801	0					0		1	0	0	0
IIT57	521500	5182700	5			3	2	5		3	0	0	0
IIT58	521400	5182600	0					0		0	0	0	0
IIT59	521451	5182501	0					0		0	0	0	0
IIT60	521599	5182701	7			6	1	7		0	1	0	0
IIT61	521700	5182701	6			5		5	1	0	1	0	0
TOTAL			**298**	**2**	**13**	**217**	**44**	**276**	**22**	**38**	**233**	**0**	**5**
%				**0.7**	**4.7**	**78.6**	**15.9**	**100**					

WPT ID	Easting	Northing
I10	522088	5182289
I11	522102	5182298
I12	522053	5182197
I13	522065	5182205
I14	522068	5182213
I15	522081	5182220
I16	522081	5182210
I18	522092	5182210
I19	522091	5182216
I20	522087	5182229
I21	522111	5182240
I22	522118	5182250
I23	522130	5182254
I24	522158	5182277
I25	522187	5182318
I26	522172	5182322
I27	522106	5182352
I28	522125	5182284
I29	522116	5182275
I30	522121	5182263
I31	522104	5182263
I32	522097	5182258
I34	522089	5182252
I35	522086	5182250
I36	522083	5182246
I37	522080	5182234
I38	522070	5182236
I39	522066	5182218
I40	522053	5182215
I44	522050	5182183
I47	522284	5182229
I48	522287	5182238
I49	522321	5182254
I50	522326	5182246
I51	522313	5182256
I52	522341	5182255
I54	522361	5182202
I43	522042	5182205

Table E.9. Waypoints of sherd scatters (3 or more) at Tarhos 19 added to the site map of Békés-Várdomb for interpolation in Surfer.

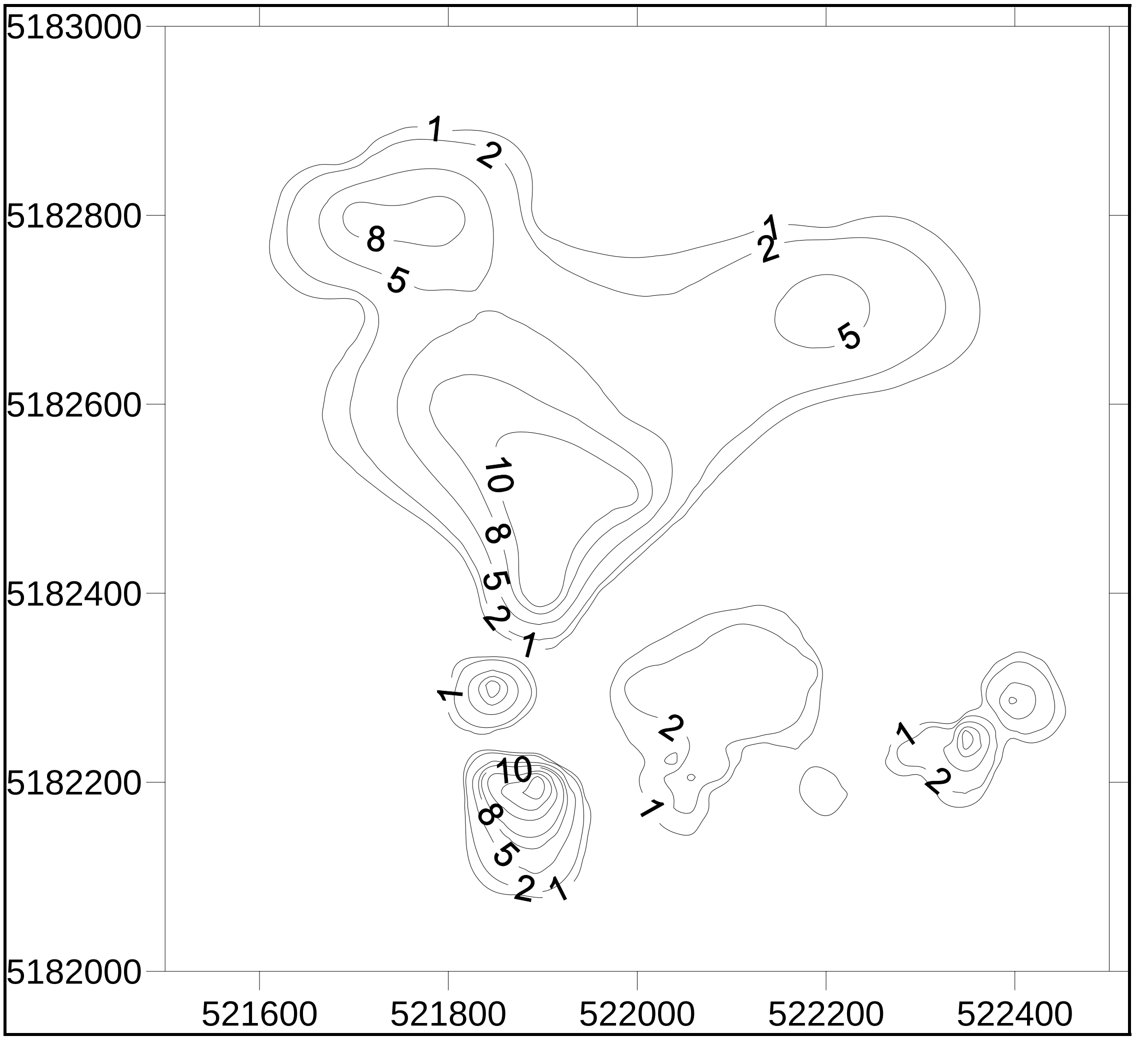

Figure E.10. Interpolation of sherd numbers in Surfer using combined STP, transect, and waypoint datasets. Numbers on X and Y axis UTM coordinates (Zone 34 N).

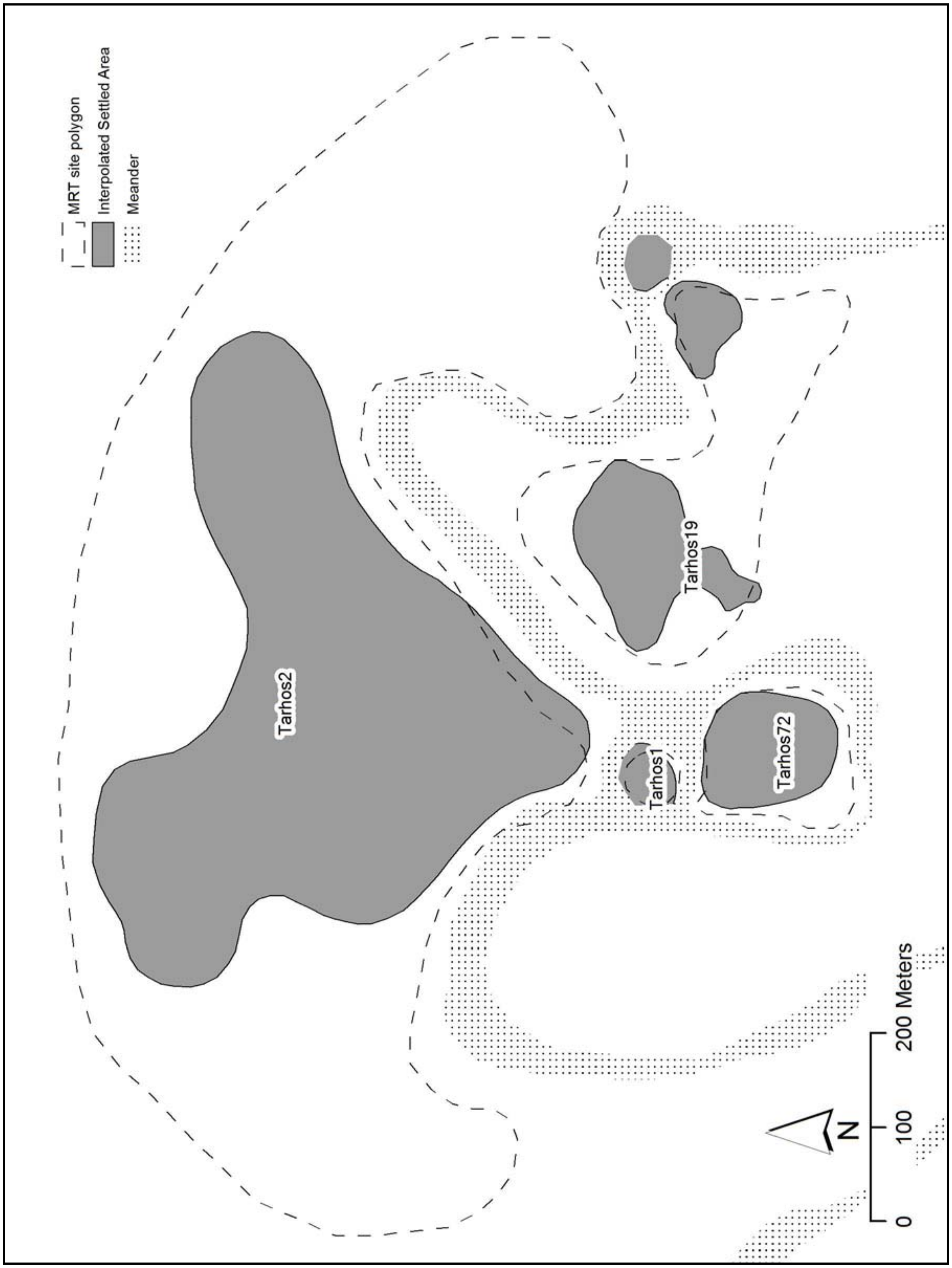

Figure E.11. Site polygons of two or more sherds per m2 for Békés-Várdomb and surrounding sites.

Peckesi-domb (Sarkad 8) Cluster

No excavation took place outside of the tell enclosure in the early 1990s, but daub patches noted on the surface of both Sarkad 7 and Sarkad 88 by MRT surveyors suggest that the Middle Bronze Age occupation was tied to the area within 100 meters of the river, occasionally up to 200 meters (Figure E.12). For Sarkad 7, the MRT surveyors describe large daub stains on the surface mostly on the highest areas, with an insignificant amount of Sarmatian, Árpád and Late Middle Age period sherds. For Sarkad 89, surveyors found Sarmatian, Árpád, and prehistoric sherds. Sarmatian dominated in the northwest of the site, and in the southeast, prehistoric sherds dominated, although the Gyulavarsánd diagnostics were few. For Sarkad 88, the largest contiguous site, Bronze Age ceramics were reported from all over. The densest material was the ring around the southern bank of the meander near the islands, with house daub stains occurring alongside diagnostic Gyulavarsánd material. A small amount of Sarmatian material occurred in this area too, but dominated the southern part of the site, where prehistoric sherds are more infrequent.

Field conditions during May and June surface collection offered very poor visibility over the surrounding sites. Only both northern and southern mounds (Sarkad 8 and 9, respectively) had been recently ploughed with good visibility. Sarkad 7 to the north was mostly covered by wheat. Sarkad 89 was entirely covered in hay bails and grasses. Wheat and a small amount of corn covered about 70% of Sarkad 88. Only about 15% of Sarkad 88, the eastern flank extending up to the meander, was recently ploughed and planted with sunflower. Here we collected four transects totalling 117 units (Figure E.13). Field walking revealed almost nothing from the easternmost ploughed field, and there was a strong drop off of MBA diagnostics about 200 m from the ancient meander in the western field. Waypoints were collected in 60% of the same field, equalling about 5 ha in size.

Our spatially expansive collection of Sarkad 88 returned a large number of ceramics. About a quarter of the diagnostic ceramics came back burnished, with only 2% brushed, strongly supporting a dominant Gyulavarsánd phasing (Table E.10). Diagnostics from transects include engraved channels, in straight and curved lines or spirals. Incising tends to be thin and carefully executed. Burnishing tends toward an extreme reflective polish. Thick vessels still have appliqué ribbing near the rims, with coarsely impressed dots or lines. We found one incised line cluster in a zig-zag pattern characteristic of the earlier Ottomány phase, but no other chronologically restrictive markers. Of the Sarmatian and later ceramics, most occurred furthest away from the site (10 in a single unit the furthest away from the ‘tell’). There is a tremendous amount of daub, mostly from the units closest to the banks of the former meander. A few lithics and slags occur in transects, but are low in numbers compared to the ceramic and daub.

Time constraints prohibited shovel testing at this site, so providing an MBA site size estimate is difficult given that so little of it was visible on the surface. The two enclosed sites make up about 0.8 ha. Although there are Sarmatian components, easily half of Sarkad 7 and 89 have MBA debris, judging by the MRT reports. Taken together, the sum would comprise about 9 ha.

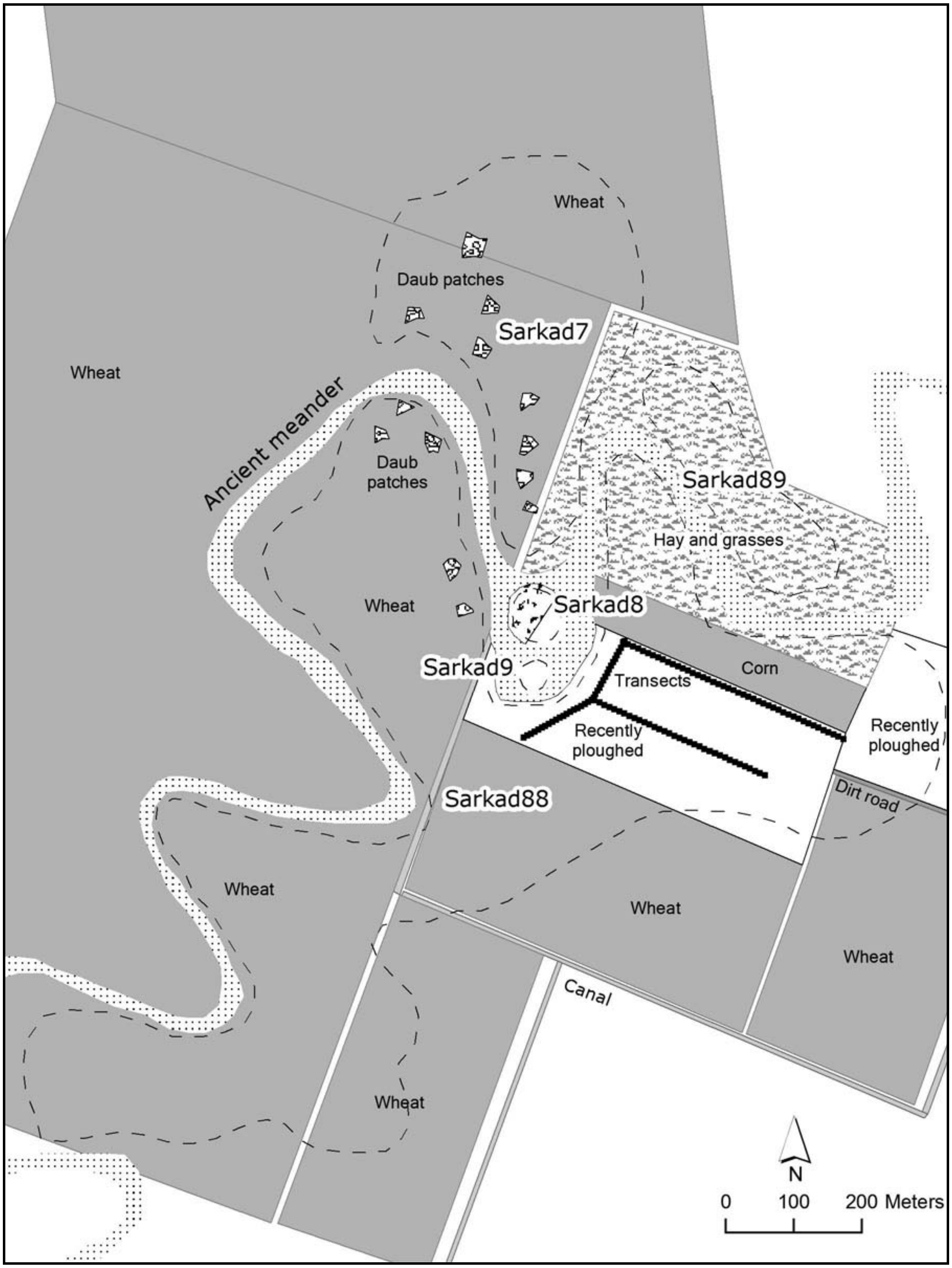

Figure E.12. Sarkad-Peckesi-domb and surrounding area.

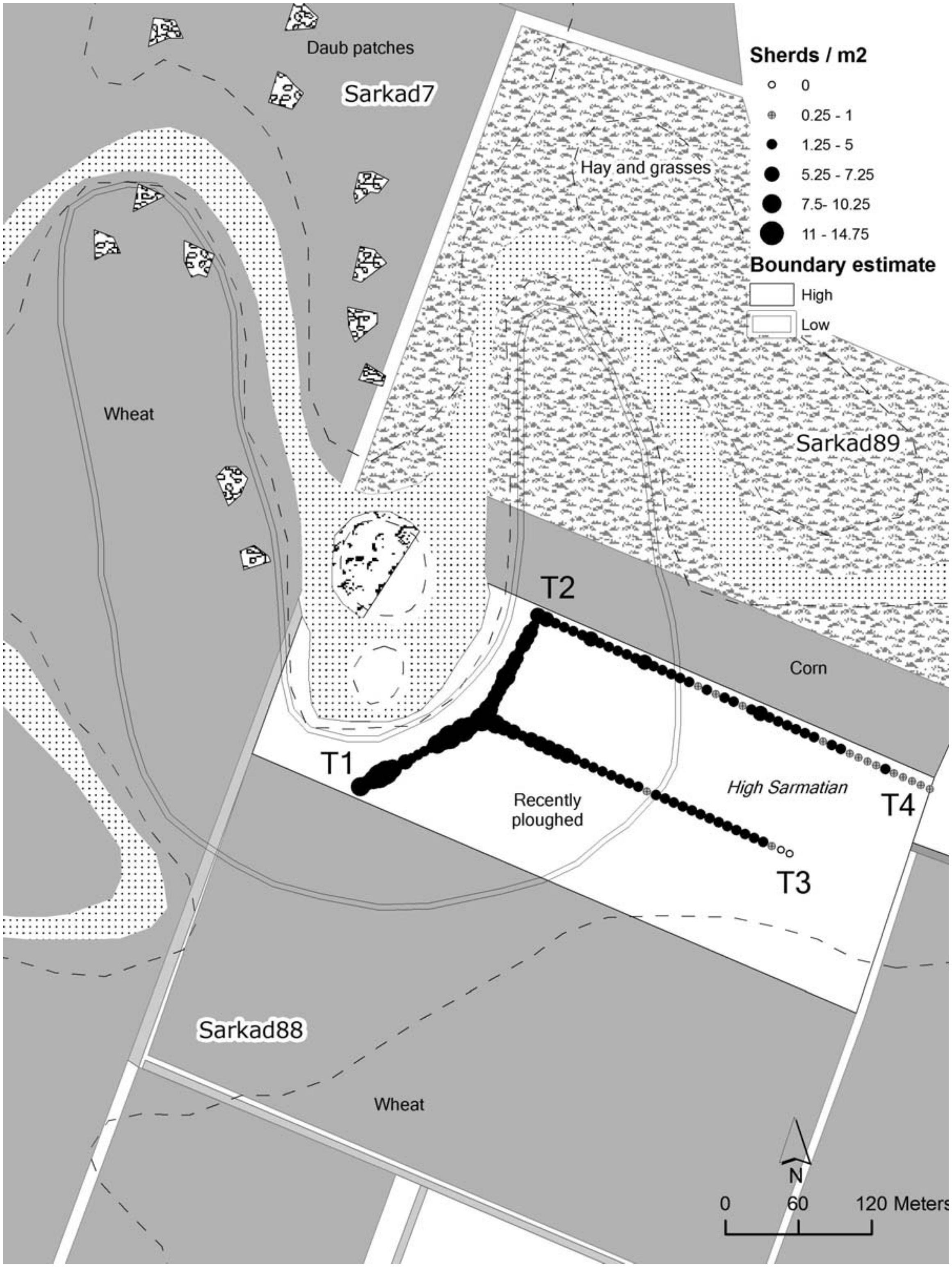

Figure E.13. Close up of transect data at Sarkad 88 and the estimated MBA site boundary.

Peckesi-domb (Sarkad 8) Cluster

Unit collected: 468 m^2 Waypoint collected: 5 ha Size estimate: 24.69-25.77 ha

Overview of Collected Material by Transect (Sarkad 88)

Transect	Num. of Units	Non-Diag Pot	Diag Pot (C)	Non-MBA Diag (NC)	Bone	Daub	Chipped and ground stone	Slag	Other
1	20	563	92	0	95	597	1	1	1
2	17	297	82	8	55	279	0	2	0
3	35	416	55	7	41	173	0	1	4
4	45	400	39	43	25	116	2	1	1
SUM	**117**	**1676**	**268**	**58**	**216**	**1165**	**3**	**5**	**6**

Identifiable Ceramics by Transect (N)

Neolithic	0	Late-Bronze Age / Iron Age	0
Copper Age	0	Later	34
Early-Middle Bronze Age	252	**Total**	290

Summary of Surface Treatment for MBA ceramics in Transect

	Burnished	Brushed	Burnished and Brushed	No Treatment	Total
N	65	6	0	181	252
%	26	2	0	72	100

Distribution of Diagnostic Ceramics by Transect

	Burnished				**Brushed**				**No Burnishing or Brushing**							
Transect	Rim	Base	Handle	DecoBody	Rim	Base	Handle	Body	Rim	Base	Handle	DecoBody	**Total MBA Diag**	**Non-MBA Diag (C)**	**Non-MBA Diag (NC)**	**Total Identifiable**
1	16	3	0	10	1	0	0	0	32	4	3	21	90	0	0	90
2	10	1	2	11	1	0	0	0	28	6	5	15	79	0	8	87
3	2	1	0	4	0	1	0	3	19	2	1	14	47	1	7	55
4	5	0	0	0	0	0	0	0	20	1	1	9	36	3	19	58
SUM	***33***	***5***	***2***	***25***	***2***	***1***	***0***	***3***	***99***	***13***	***10***	***59***	***252***	***4***	***34***	***290***
Wpts	10	1	1	18	0	0	0	0	31	2	2	6	71			

Table E.10. Material culture at Sarkad 88.

Finally, by using my surface collection and the MRT descriptions together, I offer a site boundary estimate for Sarkad 88 in Figure 8.16 that comes to 14.8 ha. Here I have assumed that the eastern boundary transect values reflect later components, a trend observed during waypoint collection. I've also assumed that the same density of material wraps around the southern meander shore, but does not flare out to the west and south. This is supported by the MRT surveyors' observation that large patches of daub are smeared on the surface near the south shore, but not away from it in the same field. Nonetheless, I'll allow an additional 20% for upper range for this site, equally 17.8 ha. Together, that puts the maximal site size of the entire cluster between 24.6 and 27 ha.

Belső-Szőlők (Sarkad 46) Cluster

Although some prehistoric ceramics had come to the museum from the area in the 1950s, these sites were defined for the first time by MRT surveyors. Belső-Szőlők (Sarkad 46) is a natural enclosure inside of a meander loop less than a kilometre southeast of the modern town of Sarkad. Sarkad 24 is across the meander to the east, itself primarily restricted to the inner loop of a meander bend. Sarkad 30, to the northeast and east of both sites, is a vast site following the right bank of the Gyepes river (Figure E.14). The enclosed site is registered in the Hungarian Museum record as a tell, although not test excavation occurred and it is unclear how much of the elevation is artificial versus natural. Both Sarkad 46 and Sarkad 24 are in an area that has been used as community gardens for some time. The first Habsburg survey map of this area differs significantly from the second (Figure E.15). The first map suggests that before regulation, a significant portion of the area contained marshy conditions, and that the dryer, farmable land was on the south side. The second map, which presumably includes a more accurate representation of the meander geometry but not the hydrology (it was after river regulation had began), indicates that Sarkad 46 was in fact an island. The MRT surveyors suggest that the cut into a peninsula is artificial (see description under Sarkad 30). The light blue area forming the western edge of this island suggests that it may have still been at least seasonally wet at the time of the second Habsburg military survey.

The MRT survey records the majority of the diagnostics for Sarkad 46 as Gyulavarsánd, with a small number of Gáva. There were also a few sherds from the Keltic and Sarmatian periods, and a couple from the Árpád and Late Middle Ages. Field conditions during our survey included gardens and orchards, small plots and grassy areas. Although detailed measurements were not taken during survey, probably only 5-10% was of the surface had been ploughed or planted recently enough in order to see archaeological material on the surface. In order to get a sense of settlement concentration, the inside the enclosure was shovel tested at 100 m intervals, although an additional two were put in on the area of highest elevation and concentration (Table E.11, Figure E.14). Interpolation of the data took place using dummy points along the edge of the island, resulting in one large concentration on the area of highest elevation, and another on the southeast of the site (Figure E.16).

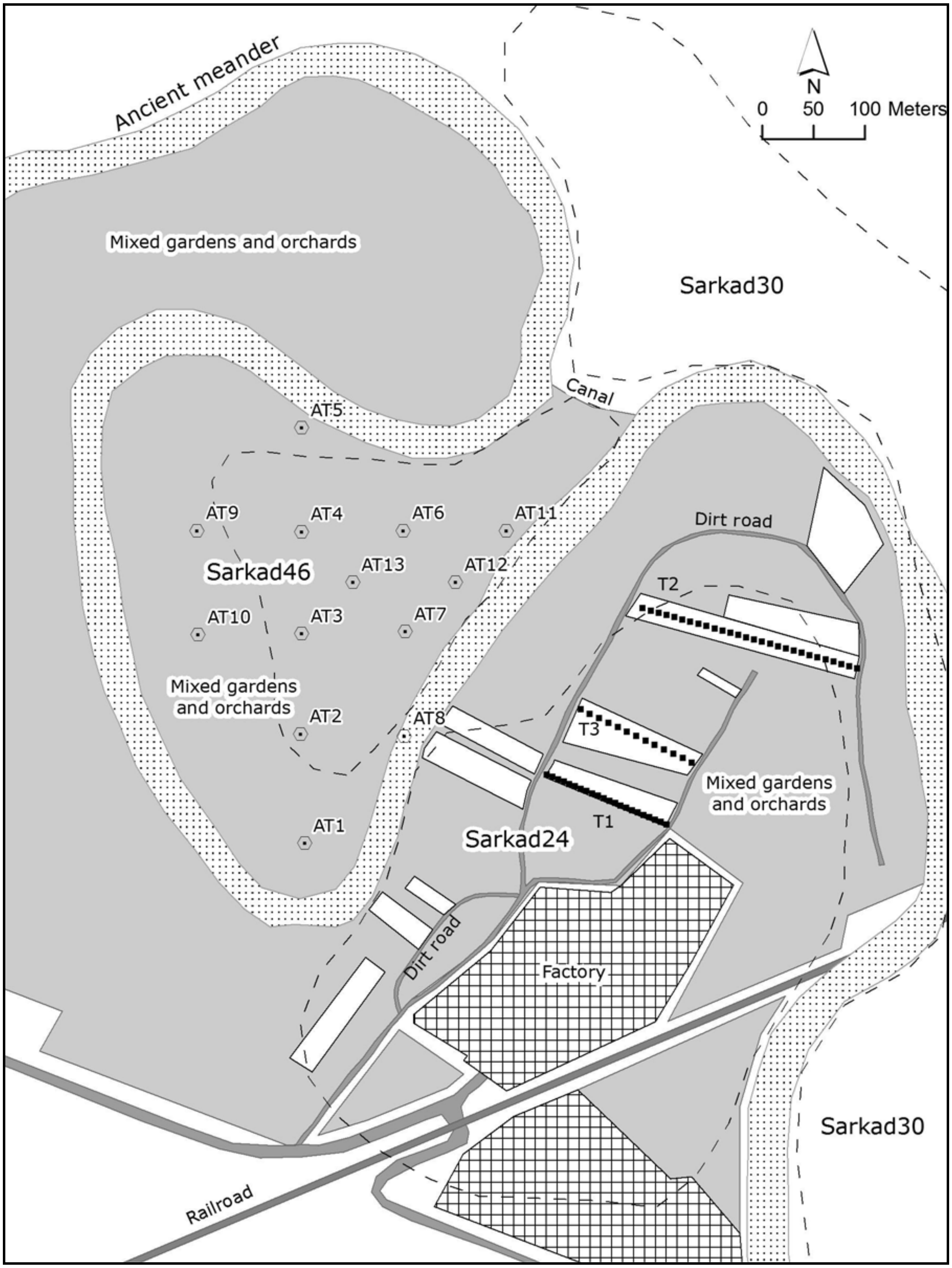

Figure E.14. Shovel test probes and transects at Belső-Szőlők (Sarkad 46) and surrounding sites.

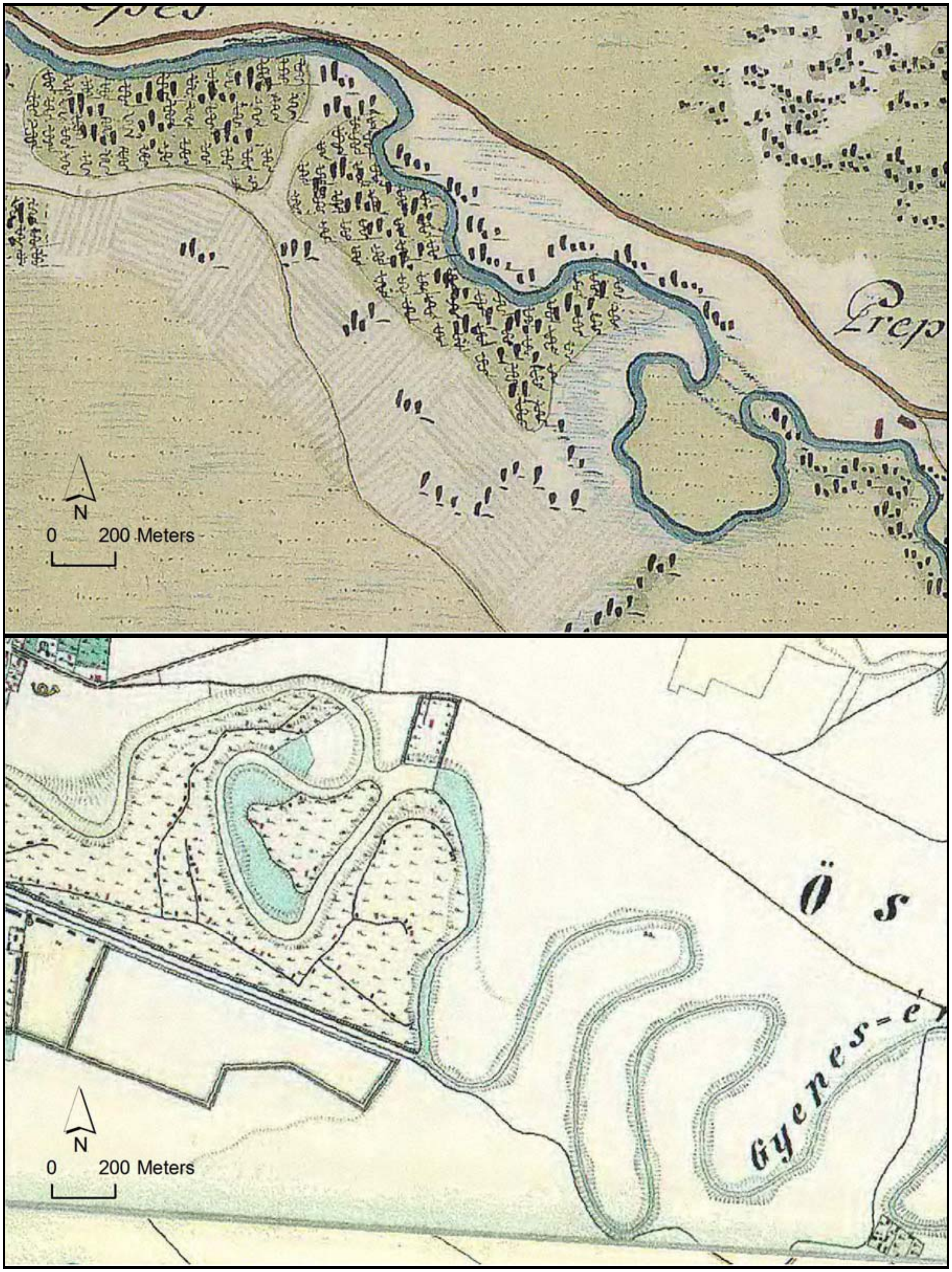

Figure E.15. The same area (the location of Sarkad 24, 30 and 46) depicted in the first (above) and second (below) Hapsburg military survey maps.

Across the meander on Sarkad 24, MRT surveyors also collected a large amount of Gyulavarsánd material. They encountered as well a couple of sherds typically assigned to the Hatvan and Wietenberg groups. They identified only two Gáva diagnostics and a small amount of Keltic, Sarmatian, Árpád period and Late Middle Ages sherds. This site is the equivalent open settlement to the large settled areas around both the Tarhos 1 and Sarkad 8 enclosures, and was similarly surface collected for comparison. About 40% of it is built space or inaccessible due to modern commercial activities when we visited in 2006. Another 50% had orchards, tall vegetable gardens or was covered in grass. Only about 10% - about 2 ha – had good enough visibility for us to characterize the surface and carry out waypoint collection, all in recently ploughed garden plots. Three of these with the highest concentration of material were used for systematic collection in three transects, totalling 63 units.

Sarkad 24 has been cultivated by hand for probably the past century, and the condition of the ceramics is considerably better than in most sites visited in Békés County; sherds are larger and less weathered. As at Sarkad 8 Cluster, a higher degree of burnishing is characterizes these ceramics (Table E.12). Brushed sherds are rare, and all indications suggest exclusively Gyulavarsánd phasing, perhaps tending toward the latest component. Engraving and incision decorations are often extremely fine and carefully executed, with elaborate spirals and bossing. Burnishing tends toward a high reflective polish and vessels are thin. No earlier Bronze Age diagnostics were found in transect survey, nor were any from other prehistoric periods. Chipped stone is rare, but slags were common, mostly concentrated in a single transect.

Sarkad 30 is an enormous site and lies to the east across the meander. MRT surveyors found a few Nagyrév sherds here, but a large number of the prehistoric sherds are Gyulavarsánd. There is a moderate amount of Gáva, but the site has significant Sarmatian, Árpád and Late Middle Ages components, together constituting much more than the Bronze Age material. Avar and Germán also occurred in small quantities. Almost all of the area seems to be commercial agricultural land in the aerial photos. However, due to time constraints, this site could not be re-visited to be shovel-tested or field walked. The MRT reports that the highest density of prehistoric sherds occurs at about the same elevation as the occupation on Sarkad 24, perhaps totalling some 4-6 ha to the north of the railroad due east of the highest part of Sarkad 24. Another few hectares of material are found toward the artificial ditch dividing it from the island of Sarkad 46. Still, many parts of the area north of the railroad, and almost all of the areas south of it, belong to later periods.

As for the Sarkad 8 Cluster, the total area occupied for these three sites is a rough estimate. The two areas in the enclosure constituting 2 sherds or more sum to 2.83 ha. Sarkad 24 has a high concentration of material at the highest elevations towards the center, but is otherwise very patchy. It is plausible that one third to a half of the MRT polygon (21.85 ha) has a high enough density to be settlement by my definition (7 – 11 ha). For Sarkad 30 (67.48 ha), given the extensive occupation during later periods and the detail to which the MRT accords it, I suggest 10-15 hectares of it might have debris from the MBA. Totalling the areas for the three sites, in round numbers we get a range of 20-to 29 ha.

STP	Easting	Northing	Prehistoric ceramics	Bone	Daub	Slag	Other	Comments
AT01	530953	5176396	0	0	0	0	0	Possibly re-deposited
AT02	530949	5176502	0	0	0	0	0	
AT03	530950	5176600	1	0	3	0	0	
AT04	530950	5176699	2	0	1	0	1	Grinding stone (modern?)
AT05	530950	5176800	0	0	0	0	0	
AT06	531049	5176700	15	1	15	0	0	
AT07	531051	5176602	2	0	10	0	0	
AT08	531050	5176500	4	0	1	0	0	
AT09	530849	5176700	0	0	0	0	0	
AT10	530850	5176599	0	0	0	2	0	Slag is possibly vitrified daub
AT11	531149	5176700	4	0	5	0	0	
AT12	531100	5176650	10	0	14	0	0	
AT13	531000	5176650	3	0	5	0	0	

Table E.11. Shovel test probes inside the enclosed site of Belső-Szőlők. Surface treatment was not recorded.

Belső-Szőlők (Sarkad 46) Cluster

Unit collected: 252 m^2 Waypoint collected: 2 ha Size estimate: 16-23 ha

Overview of Collected Material by Transect (Sarkad 24)

Transect	Num. of Units	Non-Diag Pot	Diag Pot (C)	Non-MBA Diag (NC)	Bone	Daub	Chipped and ground stone	Slag	Other
1	22	457	103	3	68	389	1	29	4
2	28	306	66	1	34	99	1	1	1
3	13	139	26	0	8	54	0	4	0
SUM	**63**	**902**	**195**	**4**	**110**	**542**	**2**	**34**	**5**

Identifiable Ceramics by Transect (N)

Neolithic	0	Late-Bronze Age / Iron Age	0
Copper Age	0	Later	3
Early-Middle Bronze Age	189	**Total**	192

Summary of Surface Treatment for MBA ceramics in Transect

	Burnished	Brushed	Burnished and Brushed	No Treatment	Total
N	28	2	0	159	189
%	15	1	0	84	100

Distribution of Diagnostic Ceramics by Transect

	Burnished				**Brushed**				**No Burnishing or Brushing**				**Total MBA Diag**	**Non-MBA Diag (C)**	**Non-MBA Diag (NC)**	**Total Identifiable**
Transect	Rim	Base	Handle	DecoBody	Rim	Base	Handle	Body	Rim	Base	Handle	DecoBody				
1	11	0	0	13	0	0	0	0	34	2	1	39	100	0	3	103
2	2	0	1	0	0	0	0	2	25	0	3	31	64	0	0	64
3	0	0	0	1	0	0	0	0	8	2	0	14	25	0	0	25
SUM	***13***	***0***	***1***	***14***	***0***	***0***	***0***	***2***	***67***	***4***	***4***	***84***	***189***	***0***	***3***	***192***
Wpts	4	0	1	4	0	0	0	0	3	0	0	0	12			

Table E.12. Material culture at Sarkad 46.

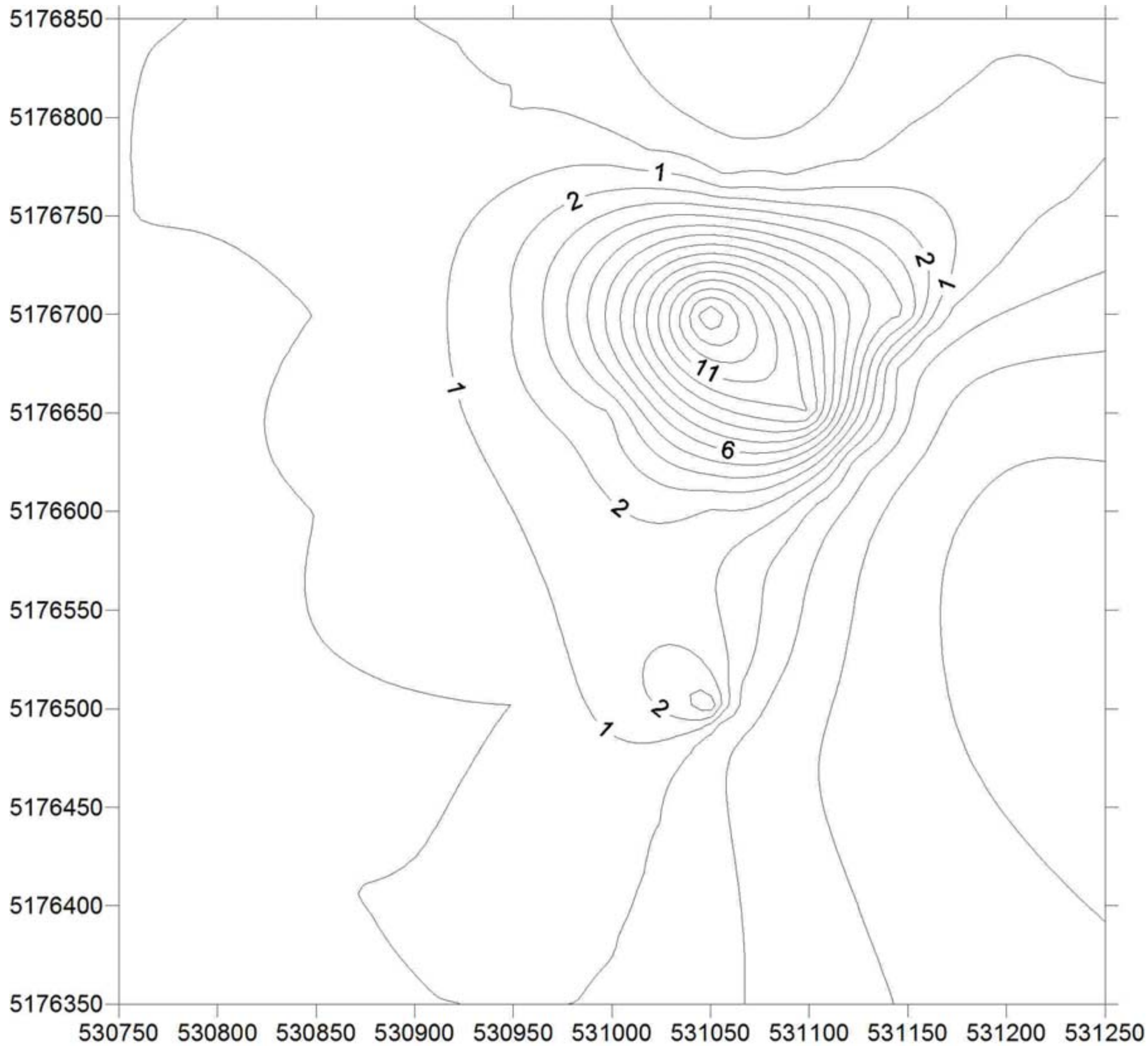

Figure E.16. Interpolation of sherd numbers in Surfer for Belső-Szőlők (Sarkad46) using combined STP values. Numbers on X and Y axis are UTM Zone 34 N.

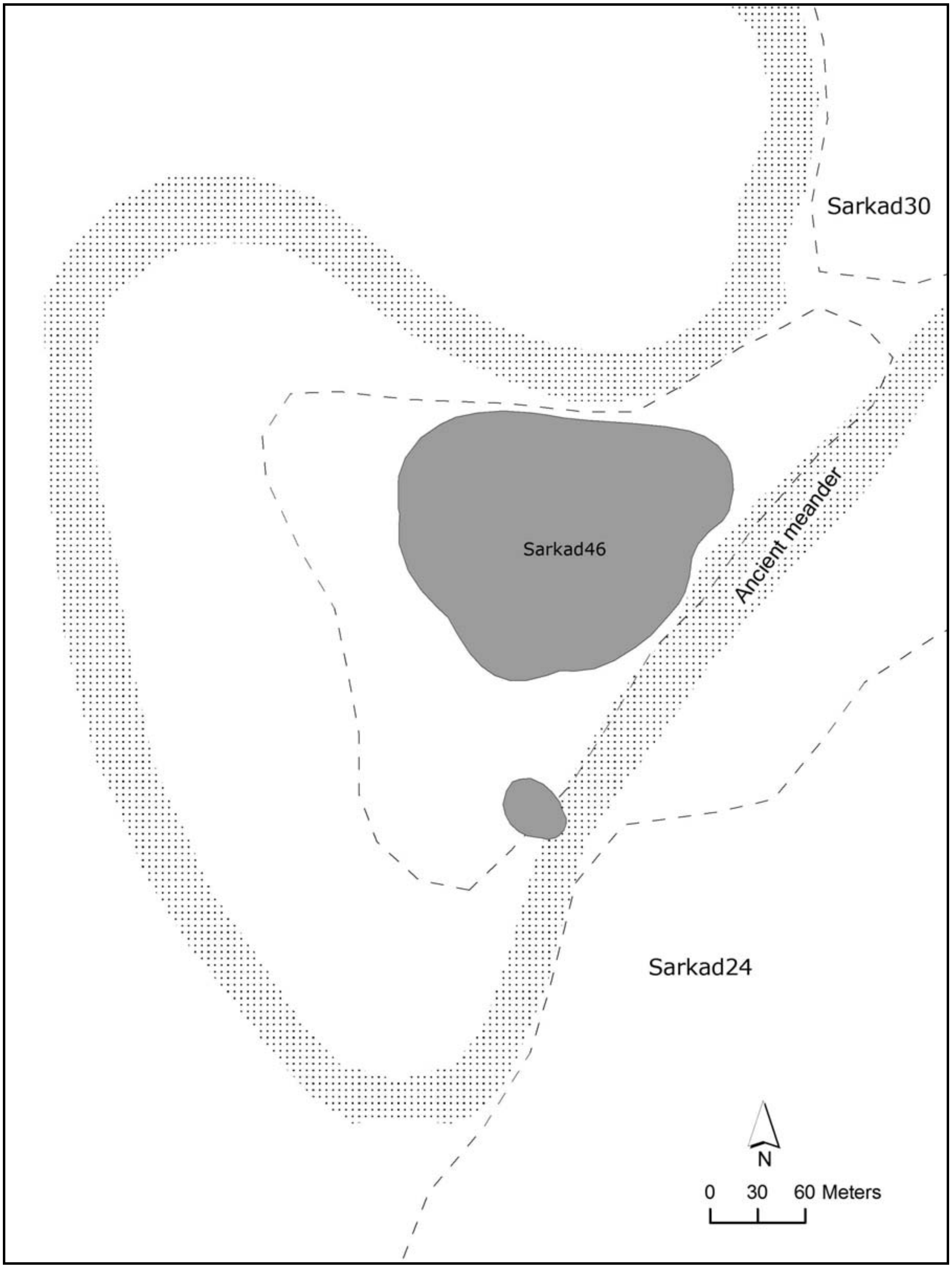

Figure E.17. Polygons created for Sarkad 46 on the basis of shovel tests probes.

FORTIFIED SITES OUTSIDE THE MICRO-REGION

Vésztő 65 - Vadas

This site is 2.5 km southwest of the modern town of Vésztő. It lies on the western bank of an ancient meander along with another small site – Vésztő 64 to its west. Vésztő 65 is identified as a 'tell' in the MRT volume, and is listed as fortified in the National Site Registry. On the first Habsburg survey map the meander – and possibly the fortification ditch – are represented by horizontal blue hatching more suggestive of standing water than an active river. Survey conditions were decent when we visited. Both ploughed fields were interspersed with some kind of leafy green sprout, but visibility was adequate. The ditch is plausible, as nothing was found in shovel tests or on the surface in this topographic depression (Figure 8.28). The ancient meander holds some water in it still, as well as marsh brush and reeds. It drains the northern edge of the *Boderere Morass*, the same body of water that the Tarhos 1 Cluster borders in the south. The interpolated site boundary is set at the two sherd limit (Figure E.18).

MRT surveyors found a few Neolithic, Tiszapolgár and Bodrogkeresztúr sherds, and a sherd with an incised zigzag pattern of bunched lines indicative of the Nyírség (Ecsedy et al 1989:195). Several other ceramics with brushed surfaces also put this site in the Early Bronze Age. To the west on Vésztő 64 there were a lot of brushed sherds, and fingernail-impressed and dot-impressed Bronze Age rims. Our experience during survey was similar.

The smaller site required a higher resolution shovel-testing strategy of mostly 50 m intervals. The shovel test data comes back with a low percentage of brushed ceramics overall, only 6.4% (Table E.13). Strong weathering of the ceramics makes it more difficult to identify, however, and it is likely that Copper Age sherds dilute the ratio somewhat. For the waypoint ceramics, 35% come back brushed, which is more the impression one gets from the range of Bronze Age ceramics identifiable on the surface (Table E.14). The brushing on these ceramics is toward much wider, and deeper 'bristles', given them the appearance of a coarser ware. The paste is also often grittier than is typically found in the micro-region. The lugs and finger-pressed appliqués identified on site probably belong to the Bronze Age, but are also conceivably Copper Age.

In the MRT description, the 'tell' of Vésztő 65 is estimated to rise up to 1.5 m, but the artificial maximum does probably not extend past an area some 50 by 25 m, if we take the maximum topographic contour of the 1:10,000 topographic map as an indication, stratified cultural deposits might extend across entire 2.59 ha area. The area of the western scatter is 1.18 ha.

Figure E.18. Shovel test locations for Vésztő 65.

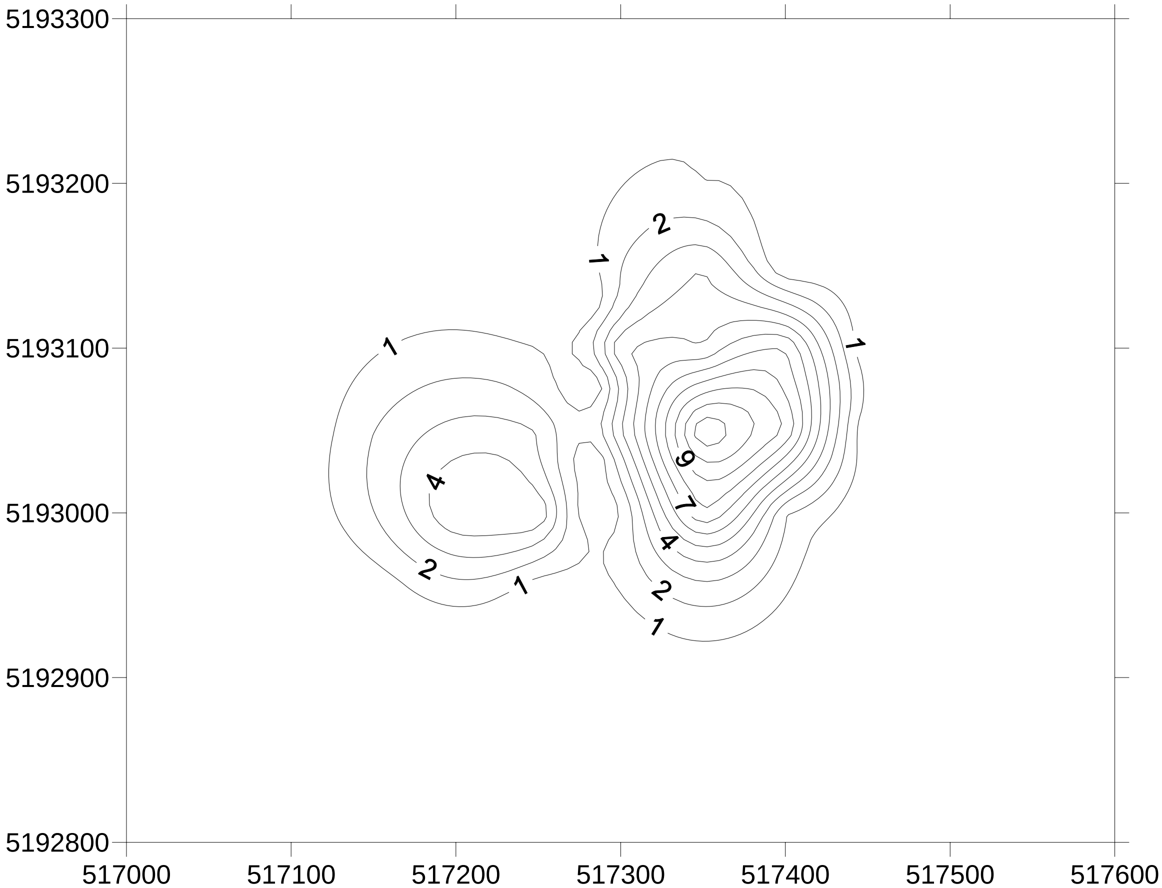

Figure E.19. Interpolated site boundary for Vésztő 65. Numbers on X and Y axis are UTM Zone 34 N.

STP	Easting	Northing	Total Pot	Brushed	Burnished	Prehistoric Body	MBA Diag; no surface treatment	Total Prehistoric and MBA	Non-Pre-historic	Bone	Daub	Slag	Other
LLT01	517199	5193002	5			5		5		1	0	0	0
LLT02	517250	5193000	5	1		4		5		0	1	0	0
LLT03	517300	5193001	1			1		1		0	1	0	0
LLT04	517350	5193000	8			8		8		0	4	0	0
LLT05	517400	5193000	2			1	1	2		0	2	0	0
LLT06	517450	5193001	0					0		0	0	0	0
LLT07	517450	5193050	0					0		0	0	0	0
LLT08	517400	5193051	10			8	1	9	1	0	0	0	0
LLT09	517350	5193050	13	2		10		12	1	0	9	0	0
LLT10	517300	5193050	4			4		4		0	3	0	0
LLT11	517300	5193100	5			4	1	5		0	3	0	1
LLT12	517350	5193100	5			5		5		1	11	0	0
LLT13	517400	5193101	7			7		7		0	2	0	0
LLT14	517450	5193100	0					0		0	0	0	0
LLT15	517450	5193150	0					0		0	0	0	0
LLT16	517400	5193150	0					0		0	0	0	0
LLT17	517350	5193150	4	1		3		4		0	2	0	0
LLT18	517300	5193150	2			2		2		0	0	0	0
LLT19	517250	5193150	0					0		0	0	0	0
LLT20	517250	5193101	1				1	1		0	0	0	0
LLT21	517250	5193050	3	1		2		3		0	1	0	0
LLT22	517150	5193049	2			2		2		0	0	0	1
LLT23	517150	5193150	0					0		0	0	0	0
LLT24	517250	5193249	0					0		0	0	0	0
LLT25	517350	5193251	1			1		1		1	0	0	0
LLT26	517400	5193250	1			1		1		0	0	0	0
LLT27	517450	5193249	0					0		0	0	0	0
LLT28	517350	5193201	1			1		1		0	0	0	0
LLT29	517250	5192950	0					0		0	0	0	0
LLT30	517150	5192950	0					0		0	0	0	0
LLT31	517100	5193050	0					0		0	0	0	0
TOTAL			**80**	**5**	**0**	**69**	**4**	**78**	**2**	3	39	0	2
%				**6.4**	**0.0**	**88.5**	**5.1**	**100**					

Table E.13. STP data for Vésztő 65.

Number of STP: 31 Fortified area: 2.58 ha Unfortified area: 1.18 ha

	Burnish				Brush				Burn/ Brush				No burn or brush				
	Rim	Base	Handle	DecoBody	Rim	Base	Handle	Body	Rim	Base	Handle	Body	Rim	Base	Handle	DecoBody	TOTAL
Wpts	2	0	0	1	6	0	0	5	1	0	0	0	10	0	2	5	32
SUM				3				11				1				17	
%				9.4				34.4				3.1				53.1	100

Table E.14. Surface treatment of waypoint ceramics at Veszto 65.

Füzesgyarmat 77 – Szőke tanya

This site is less than a kilometre east of the modern town of Füzesgyarmat and lies on the southwest bank of an old meander. The meander is illustrated with the horizontal blue hatchings of very still water on the first Habsburg series, but is drained by the second series. On both however, and more accurate on the first series, a mound is shown at the center of the site, about 100 m across at the base. The site is called a fortified tell in the MRT volumes and registered as such in the National Site archives. A more detailed topographic map of the site is also published in the MRT volume (Ecsedy et al. 1989:94-5), illustrating this fortification ditch extending around the north, west, and southern sides joining with the river. It is approximately 50-60 m across, and more or less visible in the field and partially in the aerial imagery. The site is divided by a major road, isolating a quarter of the site to the north (Figure E.20). This northern section was on ploughed land when we surveyed, but most of the area south of the road recently had a hay harvest and visibility was poor. The mound illustrated on the Hapsburg map was excavated out at some point in the early twentieth century, leaving a vast pit (*digó-gödör*) currently filled with trees and shrubs.

The MRT reports Copper Age ceramics in the center and southern portion of the site, as well as a few wheel-made sherds from the Celtic, Sarmatian and Árpád periods. Otherwise however, the site is reported as flush with both Ottomány and Gyulavarsánd ceramics. Brushed ceramics and ribbon appliqué, with zigzag incised decorations were especially common in the interior of the fortification.

The percentages of surface treatment on sherds from the shovel tests do not reveal an unambiguous signature to help place the site more firmly in one phase or the other (Table E.15). Brushed ceramics are a small percentage, as are burnished. In both the waypoints and shovel tests, a small number of both Ottomány diagnostics and Gyulavarsánd diagnostics surface, suggesting a roughly equal component attributable to both of them (Table E.16). Based on the survey map provided in the MRT, the fortified area of the site is about 0.48 ha. The area outside of it is 9.01 ha.

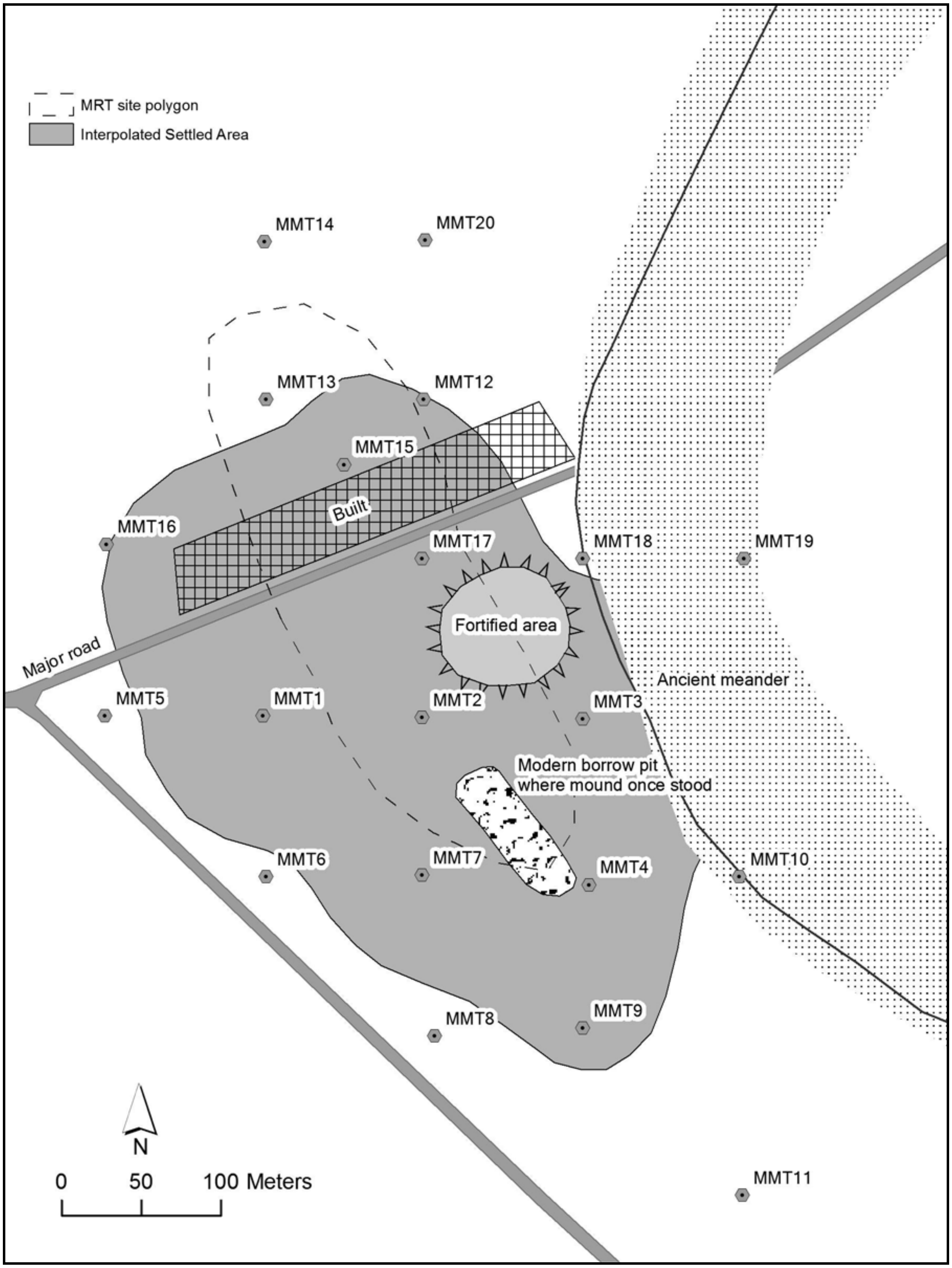

Figure E.20. Shovel test locations for Füzesgyarmat 77.

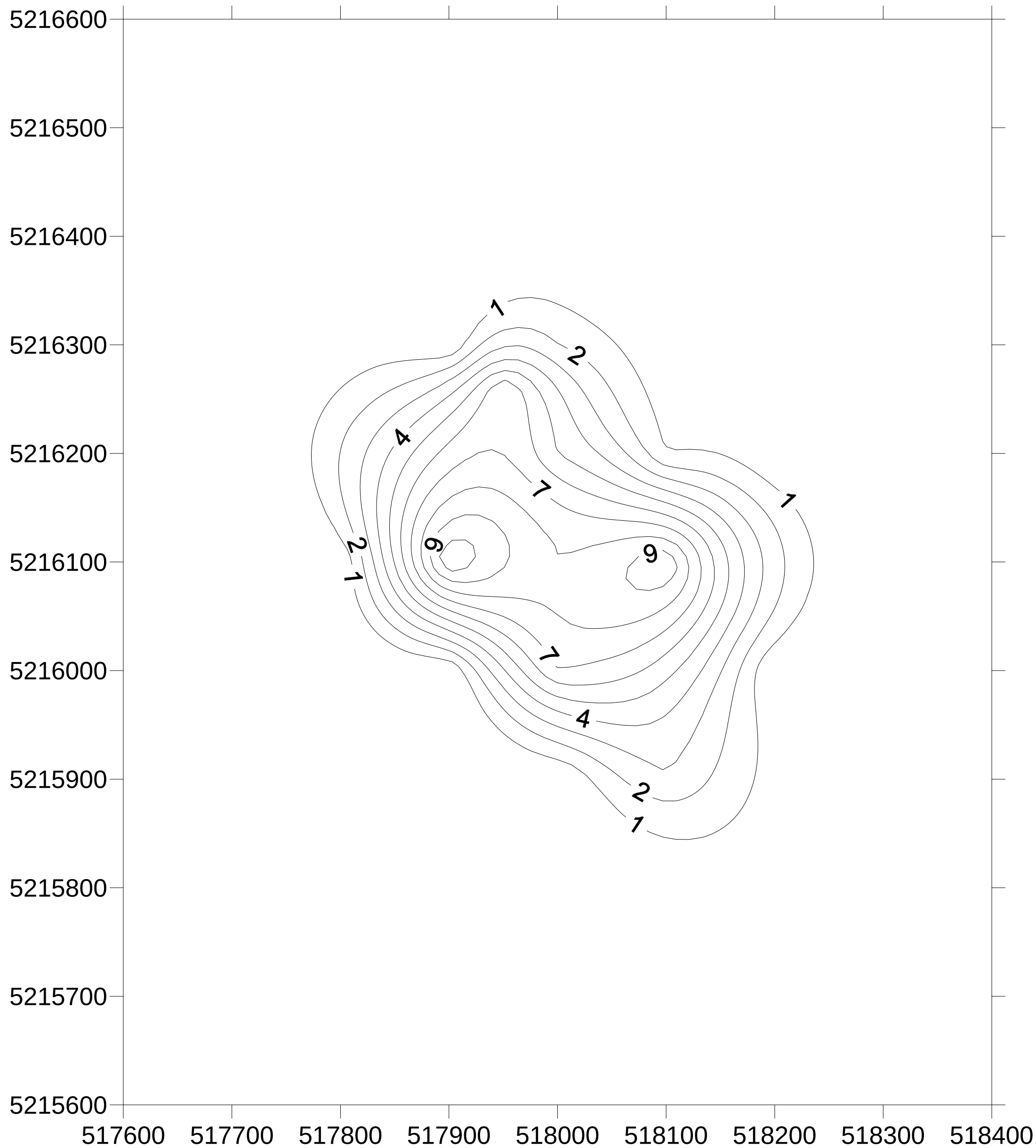

Figure E.21. Interpolated site boundary for Füzesgyarmat 77. Numbers on X and Y axis are UTM Zone 34 N.

STP	Easting	Northing	Total Pot	Brushed	Burnished	Prehistoric Body	MBA Diag; no surface treatment	Total Prehistoric and MBA	Non-Pre-historic	Bone	Daub	Slag	Other
MMT01	517899	5216101	11			10	1	11		0	0	0	0
MMT02	517999	5216100	8		1	5	2	8		1	3	0	0
MMT03	518100	5216099	12			10		10	2	1	1	0	0
MMT04	518104	5215995	5		1	3	1	5		0	2	0	0
MMT05	517800	5216101	0					0		0	0	0	0
MMT06	517901	5216000	0					0		0	0	0	0
MMT07	517999	5216001	7	3		4		7		0	0	0	0
MMT08	518007	5215900	0					0		0	2	0	0
MMT09	518100	5215905	3			2	1	3		0	1	0	0
MMT10	518198	5216000	0					0		0	0	0	0
MMT11	518200	5215800	0					0		0	0	0	0
MMT12	518000	5216300	2			2		2		0	0	0	1
MMT13	517901	5216300	0					0		0	2	0	0
MMT14	517900	5216399	0					0		0	1	0	0
MMT15	517950	5216259	9		1	6		7	2	1	0	0	0
MMT16	517801	5216209	2				2	2		0	0	0	0
MMT17	517999	5216200	6	1	1	2	1	5	1	0	0	0	0
MMT18	518100	5216200	2		1			1	1	0	0	0	0
MMT19	518201	5216200	0					0		0	0	0	0
MMT20	518001	5216400	0					0		0	0	0	0
TOTAL			**67**	**4**	**5**	**44**	**8**	**61**	**6**	**3**	**12**	**0**	**1**
%				**6.6**	**8.2**	**72.1**	**13.1**	**100**					

Table E.15. STP data for Füzesgyarmat 77.

Number of STP: 20 Fortified area: 0.48 ha Unfortified area: 9.01ha

	Burnish				Brush				Burn/ Brush				No burn or brush				
	Rim	Base	Handle	DecoBody	Rim	Base	Handle	Body	Rim	Base	Handle	Body	Rim	Base	Handle	DecoBody	TOTAL
Wpts	0	0	0	2	1	0	0	2	0	0	0	3	4	1	1	4	18
SUM	2				3				3				10				
%	11.1				16.7				16.7				55.6				100

Table E.16. Surface treatment of waypoint ceramics at Füzesgyarmat 77.

Dévaványa 66 – Tó-kert

The site lies on the eastern edge of the modern town of Dévaványa, on the western bank of an old meander. In the MRT volume it is said to be fortified along the north-west axis, and is a tell according to the National Site Registry. On both Habsburg map series the site lies among patches of gardens and orchards outside the old village, which remains the vegetative cover still. The gardens are small and visibility varied on the field, from grassy orchards to sprouts of un-determined plants beginning to emerge through the earth (Figure E.22). Houses and fenced areas are found to the west and south of the site, but the interpolation suggests, and my survey impression corroborates, a natural site edge on both sides anyway (Figure 8.E.23). There is a canal on the eastern edge of the site, but ceramics disappear and thick clay appears before it is reached.

MRT surveyors found a couple of Early Neolithic and Sarmatian sherds, but the majority of the site ceramics date to the Ottomány phase, with brushed sherds and characteristic appliqué ribbons found on the surface (Ecsedy et al. 1989:50-51). Locals had previously brought ceramics to museum specialists, who attributed them to the Late Neolithic, Hatvan, Gyulavarsánd and Migration periods. We identified mostly Ottomány diagnostics on the surface (brushing, incised lines, zig zag motifs and appliqué) and in shovel tests (Table E.17, E. 18), although we noted a few Neolithic, Migration and Sarmatian period sherds. Only a couple of potential Gyulavarsánd style ceramics were recovered during survey, but there was a strong presence in burnished surfaces, lending credence to a later Middle Bronze Age component.

The 'tell' at Tó-kért is approximated at 1.5 m over a 150 m by 50 m area. Without a clear sense of how the ditch might divide the site, the total site size is 11.45 ha; approximately 0.75 ha of this is fortified and the remainder might be plausibly attributed to open settlement.

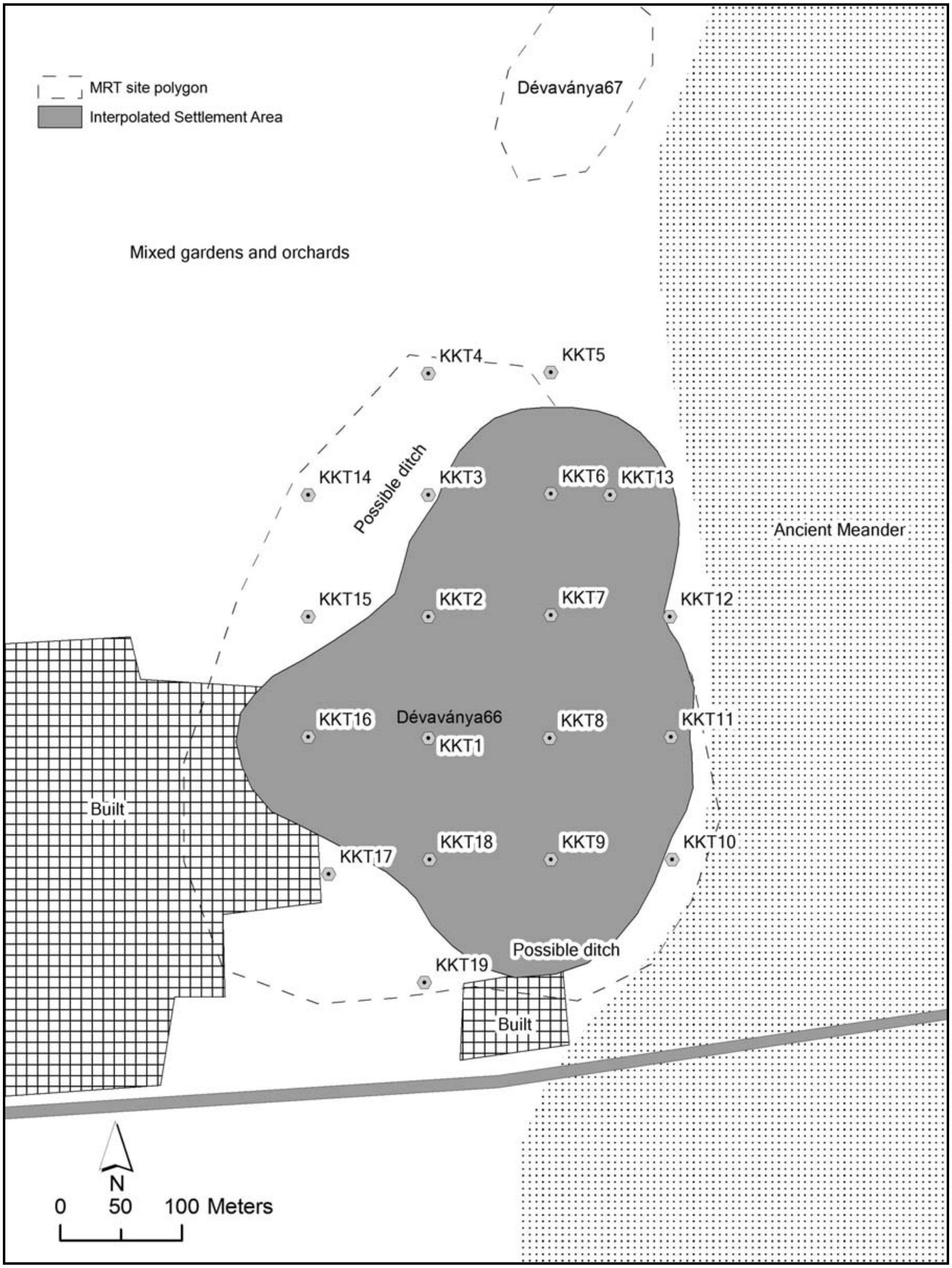

Figure E.22. Shovel test locations for Dévaványa 66.

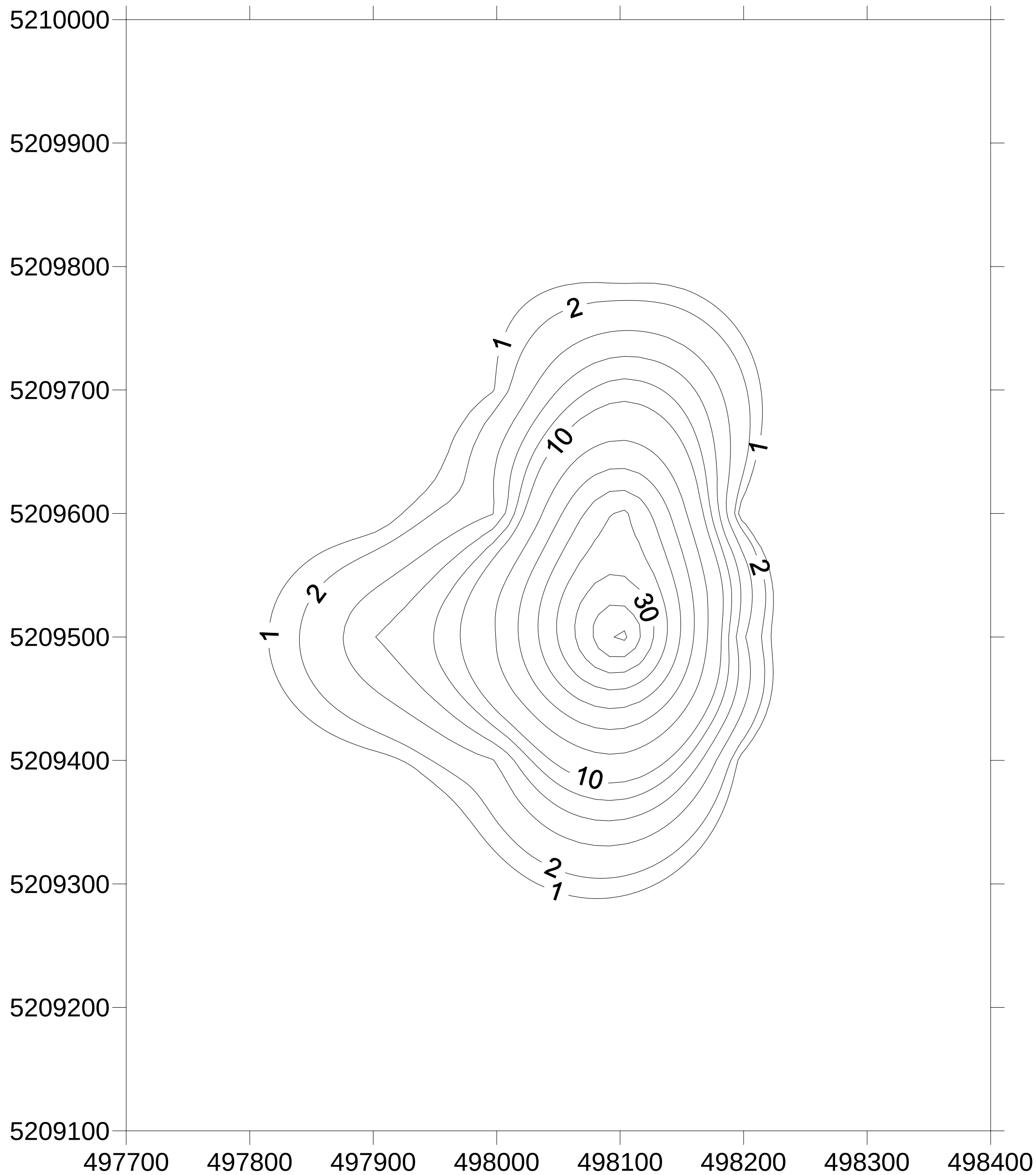

Figure E.23. Interpolated site boundary for Dévaványa 66. Numbers on X and Y axis are UTM Zone 34 N.

STP	Easting	Northing	Total Pot	Brushed	Burnished	Prehistoric Body	MBA Diag; no surface treatment	Total Prehistoric and MBA	Non-Pre-historic	Bone	Daub	Slag	Other
KKT01	498000	5209500	15	1	3	5	5	14	1	1	4	0	0
KKT02	498000	5209600	4		1	2	1	4		0	0	0	0
KKT03	498000	5209700	4			1		1	3	0	0	0	0
KKT04	498000	5209800	0					0		0	0	0	0
KKT05	498101	5209801	0					0		0	0	0	0
KKT06	498101	5209701	9		2	5	2	9		0	1	0	0
KKT07	498101	5209601	27	1	7	16	3	27		8	3	0	0
KKT08	498100	5209500	40	7	20	11	2	40		21	11	0	0
KKT09	498101	5209400	13		2	10	1	13		4	1	0	0
KKT10	498201	5209400	0					0		0	0	0	0
KKT11	498200	5209501	4		3	1		4		1	0	0	0
KKT12	498199	5209600	0					0		0	0	0	0
KKT13	498150	5209700	7		2	5		7		0	0	0	0
KKT14	497901	5209700	0					0		0	0	0	0
KKT15	497901	5209600	1					0	1	0	0	0	0
KKT16	497901	5209501	7			5	1	6	1	2	1	0	0
KKT17	497918	5209388	0					0		0	0	0	0
KKT18	498001	5209400	4		1	3		4		1	0	0	0
KKT19	497997	5209299	0					0		0	0	0	0
TOTAL			**135**	**9**	**41**	**64**	**15**	**129**	**6**	**38**	**21**	**0**	**0**
%				**7.0**	**31.8**	**49.6**	**11.6**	**100**					

Table E.17. STP data for Dévaványa 66.

Number of STP: 19 Fortified area: 0.75 ha Unfortified area: 10.75 ha

	Burnish				Brush				Burn/ Brush				No burn or brush				
	Rim	Base	Handle	DecoBody	Rim	Base	Handle	Body	Rim	Base	Handle	Body	Rim	Base	Handle	DecoBody	TOTAL
Wpts	8	0	0	7	1	0	0	1	2	1	0	1	6	0	0	3	30
SUM	15				2				4				9				
%	50.0				6.7				13.3				30.0				100

Table E.18. Surface treatment of waypoint ceramics at Dévaványa 66.

Appendix F: Chipped Stone Tool Production

This appendix presents the data for stone tool production in the micro-region. Tables F.1 and F.2 list the values for lithics by their stage of reduction, for exotic material and river gravels, respectively. Chipped stone categories on the Great Hungarian Plain include 1) un-modified (pebble); 2) core (or pre-core); 3) un-modified flake or debitage with cortex; 4) un-modified flake or debitage without cortex; and 5) modified flake or core-tool. The first four categories are from earliest to latest in the reduction sequence, and the final is the resulting tool.

For the exotic and highest quality material, it seems that little is being reduced from its natural state at individual sites. Still, almost 10% of the finds are cores or precores, though unevenly distributed across sites – two of four sites in the Ottomány phase and only one of five sites in the Gyulavarsánd. The numbers are nonetheless too small to know if we are observing a greater amount of lithic reduction at some sites over others. Quartz and quartzite river gravels seem to be present in both phases, and more common earlier in the reduction sequence.

The raw data from waypoints and units are compiled into single values to increase sample size, and presented by phase in Table F.3. If these numbers were representative of the prehistoric reality, the fortified sites of the Gyulavarsánd phase do not appear to have special access to flint-knappers or exotic raw material. The obvious difference between the two periods, however, is still that there are simply a lot few lithics around in the Gyulavarsánd phase.

	Open settlements														Fortified settlements								
	Békés178		Békés179		Bélmegyer2		Tarhos26				Bélmegyer 45		Tarhos32		Tarhos19		Tarhos2	Sarkad88		Sarkad24		**TOTAL**	**TOTAL %**
Component	OT		OT		OT		OT				GY		GY		GY			GY		GY			
Collection method	U	W	U	W	U	W	U	W	S	L	U	W	U	W	U	W	W	U	W	U	W		
Pebble	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	**3.8**
Core/pre-core	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**5**	**9.6**
Unmod cortex chip	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**5**	**9.6**
Unmod chip	6	3	1	3	0	0	1	0	1	4	0	0	0	0	0	0	1	0	0	0	0	**20**	**38**
Mod flake	4	5	0	3	0	0	0	0	2	1	1	1	1	1	1	1	0	1	0	0	0	**22**	**42**
TOTAL	**15**	**9**	**1**	**11**	**0**	**0**	**1**	**0**	**3**	**5**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**0**	**1**	**0**	**54**	**104**

Table F.1. Exotic and unidentified chipped stone by location in reduction sequence. One burned piece from Békés 178 and the fossilized wood from Tarhos 26 are excluded. (U= transect unit collection, W = waypoint collection, S= Special sample from excavation, L= lot from excavation).

	Open settlements														Fortified settlements								
	Békés178		Békés179		Bélmegyer2		Tarhos26				Bélmegyer 45		Tarhos32		Tarhos19		Tarhos2	Sarkad88		Sarkad24		**TOTAL**	**TOTAL %**
Component	OT		OT		OT		OT				GY		GY		GY			GY		GY			
Collection method	U	W	U	W	U	W	U	W	S	L	U	W	U	W	U	W	W	U	W	U	W		
Pebble	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	1	0	7	**13**
Core/pre-core	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	3	**5.8**
Unmod cortex chip	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Unmod chip	3	0	0	1	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	7	**13**
Mod flake	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	**1.9**
TOTAL	**4**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**4**	**7**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**18**	**35**

Table F.2. Chipped stone (quartz and quartzite) by location in reduction sequence. Same conventions as above.

	OTTOM		GYULAVAR	
	F	%	F	%
Pebble	2	5.4	0	0
Core/pre-core	4	11	1	11
Unmod cortex chip	5	14	0	0
Unmod chip	14	38	1	11
Mod flake	12	32	7	78
TOTAL	37	100	9	100
Unit area total	988		1652	
Wpt area total	6.1		19	

Table F.3. Exotic chipped stone by stage in reduction sequence and ceramic phase. Units and waypoints are collapsed, excavation contexts omitted, and total collection areas provided below.

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