Spring 5-15-2015

A Line in the Sand: Archaeological Evidence for the Interactions of Settled Farmers and Mobile Pastoralists in the Late Bronze Age (1950 - 1500 BC) Murghab alluvial fan, Turkmenistan

Lynne Marie Rouse
Washington University in St. Louis

WASHINGTON UNIVERSITY IN ST. LOUIS

Department of Anthropology

Dissertation Examination Committee:
Michael D. Frachetti, Chair
Nikolaus Boroffka
Tristram R. Kidder
Xinyi Liu
Fiona B. Marshall
Sandra L. Olsen

A Line in the Sand: Archaeological evidence for the interactions of settled farmers and mobile pastoralists in the Late Bronze Age (1950 – 1500 BC) Murghab alluvial fan, Turkmenistan

by
Lynne Marie Rouse

A dissertation presented to the
Graduate School of Arts & Sciences
of Washington University in
partial fulfillment of the
requirements for the degree
of Doctor of Philosophy

May 2015
St. Louis, Missouri

Table of Contents

List of Figures

List of Tables

Acknowledgments

During the course of this research, I received support from countless people. It is impossible to name them all individually here and to express the magnitude of my thanks to each one. Still, I hope in these few words to sincerely thank those that made this accomplishment possible. Dr. Michael Frachetti steered me toward Washington University and Central Asia, and for this I will forever be grateful. As my graduate advisor, he pushed me to be a better thinker, scholar, and colleague. Even in the moments I felt undeserving of his confidence in me, his unflagging support challenged me to reach for the heights he thought I was capable of. Other mentors in the Anthropology Department at Washington University, particularly Fiona Marshall and T.R. Kidder, likewise inspired me to better scholarship through their own passion for archaeology and the respect and openness they always showed me. I have been extremely lucky to count Dr. Barbara Cerasetti as a mentor and a friend along this journey. She has been selfless in teaching me all she knows about working in Turkmenistan, but also never failed to treat me as an equal partner and trust me as a colleague. I am incredibly grateful to have "grown up" with her as my guide in the Murghab.

Of course, none of the work in Turkmenistan would have been possible without the support of Dr. Mukhammed Mamedov, of the Ministry of Culture of Turkmenistan, and his staff. Dr. Mamedov has always ensured the paperwork and logistics of field research were taken care of, and gone out of his way to graciously accommodate our needs. Of the same institute, Dr. Ejegul Muradova shared her valuable knowledge of the Murghab and its artifacts and taught me a good deal, and Abdullah kindly shuttled me around Ashgabat and waited with me in some very long lines. Thanks also go to Rejeb Jepbarov, of the Ancient Merv National Historical Park, who

has been a true gentleman and instrumental in securing registration permissions and storage facilities for the crates of excavated materials we presented to him. The late Victor Sarianidi and Nadezhda Dubova were truly supportive of the research and wonderful hosts on our visits to Gonur, and I enjoyed every meal and cup of tea we shared there and at Ojakly. Living in Turkmenistan would have been neither feasible nor enjoyable if it were not for our home in the *sovkhoz*, and I am endebted to Gulya and Dowlet for opening their home to us, and to Olya for waking up ridiculously early every morning – with a smile! – to feed us, and for teaching me to love a hot bowl of soup on a sweltering afternoon. Misha and Nuryagdy were skilled drivers navigating the sand dunes, and just as important, enjoyable people to be around. Sergei, Guncha, and Islam also provided help and comraderie at home. To the archaeological field crew, who were both brave and very hard workers, I give my thanks: Hossein Azizi, Sonia Angelini, Kat Berger, Giorgia Codini, Kate Grillo, Meghan Kenny, Rachel Mairs, Giuseppe Piccinni, Gisella Specia, Rob Spengler, and Deland Wing; Murat, Lyova, and Andrei also provided great help. Finally, I give special thanks to Aydogdy Kurbanov and his delightful family for making me feel at home thousands of miles away from where I live.

Facilitating the logistics of research closer to home, I am grateful to Kathleen Cook, Kirsten Jacobsen, Elaine Beffa, Leah Miles, and Carrie Asmar-O'Guin for always having the right answers and a kind word. Thanks are also due to my outside dissertation committee members, Nick Boroffka and Sandi Olsen, who were generous with their time and advice. Professors Maurizio Tosi and Maurizio Cattani were likewise full of helpful advice. I was fortunate to receive generous financial support for this research from the National Science Foundation (Dissertation Improvement Grant No. 1036942), the Wenner-Gren Foundation (Grant No. 8157), the George Franklin Dales Foundation, and International Research and

Exchanges Board IARO Grant program. Washington University also supported this research, as did the Italian Ministry for Foreign Affairs, the Department of History, Cultures, Civilizations, Archaeology Section of University of Bologna, and the Italian Institute for Africa and the Orient in Rome.

Emotional support during this long process came from numerous people, though nobody bore the brunt of it the way Trent Rouse did. He deserves thanks beyond what I can summarize here for his constant, quiet support and encouragement, his willingness to let me disappear for a few weeks (multiple times), and for suffering through a lot of slapped-together dinners at the end. I am certainly the luckiest person alive to have him as a partner. Lucy did her part to ground me, reminding me to have fun and enjoy the small details of life I might otherwise overlook. From the beginning of my time thinking about Central Asia, Paula Doumani Dupuy has been there. I have benefitted greatly from sharing the journey with her, and will miss the constant availability of a smile and insightful chat. My "Golden Girls" – Clarissa Cagnato, Diana Fridberg, and Anna Weyher – have been tremendous and invaluable support especially during the last few months. The friendship of many others also kept me balanced: Kate Grillo, Eddie Henry, BrieAnna Langlie, Sarah Malena, Josh Marshack, Juan Carlos Melendez, David Mixter, Rob Spengler, Abby Stone, Chris Thornton, and Helina Woldekiros, and certainly many others I am forgetting to mention by name (sorry!). Finally, enough thanks cannot be given to my parents, sister, and grandmother, who have never faltered in their love and encouragement. Without them, I would never have been capable of following through!

Lynne M. Rouse

Washington University in St. Louis

April 2015

Dedicated to Trent

and my parents.

ABSTRACT OF THE DISSERTATION

A Line in the Sand: Archaeological evidence for the interactions of settled farmers and mobile pastoralists in the Late Bronze Age (1950 – 1500 BC) Murghab alluvial fan, Turkmenistan

by

Lynne Marie Rouse
Doctor of Philosophy in Anthropology
Washington University in St. Louis, 2015
Professor Michael D. Frachetti, Chair

This dissertation focuses on the interactions of mobile pastoralist groups with sedentary farming communities in the Late Bronze Age period (1950 – 1500 BCE) in the Murghab alluvial fan of present-day Turkmenistan. Traditional archaeological and historical studies in Central Asia, focused as they are on urban contexts or centers of dense population, have colored interpretations of mobile-sedentary interaction in prehistory and helped reinforce a view that mobile and settled groups were always at odds with one another. The Late Bronze Age Murghab marks the period and locale of the first sustained interaction between distinct cultural communities of mobile pastoralists and sedentary farmers in southern Central Asia. To evaluate long-held conceptions of mobile-sedentary relationships here, this study presents some of the first empirical archaeological data from mobile pastoralist occupation sites. Specifically, I present the results of excavations undertaken at the site of Ojakly (Site 1744), currently the earliest-dated (ca. 1600 BCE), largest, and most complex mobile pastoralist site known in the Murghab. Results from Ojakly, I suggest, reveal how communities are able to participate in and re-shape distinct social institutions without submitting to hegemonic directives or cultural assimilation.

Ojakly provides key archaeological evidence for the daily activities, habitual practices, and materials utilized by peripheral groups occupying the northeastern Murghab in the Late Bronze Age, who were linked both to Eurasian mobile pastoralists broadly defined as

"Andronovo" groups and local farming communities of the Namazga tradition. The excavated portion of the site contained two multiple-phase habitation areas, where people repeatedly re-occupied the same space in temporary structures, cooked meals, and dumped refuse. The faunal and archaeobotanical assemblages both support the view that the inhabitants of Ojakly were mobile pastoralists, indicating on the one hand that herd animals (especially sheep and goat) formed a basic subsistence unit, and on the other that farming and grain processing were not undertaken at Ojakly, and domestic cereal consumption was limited. Yet, while subsistence practices appear largely independent between Ojakly and coeval sedentary farmers, a third excavated area revealed certain overlaps in ceramic production activities. A subterranean ceramic kiln that collapsed on its first firing, sealing inside wheel-made ceramics similar to those known only from sedentary communities at this time, is strongly suggestive that the people living at Ojakly were incorporating new methods of production and forms into their ceramic repoirtoire. These shifts in behavior, however, did not supplant the handmade ceramics used on an everyday basis at the site, nor the household level of its production.

I contextualize the results from Ojakly within the broader social and political shifts occurring in the Murghab at the end of the Bronze Age, when a regional polity known as the Bactria-Margiana Archaeological Complex was in decline. I argue that by virtue of their position at the intersection of the "steppe" and "sown" worlds, and at an important socio-political juncture in the trajectory of the region, the inhabitants of Ojakly were able to participate in a variety of non-contiguous social, technological, and probably ideological institutions. This challenges the traditional view of sedentary-mobile interaction, whereby pastoralists are dependent upon village-based communities or challengers to their authority, and frames encounters as negotiated participation in each other's worlds.

Chapter 1: Introduction

Few social theories have sustained such interest across academic, policy-making, and general-interest circles as Samuel Huntington's "Clash of Civilizations" (1993). In spite of the storm of criticisms weathered in the twenty years since it was published, the Manichaen view of the world it espoused continues to resonate. Whether or not one agrees with the theory in its details, Huntington, a political scientist, is not alone in his opinion that culture is one of the "great divisions among humankind and the dominating source of conflict" (Huntington 1993:22). The "clash" narrative not only serves up a broadly intelligible if oversimplified view of the world in one pithy phrase, but arguably touches on so many nerves by playing into the pervasive human tendency to categorize the social world into groups of "us" and "them" (Mahajan and Wynn 2012). Such polarizations carry both psychological and behavioral impacts, so that we not only attribute negative qualities to people "not like us" (Brewer 1979; Doise et al. 1972), we also act differently toward them (Singh and Ho 2000; Tajfel 1970).

Due to a host of factors, a social division is drawn along the lines of a settled "us" and a nomadic "them" in many parts of the world. The notion of sedentary farming communities and nomadic, or mobile pastoralist, groups as dichotomous entities is well-represented in anthropological literature by terms such as "the desert and the sown" (Bell 1907; Nelson 1973), "the steppe and the sown" (Fleure and Peake 1928), and variations on "nomads and the state" (Khazanov 1994, 2001; Szuchman 2009). These phrases have colored the academic and popular view of the role of nomadic groups in social encounters from Europe to China (Barfield 1989; Golden 2003; Khazanov 2005), and the deployment of these historically contingent social categories remains salient to this day in political and economic calculus across the region

(Honeychurch 2010; Humphrey and Sneath 1999; Ilkhamov 2006; Rancier 2009). Yet even if we acknowledge the enormous time depth of the sedentary-mobile dynamic in Eurasia, and its fundamental impact across the contours of geography and history, the thread weaving these societies together is often obscured by a tendency to separate the material and social worlds of settled and nomadic communities. The result is an undue polarization of objects, symbols, and identities that overlapped and profoundly shaped one another through time.

In Eurasia, scholars are increasingly calling out the settled-mobile dichotomy as contrary to the highly integrated, overlapping, and highly flexible modes of engagement that characterize archaeological, historical, and ethnographic findings (Bradburd 1989, 1997; Callahan 2007; de Weijer 2007; Frachetti 2008a, 2008b, 2009; Frachetti and Rouse 2012; Glatzer 1996; Honeychurch and Amartuvshin 2007; Irons 1974; Paul 2006; Smith 1978; Tashbaeva and Gritsina 2005). And yet, despite inconsistency between theoretical notions and the observed reality of archaeological and ethnographic study, to date there have been only limited and localized attempts to re-frame the way we think about the political, economic, and social aspects of mobile-sedentary interaction. Eurasian prehistorians, for their part, often remain mired in paradigms of dependency or diffusion that were drawn up for circumstances that have little congruence with their own research context (prior to widespread horse-riding, for example, or interactions taking place outside formalized exchange systems). Even in Central Asia, where both historical and modern manifestations of tribal nomads versus civilized states are well-documented (Sahedo and Zanca 2007), we can say very little about the specific characteristics of the mobile-sedentary relationship and its nuances in prehistory (see Cattani 2008a; Kohl 2007; Kutimov 2014; Lamberg-Karlovsky 2003; Salvatori 2008a).

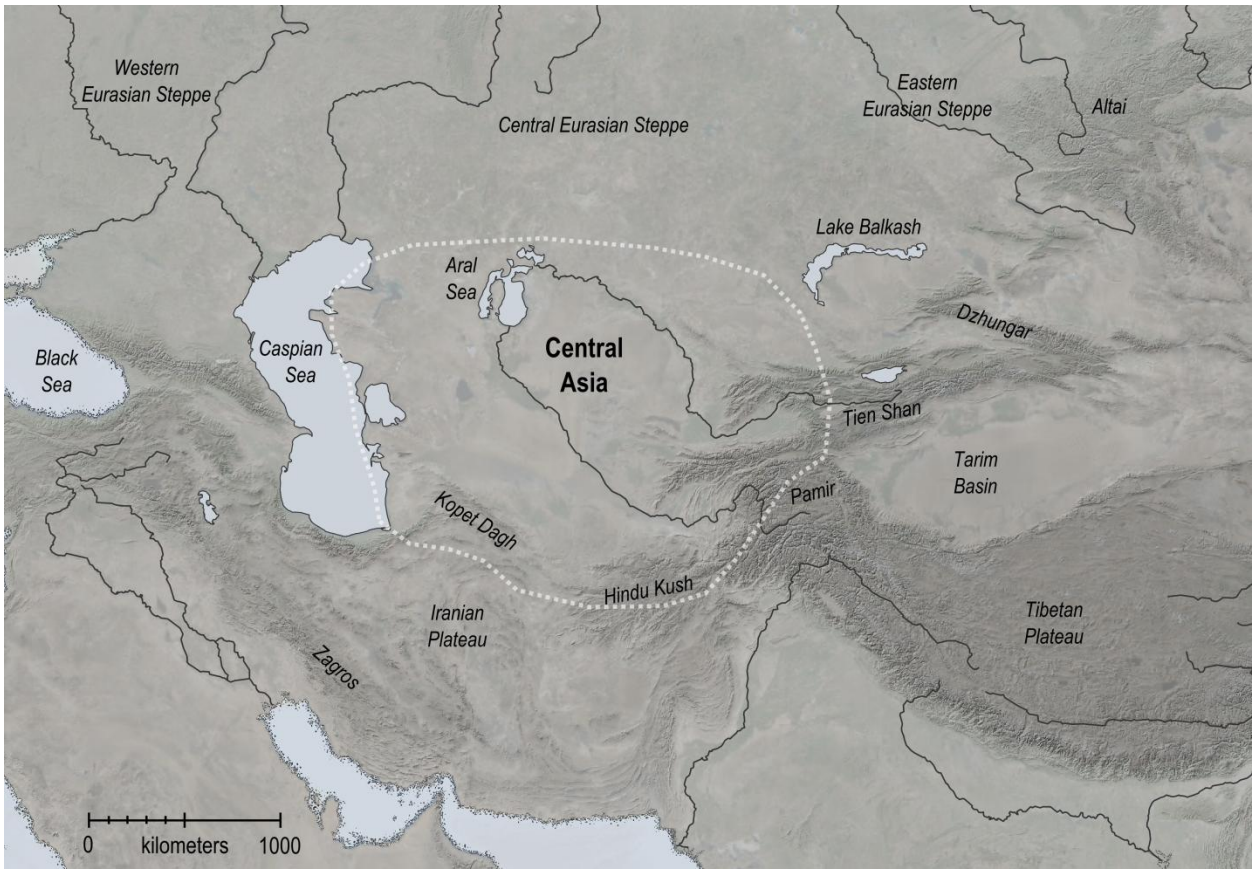


Figure 1.1: The region of Central Asia, as conceptualized for this study. Other major regions mentioned in the text are also labeled.

An important context for cultural interaction since ancient times, Central Asia (Figure 1.1)[1] has witnessed complex inter-relationships between typically sedentary farming communities of the lowlands and mobile agro-pastoral groups inhabiting the surrounding mountains and mountain-steppes from at least the 3rd millennium BC. My research focuses specifically on a lowland alluvial plain, the Murghab River fan of southern Turkmenistan, where during the later phases of the Bronze Age (ca. 1800-1350 BCE) the first sustained intercultural contact between settled farming and mobile pastoral communities in southern Central Asia seems to have taken place. I began the dissertation project with the straightforward goal of

[1] See discussion regarding the definition of this area below, Section 1.3
[2] Much gratitude is extended to the Director of the Joint Mission, Professor Maurizio Tosi, and to Field Director Dr. Barbara Cerasetti, with whom I co-directed excavations at Ojakly.
[3] In an interesting side note to these events, a number of states tried to restrict or control access to news about these

disentangling and describing the archaeological material culture of these social groups. In its most granular form the task was to archaeologically document, for the first time, the daily activities of nomadic groups who were interacting with urban communities around 2000 BCE in the Murghab alluvial plain, a time and place that despite its significance to broader trajectories remains poorly documented. This prehistoric context has traditionally been interpreted through anachronistic historical analogies in which mobile pastoralists are described by urban literates (usually tied to socio-political elite classes), or using single finds turned up in excavations at ancient settlements (a piece of incised pottery, for example). This physical and conceptual anchoring in urban communities biased our understanding of sedentary-nomad relations, inspiring conventional interpretations that paint an eternal antagonism between "steppe and sown" and is extended into polarized notions of "civilization and barbarian". Against these stereotypes, my research in the Murghab alluvial fan reveals a deep symbiosis between ancient farmers and nomads, which is overlain by inter-group distinctions that are less the product of divergent livelihoods than a consciously constructed cultural identity. Viewing these interactions in terms of active engagement in overlapping social networks of participation may help to productively unsettle our traditional notions of dominance, control, and polarization in sedentary-mobile interactions.

1.1 Aims of the Dissertation

To build a more concrete and comprehensive picture of social engagement during the pivotal later Bronze Age period of the Murghab alluvial fan, when an archaeologically distinct set of material remains appears at smaller peripheral occupations alongside settled farming

communities for the first time (Hiebert 1994a; P'yankova 1994; Salvatori 2008a), I have two main goals.

First, I have sought empirical archaeological evidence to clarify the hitherto vague characterization of "steppe pastoralists," based for this period largely on ceramic affinities. To this end, I conducted systematic excavations under the aegis of the Joint Italian-Turkmen Mission to the Murghab Alluvial Fan[2] at a so-called "Andronovo" campsite, now known as Ojakly ("place with kiln" in Turkmen). Although not especially surprising given the initial working hypotheses, the multiple lines of archaeological evidence consistently point to the Ojakly inhabitants having been mobile pastoralists. More importantly, however, is that the data presented here characterize the economic and production strategies of mobile pastoralists in the later Bronze Age Murghab more specifically than has yet been archaeologically demonstrated, and serve as an important baseline for future study at sites like these.

Following this, the **second** major goal of the dissertation research has been to use these archaeological data as a direct index for fixing our interpretations of interaction between mobile pastoralists and sedentary farmers in the particular geographic and temporal space of the later Bronze Age Murghab, and to build out from there into wider anthropological discourse. In particular, the details of my research bear on an important paradoxical relationship between the material and the social – how do objects tangibly and symbolically reflect social affiliations while simultaneously shaping them? The thesis I present here reconciles material expressions and their social deployment in prehistoric Central Asia through a theoretical intervention into the concept of *participation*. I argue that materials act as grammatical indices of participation, defining who became a nomad, a farmer, a trader, or a leader, and rooting these historically

[2] Much gratitude is extended to the Director of the Joint Mission, Professor Maurizio Tosi, and to Field Director Dr. Barbara Cerasetti, with whom I co-directed excavations at Ojakly.

contingent categories in the particular time, place, and social dynamic of my dissertation's case study.

1.2 Structure of the Dissertation

This introductory chapter of the dissertation provides an inroad to reasoning and methods behind the dissertation research as a whole. In Chapter 2, I turn specifically to the theoretical framework that drives the concept of *participation* I develop through this research. In this chapter, I argue that models of sedentary-mobile interaction that can be broadly characterized as either dependency or diffusion are inadequate for describing the relationship of farmers and pastoralists in prehistoric southern Central Asia because they cannot accommodate the flexibility inherent in those relationships. Building from a number of other scholars who focus on the social and material context of complex interaction, I offer a new theoretical intervention into the concept of participation as a general framework for understanding the Bronze Age in southern Central Asia.

Chapter 3 provides the overall setting of the research in terms of its geographical and physical location, the history of research in the Murghab, and how it has set up our current state of knowledge and understanding about the socio-cultural processes of the later Bronze Age Murghab. I begin with some details about the physical geography, climate, ecology, and hydrology of southern Turkmenistan and the Murghab in particular, because no matter the era, people living here must deal with all of these common factors. Next, I summarize the history of archaeological research in the Murghab, which, having been mainly conducted since World War II and under the conflated rubrics of national and ethnic patrimony, bears directly on the way our

current knowledge of prehistory in the area is constructed. I discuss the agrarian, urban phenomenon of the Bactria-Margiana Archaeological Complex in some detail, especially the later periods of its expression, because this is when the archaeological evidence for intercultural contact with mobile pastoralists is strongest.

Beginning in Chapter 4, I turn to the results of archaeological excavations conducted for the dissertation. I present the results of excavations at Ojakly, which in terms of dating and site complexity, represent the first comprehensive, systematic investigation of a mobile pastoral campsite securely dated to the Bronze Age from the Murghab region. In this chapter, the discovery and unique setting of Ojakly are more specifically drawn, and the excavation methods and analytical goals are spelled out in some detail. A description of the general layout and features of the site are given, and the details of a subterranean ceramic kiln discovered in a production area are presented. The features of two other distinct areas of the site, which are characterized by multiple living phases, highlight the punctuated occupations and activities of Ojakly's inhabitants, supporting an interpretation of mobile pastoralists. Radiocarbon dates fix these occupations to the Late Bronze Age, at ca. 1600 BCE, which is squarely within a period of marked shifts in settlement and socio-political organization related to the dissolution of the BMAC phenomenon (Cattani 2008a; Hiebert 1994a; Luneau 2010; Salvatori 2008a). Additional details about the limited stone, non-ceramic clay material, and metal finds from the site complete this comprehensive introduction to Ojakly and the material basis for mobile pastoral occupation.

Chapter 5 adds additional, supportive lines of evidence for mobile pastoral occupation at Ojakly with the results of faunal and archaeobotanical analysis. These datasets are discussed in turn, with faunal remains indicating a reliance on herds of sheep and goat, and archaeobotanical remains revealing more evidence for agricultural foodstuff coming through dung burning than

on-site consumption or processing. The localized economy and environment of Ojakly should thus be understood in terms of arid mobile pastoralism. Although the possibility of a mixed agro-pastoral economy cannot be definitively ruled out at Ojakly, the evidence as a whole is rather more indicative of the site's inhabitants being full-time mobile pastoralists who engaged in limited trade with farming neighbors no more than a day's trek away.

Summarized results of ceramic analyses are presented in Chapter 6. The Ojakly ceramic assemblage is unique in the Murghab for its size, and macroscopic analyses reveal a diversity of vessel forms within the "steppe ceramics" of the Murghab that is rarely presented in the English-language literature (but see Kutimov 1999, 2014). Mineralogical, chemical, and petrographic analyses indicate that all the ceramics at the site – the undecorated handmade coarseware, the decorated "Andronovo" pieces, and the wheel-made Namazga-style ware typical of farming settlements – are made from the same range of local clay sources. This suggests the inhabitants of Ojakly were not regularly moving out of the Murghab (or at least not moving with any ceramic vessels), a point further emphasized and made more intriguing by a handful of other analyzed "Andronovo" sherds taken from survey in the Murghab that do show differentiation from local clays. Also in this chapter, I discuss the unfired vessels found in the lowest fill of the ceramic kiln at Ojakly, a hybrid form of potstand that evidences technological transfer, knowledge sharing, and participation in overlapping institutional networks.

Building from the previous three chapters, Chapter 7 provides a comprehensive discussion of the overall results from Ojakly. The first part of the chapter draws together the multiple lines of evidence – site layout and organization, features and architecture, faunal and archaeobotanical data, and ceramic analyses – to make the case for Ojakly's inhabitants being mobile pastoralists, and members of a distinct social unit that was not a subset of the settled

farming community. I then move on to contextualize the Ojakly results in light of archaeological research at those settled farming sites, as well as at the handful of other Murghab mobile pastoral sites and more broadly at some Andronovo sites of Central Asia. Taking all this together, I argue that Ojakly's inhabitants were not the passive recipients of civilizational forces, but were actively negotiating their engagements through material culture. In so doing, they helped shape patterns of interaction and interplay between social groups that would resonate for centuries to come.

Finally, Chapter 8 offers some summarizing and concluding thoughts about the concept of participation and prehistoric Central Asia.

1.3 A Note on Chronology and Terminology

Before turning to the remainder of the dissertation, it is important to briefly explain some of the terms that will appear most often, as there are a number that could potentially cause confusion. First, I use the term *mobile pastoral* (*-ist*, *-ism*) as a general phrase to describe human social units built around herds of sheep, goat, and/or cattle, and who do not reside on one patch of ground year-round. I purposely cast the net wide here, as I am not concerned with defining any specific *type* of mobile pastoralism in the Bronze Age Murghab, but only to set up a neutral but still conceptually useful term for identifying the groups who lived at Ojakly. I use the term *sedentary farmer*, in contrast, to describe inhabitants of the farming villages and hamlets of the Late Bronze Age Murghab. As I expand on in the discussion in Chapter 7 will expand on, the groups occupying this particular landscape were less neatly divergent and more modually integrated than traditional views might suggest. However, we still need something to call these groups, and I use *sedentary farmer* and *mobile pastoralist* not to reify and engrave assumed

behaviors, but as a means of engaging with more broadly-shared general conceptions and terminology.

A second potentially controversial term that will appear throughout this research, especially for those familiar with Eurasian Bronze Age cultures, is *Andronovo*. Very broadly, Andronovo describes groups of pastoralists sharing (among other material remains) ceramic vessels and metal objects that bear broad stylistic similarities to one another (Kuz'mina 1994a, 2007). As a colleague recently told me, and I paraphrase, "You can't just stop saying Andronovo altogether. Nobody will know who you're talking about!" There is some measure of truth to this statement, and though I agree with critics of the Andronovo phenomenon in general (Doumani 2014; Frachetti 2008), I see the value in retaining the term as a cautiously-employed shorthand with salience for most Eurasian prehistorians.

The term *Central Asia*, on the other hand, needs some specific clarification in relationship to this research, since it has rather well-trodden connotations for different groups of scholars. In English, *Central Asia* often refers to the entire arid center of the Eurasian continent, stretching from the Caspian Sea in the west to Manchuria in the east. For Russian-speaking researchers, *Central Asia (Центральная Азия –Tsentral'naya Aziya)* and *Middle Asia (Средняя Азия – Srednyaya Aziya)* are distinct areas within this, the first being comprised of the Pamir Mountains, Mongolia, and western China, and the second used to designate deserts and semideserts of the Aralo-Caspian lowland, Kazakhstan, and the mountainous systems of western Tien Shan, Ghissaro-Darvaz, and northern Afghanistan (Kryzhanovsky and Atamuradov 1994:403-404). This general distinction is carried over in German, Turkish, and Persian with the same translations, though in French the terms are reversed geographically so that *Asie centrale* (Central Asia) corresponds to the western portion and *Haute Asia* to the eastern portion (Bregel

1996:1-2). Figure 1.1 maps the area I am referring to when using the phrase Central Asia, which generally coincides with the French *Asie centrale*, parts of Russian *Middle Asia (Средняя Азия – Srednyaya Aziya)*, and a part of what came to be called *Russian Turkestan*: Turkmenistan, Uzbekistan, Tajikistan, and Kyrgyzstan (which, to add to the confusion, is generally called *Central Asia [Центральная Азия – Tsentral'naya Aziya*] in Soviet literature).

When speaking of the prehistoric chronology in this region, clarity is especially important because different temporal sequences are regularly used. Figure 1.2 summarizes the correspondences between these sequences. In general, Soviet and post-Soviet scholars have tended to prefer a lower chronology, roughly 500 years later than that often used by Western scholars. The difference in chronologies stems from the use of both uncalibrated and calibrated radiocarbon dates, and an early and continued reliance on correspondences of material culture sequences (mostly ceramic-based) (Luneau 2010; Masson 2002; Vinogradova 2008; Vinogradova and Lombardo 2002). However, with several hundred dates now published (Luneau 2010), most researchers have shifted toward the use of calibrated C-14 dates (the so-called higher chronology) (Kircho and Popov 1999). For much of my discussion, I refer to periods by culture historic terms such as Late Bronze Age and Early Iron Age because these are more or less similarly distinguished by scholars working in this part of the world, even if calendar years are not always precisely agreed upon. Whenever possible, however, I will include for clarity the calibrated calendar years as BCE. As regards the use of chronological phases based on material culture sequences, such as "Namazga" (for southern Central Asia), or "Bactria-Margiana Archaeological Complex (BMAC)" and "Yaz" (local material cultures within the Murghab alluvial fan), I will introduce these with calibrated years BCE on their first appearance in each chapter but not reiterate them throughout the text.

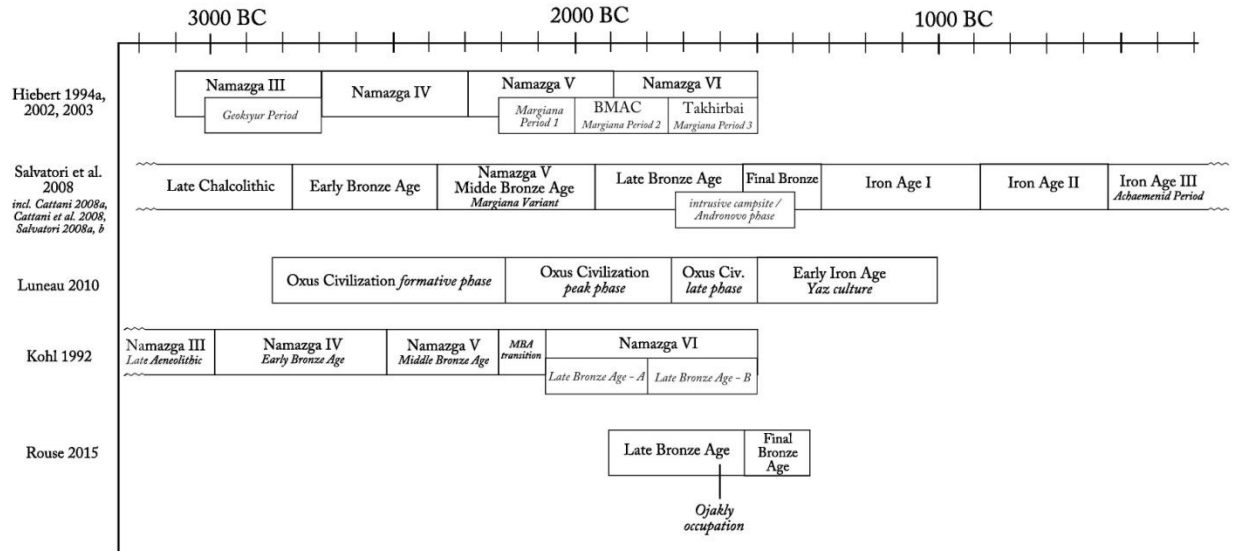


Figure 1.2: Correspondence chart of material sequence, phases, and calendar years, with references. The dating scheme used in this research is presented in the bottom row.

Chapter 2: Theoretical Concerns

In January 2000, the international conference on Eurasian pastoralism held in Cambridge reset the scholarly agenda for examining prehistoric interaction patterns in this vast and diverse region. Scholars recognized that characterizing the social formations of prehistoric Eurasia was no longer only a (post-)Soviet problem, and that archaeologists in general were moving beyond discussions of material-based culture history to critically address more contentious social and political issues such as migration, the development of social complexity, and technological transfer. At the same time, new international projects set up in post-Soviet states and the cross-pollination of research they engendered were revealing a spectrum of adaptive socio-economic strategies that conflated traditional definitions of 'pastoral' or 'agricultural' economies, carrying significant implications for questions about interactions between the societies commonly represented as distinct. Interactions, it seemed, needed to be understood not as larger or smaller arrows pointing from this center to that periphery, but as a complex web of local adaptations submerged under more broadly-shared ideologies, norms, technologies, and practices. How these scalar overlaps shaped the unique trajectory of Eurasia has been the subject of intense study of the past 15 years and counting.

Concomitantly, there has been a rapidly growing body of archaeological research highlighting groups in the 'invisible periphery' of Eurasia and Central Asia: the mobile pastoral or nomadic populations commonly held in heuristic juxtaposition to sedentary agricultural communities. Mobile pastoralists have long been left on the fringes of any discussion of prehistoric development, not least because their archaeological remains are less conspicuous than those of sedentary farmers (Bacon 1954; Finkelstein and Perevolotsky 1990; Sahlins 1972:11),

and because they are often anachronistically interpreted through much later historical texts written about rather than by them, which rarely paint flattering descriptions (Beckwith 2009; Di Cosmo 2002; Grousset 1970; Pines 2005). But the renewed focus on mobile pastoralists in Eurasian history over the last two decades, along with advances in archaeological techniques of recovering their remains, has recast these groups as playing a prominent and more crucial role in the trajectory of many aspects of Eurasian development over the last 5,000 years (Barfield 2001a; Christian 2000; Frachetti 2008a, 2008b, 2009, 2012; Frachetti and Rouse 2012; Hanks and Linduff 2009; Kohl 2007; Lindsay and Greene 2013; Rouse and Cerasetti 2014; Spengler et al. 2014a, 2014b; see also Barnard and Wendrich 2008, Porter 2012, and Ur and Hammer 2009). Given this re-calculation of Eurasian and Central Asian prehistory, we might productively deconstruct anthropological models of interaction and general socio-cultural development that conceptually prioritize settled agrarian populations over mobile groups. In this chapter, I argue that models of sedentary-mobile interaction that can be broadly characterized as either *dependency* or *diffusion* are inadequate for describing the relationship of farmers and pastoralists in the Bronze Age Murghab alluvial fan, and offer a new theoretical intervention into the concept of *participation* as a general framework for understanding Central Asian prehistory.

2.1 Defining the Boundaries: Terminology and Heuristics

There is no shortage of literature aimed at distinguishing different forms of what I generally refer to as 'mobile pastoralism'. Ethnographers, historians, and archaeologists have spent much collective energy demonstrating and defining different subsistence and mobility strategies under the umbrella of pastoralism, variously labeled "pure pastoralist", "agro-

pastoralist", "semi-sedentary pastoralist", "multi-resource pastoralist", "predatory pastoralist", "mobile herder", "nomadic pastoralist", "nomad", "transhumance", "peasant husbandry" and "herdsman husbandry" (for examples: Abdi 2003; Bacon 1954; Barnard and Wendrich 2008; Barth 1956, 1959; Bell-Fialkoff 2000; Cribb 1991; Dyson-Hudson and Dyson-Hudson 1980; Khazanov 1994; Krader 1955; Kroeber 1947; Rowton 1974; Salzman 1971; Shishlina and Hiebert 1998; Vincze 1980). These categorizations sometimes rely on very technical distinctions and unique examples, but also often emphasize practices and ideologies that can be difficult to quantify or measure. Everything from subsistence behaviors, caloric intake, productive specialization, trade economy, and movement patterns, to political complexity and social organization have been highlighted as primary defining traits of mobile pastoralists. At the same time as we are warned not to conflate specific terms (Abdi 2003; Barfield 2003; Salzman 1971), cautions are levied against generalizing, oversimplification, and creating non-specific ideal types (Barfield 2003, Salzman 1971, 2002; Spooner 1973). Thus, despite a lively academic discussion spanning decades of research across Eurasia and beyond (Lattimore 1979; Potts 2014), there remains little consensus about the correct terminology, and perhaps even less clarity about which 'category' prehistoric groups would or should fit into. The only universal apparent in relevant literature seems to be a need for scholars to justify and explain the terms they employ.

In the research presented here, I am less concerned with categorizing and defining the groups in question than I am with ascertaining their inter-group interaction patterns. While terms like "peasant husbandry" and "nomadic pastoralist" ostensibly describe social formations in certain pre-supposed relationships to sedentary agricultural groups (Khazanov 1994), the use of these terms themselves do not *a priori* detail the mechanisms of those relationships, and this is the crux of the problem in prehistoric Central Asia. We can confidently acknowledge that there

were ‘herders’ and ‘farmers’, but how they articulated with one another is not at all clear, nor is what these entanglements meant for subsequent developments on either side (see Chapter 7 for a more elaborated discussion of these issues).

Throughout this work, I use variations on the term *mobile pastoralism* to denote groups that primarily focus their day-to-day energies on herd animals (for subsistence, capital, social value, ideology, etc.) and do not physically live in the same place year-round. Following the research of Barfield (2003:173), Chang and Koster (1986), Goldschmidt (1979:16), and Salzman (2004), I see the central concern with animals as opposed to plants as an important sociological, practical, and material marker for pastoralists in both an emic and etic sense (see also Dahl 1981). How many community members move with the herds, the distances moved, or behaviors outside of herding are less important issues, here, if the group being described places premium value in herd animals and structures their social lives around pastoral pursuits or idealizations of them. Although my loose definition of mobile pastoralism does not conform to some other, perhaps more ‘canonical’ definitions of pastoralism, I prefer the flexibility it offers since this is more congruent with our current basic knowledge about the fluidity and adaptive nature of pastoralism at large – the very essence of a pastoral way of life is the flexibility to move between arrays of available strategies as circumstances warrant (Bradburd 1989, 1997; Callahan 2007; Glatzer 1996; Irons 1974; Niyazklychev 1973; Paul 2006; Porter 2009; Salzman 1971, 2000, 2004). To my mind, energy spent defining and defending precise snapshots of static ideals within a dynamic process is misplaced if it does not help us understand the process itself.

Thus, in the prehistoric context of Eurasia and southern Central Asia specifically, my aim is not to offer definitions of *mobile pastoralism* and *sedentary agriculture*, but to establish:

1) that the groups commonly labeled *mobile pastoralist* in my study area are actually concerned primarily with pastoral pursuits, which has heretofore been assumed but never specifically addressed archaeologically (Chapters 4-6)
2) that in the context of my dissertation case study, the *pastoralist* and *farmer/ agriculturalist* labels are appropriate stand-ins for two distinct socio-cultural groups that came into sustained, regular contact with one another (Chapters 3, 7)
3) the domains in which the two groups were interacting (Chapters 5, 6)
4) whether the mechanisms of their interaction are better understood as underlying Central Asian history if they are taken out of current theoretical contexts of interaction and re-evaluated using the concept of participation (below, and Chapter 7)

Thus, although my research may utilize familiar categories such as *mobile pastoralist* and *sedentary agriculturalist*, these are neither intended to reify polarizations between them nor mask the choices and variable overlapping practices of either group, but rather form an essential heuristic in the context of the case study presented. The questions addressed focus not on the interaction of pastoral***ists*** and agricultural***ists***, per se, but on broader questions about the dynamics of inter-cultural relationships, the changes they effect in each group, and how these overlap and intersect within a given geographic, temporal, and social space.

2.2 The Connection between Interaction and Social Change

There can be no doubt that cross-cultural contact has an impact on the social groups involved; the Silk Road is perhaps the most tangible and broadly accessible historical example of the way the sharing of objects, ideas, technologies, and people re-shaped societies and their

developments on vast scales with often unpredictable results. Another salient example from recent memory might be the so-called "Arab Spring" revolutions that began in late 2010, sparking massive public protests and leading to government collapse across the Middle East and North Africa. In this example, the use of electronic social media helped bypass physical constraints on interpersonal communication, fostering rapid, sweeping, and unpredictable social changes that are still playing out across the region.[3] For their part, archaeologists argue that the links between intercultural contact, the cross-pollination of ideas, and social changes extend deep into the human past, and social and material innovations have often been described as having spread from one society to another through various forms of direct and indirect contact (i.e. diffusion, coercion, borrowing, adoption, and influence, etc.).

As discussed below (Section 2.4), the nomenclature and mechanisms proposed for why and how interaction engenders social change and the spread of materials, technologies, and ideas are not static. In this regard, Kohl's observation that all culture is influenced by its wider context remains relevant:

> …the basic fact remains that the development or cultural evolution of any society is dependent upon its relations with other societies; that cultures are open, not closed, systems; and that studies…that fail to consider broader patterns of interaction are necessarily incomplete and partial. (1989:218)

The issue, then, is not whether a given society is influenced by any other, but how contacts between actual, real individuals manifest into larger social changes, and why particular innovations (theoretical or practical) take root and spread across cultures when certain others do not. While theory in the social sciences – archaeology included – tends to swing pendulum-like between globalizing and localizing paradigms, there is certainly room to learn from both. I view

[3] In an interesting side note to these events, a number of states tried to restrict or control access to news about these events in an effort to safeguard their own structures. This underscores how broad-scale, inter-community engagements are implicitly tied up in notions of social change.

archaeology as an important discipline for bridging these two extreme views, where the material remains of lives past provide insight into the daily and habitual practices of real people, who like us constantly navigated an array of larger social fields using a variety of methods that often included direct engagement with the physical world.

2.2.1 The "ins and outs" of group formation

Numerous psychology experiments and extended studies have shown that human infants by about three months of age recognize and exhibit preferential behavior toward perceived social 'in-groups' (Dunham et al. 2008; Mahajan and Wynn 2012). Interestingly, in-group definitions seem to follow both physical and linguistic affinities from an early age (Kinzler and Spelke 2011; Kinzler et al. 2007), but can also be constructed across seemingly arbitrary or superficial traits, such as food preferences or T-shirt color, in groups ranging from pre-linguistic babies to young children to adults (Dunham et al. 2011; Mahajan and Wynn 2012; Tajfel 1970, 1982). These observations carry two implications. One is that humans seem to be pre-wired to recognize differences, categorize social groups, and behave differently according to those categorizations. The fact that apparently random criteria can be used to define groups implies, secondly, that there are no immutable social categories, and that our schemes of inter-personal categorization are flexible and contingent. Bearing these two observations in mind, we might inquire whether larger social or cultural units are also constructions of 'in-groups' and 'out-groups', and why certain binaries – sedentary farmers and mobile pastoralists, for example – have enjoyed such conceptual longevity.

In Inner Asian history, scholars have long recognized that the promulgation of dichotomies between a Chinese civilized world based on agriculture and an outside barbarian

world of mobile pastoralists was a political tool used by the Chinese state to various ends, rather than a reflection of impermeable demarcations or unchanging attitudes between groups (Di Cosmo 2002; Pines 2005; Rogers 2012; Standen 1999). The fuzzy line drawn between the in-group and out-group in this case is also highlighted by the fact that there is no single word in historical Chinese texts that can translate to "barbarian" in English. Various terms are employed to describe the non-Chinese mobile pastoralists depending on the exact agenda or theme being discussed (Di Cosmo 2002; see Paul 2006 for a similar discussion related to Medieval Persia). Rather than any fixed socio-cultural boundaries, economic and political agendas (i.e., trade and taxation) have been keys to the relationship between the centralized Chinese state and the non-sedentary pastoral population on its frontier through time. Distinctions between the two groups are often couched in or justified by terminology that places a settled "us" in opposition to a mobile "them" (Di Cosmo 2002; Lattimore 1979; see also Khazanov 1994:206-207), but they are to be understood as socio-political propaganda, meant to crystallize clear in- and out-groups from a messier reality that did not suit the distinct aims of the writers and the offices or governments they worked for (Standen 1999).

The strategic manipulation of in-group and out-group categories as part of dynamic socio-political calculus is not restricted to the case of Inner Asia, but appears in historical literature describing sedentary-mobile encounters from different periods across the Eurasian continent. In the cuneiform texts of successive Mesopotamian states, P. Michalowski has tracked the shifting meaning of geographic toponyms in relation to the evolving geopolitical interests of administrative and military leaders. Of particular interest here are the related toponyms "Subartu" and "Subir", which alternately refer to an ill-defined "north" beyond Mesopotamian influence and more narrowly to organized polities of "uncivilized", "tent-dwelling" people

subdued and brought within the political-economic realm (Michalowski 1986, 1999). Likewise, the experiences of Alexander the Great and his army in Bactria (northern Afghanistan) seem to have been colored not only by terrain, people, and customs unfamiliar to the Macedonians, but by Hellenistic perceptions of nomadic societies in general as wild and lawless (Di Castro 2005; Holt 1988, 2005). Among other factors, fear and loathing of a heightened barbarian otherness may have contributed to the violence in Bactria in the late 4th millennium BC (Rice 2014:40-44).

The variable uses of historical terms like "Subartu" and "barbarian" index the dynamic ideological and tactical relationship of agriculturally-founded political and military institutions to their pastoral neighbors, and like the Inner Asian examples given above, tacitly frame the mobile pastoral and cultivated realms in civilizational and moral opposition to one another. They do so by defining in- and out-groups and their relationships from the point of view of agrarian politico-cultural institutions. Out-groups, in these examples, are delimited by what the in-group is not, or does not want to be. When utilizing historical sources in the understanding of sedentary-mobile relationships, it is thus critical to remember that geographic and social lexicons are not neutral and objective, but signify ideological constructs that can be reformulated, reinvented, and rewritten according to circumstance and context (Leung 2003; Michalowski 1999). As human constructs and communication devices, words are both powerful and malleable signifiers of in- and out-group formation. Moving from history to prehistory, we might grant the same efficacy to the physical communication devices humans construct: material culture and architecture. There are, of course, similar caveats to interpretation, and though the warning is directed toward the prehistory of northern China, Pulleybank's words are equally applicable across Eurasia: "our view of the interaction between the steppe and the sown gets distorted if we allow ourselves to

be dominated by the sinocentric self-image of our principal sources. We have to be even more aware of the dangers of such unconscious assumptions in dealing with prehistory" (1974:508).

Taken together, the argument to be drawn from the textual examples above is not that an ideological or cultural line is universally drawn between sedentary farmers and mobile pastoralists in Eurasian history. While these historical examples do highlight the salience and exploitability of the farmer-nomad dynamic as a delimiter of in-groups and out-groups, such an observation is an unsatisfactory end result of our anthropological inquiry because it does not in and of itself explain the human action and social processes underpinning these dynamics. If the differentiation between civilized farmers and barbarian nomads can be understood across the breadth of Eurasian history as more reflective of the internal maneuvering of complex, urban-centered polities than the lived experience of interacting communities, then there is something to be learned from when and how such strategic dichotomies are deployed and when they are not. Within this setting, the Murghab region of Central Asia is a unique locale for understanding not only the historical depth of these interactions and their impact on local and regional trajectories, but also as a particular case study with direct archaeological evidence for telling both sides of the sedentary-mobile story, something that rarely comes across in historical writings or sedentary-focused archaeological studies.

2.3 Sedentary-Mobile Interactions: The Roots of Our Thinking

The previous section presented the ideas that humans are pre-disposed to identify others in terms of social in-groups and out-groups, and that in- and out-group definitions are malleable constructions rather than primordial distinctions. I suggest that the physical world archaeologists deal in can reflect socio-political manipulations on par with those recognized in historical texts, and suggest the anthropologically salient questions in both prehistory and history are when, why, and how such constructs are employed. In this section, I turn in particular to the polarization of sedentary farming and mobile pastoral groups in academic tradition and popular thought, to address the origins of this conceptual dichotomy and the reasons for its constant reiteration.

2.3.1 Divisions in archaeological thought

The distinction between settled farming and mobile pastoral groups appears in very early texts (Michalowski 1986, 1999), but even if we recognize that such juxtaposition more strongly reflects political, military, or economic tactics than strict socio-cultural divisions, there is an implicit primacy awarded agricultural states as the source of our knowledge about (pre)historic relationships. Mobile pastoral groups are seen as fundamentally shaped and constrained by their natural environment, which ultimately retards social and technological development from following similar trajectories and reaching the levels of complexity seen in agriculturally-based societies (Barfield 2001b; Bodin 1955 [1576]; Ibn Khaldun 2004 [1377]; Khazanov 2009; Vambéry 1880:321). As Di Cosmo stresses (2002:10), our framework for thinking about the relationship between sedentary farmers and mobile pastoralists is still trapped in a dichotomy

reminiscent of early Chinese texts. But how is this conceptual heuristic an artifact of theoretical heritage and of archaeological practice itself, which relate to one another at the interpretive level (Johnson 1999; Trigger 2006 [1989])?

The myriad ways Western and Soviet archaeological discourse and practice have impinged on the study of Eurasian pastoralism in general, and on research on the Bronze Age in the Murghab alluvial fan more specifically, are worthy of comprehensive study in and of themselves. Here I limit myself to the convergences these forces had on conceptually placing sedentary farmers and mobile pastoralists in dualistic opposition. In both Western and Soviet academic traditions, mobile pastoralist groups were placed outside the scope of social-developmental trajectories, so that their theoretical and actual interactions with sedentary farming communities became viewed as threatening to the proper order of social, political, and moral life. Moreover, the practice of archaeology, which is necessarily built around the recovery of physical remains, contributed in both Western and Soviet discourse to a marginalization of materially-'invisible' pastoral groups in favor of built-up agrarian-centered settlements and their comparatively rich remains.

Western anthropological and archaeological thought drew its early sedentary–mobile interaction framework from a Classical (Greek and Roman) legacy, in which pastoral life was explicitly presented as forming a different stage in social development than agriculture (cf. Varro, Porphyry). Potts (2014) notes that it was not until the Enlightenment period that European social theorists began to take up social evolution as a serious topic, but the idea that nomadic societies were a proper foundation for the emergence of advanced civilization was rejected outright by social philosophers throughout the 17^{th} – 18^{th} century, including Hegel, Engels, and Morgan. By this time, too, there was a growing body of ethnographic literature to compile

together with the inherited Classical philosophy and centuries of cumulative European encounters with the cultural "other" (Campbell 1991). Thus, following the Classical presentation of unsettled "barbarians" as the permanent foil to self-referential examples of urban-centered "civilization", European social theory increasingly recognized asymmetrical relationships that implicitly and overtly placed Western forms of civil and moral authority as the most advanced (Fleure and Peake 1928; Neumann and Wigen 2013). Especially through cross-cultural encounters with the more pastorally-inclusive social formations of the greater Near East and Eurasia, European socio-political thinkers solidified definitions of "civilization" and "civilized" within the constructs of their familiarity – agrarian-based states and land-based social hierarchies – and against the "exotic" and unfamiliar nomadic societies they were encountering (Campbell 1991; Pratt 2008; Said 1978).

If 19th-century Europe represented the pinnacle of human social progress, and if social and political life were underpinned by sedentary agriculture, then nomadic and pastoral societies could only be viewed as primitive precursors to more advanced civilization, or as competitors to the states that made it up (Neumann and Wigen 2013). This fundamental conflict of agricultural and pastoral societies can be traced as far back as the writings of Ibn Khaldun (1332-1406) (2004 [1377]), and the separation of and tension between the two can be followed through various iterations of Western social theory, even if the writers themselves were not necessarily aware of the earlier Islamic literature (Service 1975). Comparing the early "oasis theory" of agricultural development, for example, which emphasized a shift from pastoralism to agricultural pursuits as population density increased (Trigger 2006 [1989]:8, citing Pumpelly (1908:65-66), Peake and Fleure 1927, and Childe 1928), to later theories that presented (specialized) pastoralism as an outgrowth of agricultural intensification (Abdi 2003; Bar-Yosef and Khazanov 1992; Gilbert

1983; Lees and Bates 1974; Levy 1983; Service 1975), there is a consistent conceptual line drawn between farming and pastoralism as different stages along a progressive trajectory. The implication, as Porter (2012:201) points out, is a mutually exclusive choice between two different orders of existence – pastoralism *or* agriculture – and in Western social sciences agriculture has consistently been presented as the higher order of society (Tringham 1974).

The focus on technological advancements and the intensification of agriculture as crucial to the development of civilization has enjoyed an exceptional longevity and indeed such changes were important factors in some contexts (Service 1975). Yet embedded within this is an acknowledgement that social power, authority, and integration are rooted in physical space and maintained through physical presence (Porter 2012; Service 1975), which necessarily places mobile pastoral populations on the conceptual periphery of civilization. When mobile pastoralists are brought into the discourse, it is most often to illustrate the imbalance and instability they impart on the natural development of sedentary farming communities, which serves to re-gloss the antagonistic binary of civilization-barbarian and reiterate a manifest inequality between sedentary-mobile lifeways.

In summarizing a nuanced history of Soviet archaeological discourse, we might recognize certain features of the discipline after the early 1940s, when archaeology began to be seriously and systematically undertaken in Central Asia. By this time contacts between Soviet and foreign scholars had been curtailed, and archaeology – along with all humanistic sciences in the Soviet Union – had become part of a distinctive Marxist interpretive tradition (Trigger 2006 [1989]:207, 216). Marxism follows a materialist perspective, elevating the forces and relations of production as *the* crucial factors shaping social systems; these were respectively conceptualized as the base (the means of production, which included both economic and social behaviors) and the

superstructure (social and civil order) (Bondarenko et al. 2003; Kradin 2003; Sawer 1975; Trigger 2006 [1989]:220).

Critically, for Soviet archaeologists, the Marxist paradigm necessitated a focus on identifying economic practices and technologies, as well as social organization and ideologically-influenced behaviors, for these basal elements were intrinsically linked and inseparable from the societal superstructure (Bondarenko et al. 2003:3-4; Bregel 1996; Trigger 2006 [1989]:221). The practical results were excavations aimed at uncovering the daily life of ordinary people, often through large-scale horizontal exposures that included different production areas within sites and the artifacts related to them (Masson 1981; Sarianidi 1988), investigations of cemeteries to ascertain social and ideological structures (Khlopin 1983; Sarianidi 2007), and great attention paid to the technological aspects of production (Chernykh 1964; Chernykh et al. 1999; Saiko 1982). All archaeological data were strictly interpreted in accordance with a formulated scheme of unilinear social evolution, which consisted of pre-class society (various clan formations), class society (slave, feudal, and capitalist), and classless society (socialist and communist, the latter being the pinnacle of human societal development) (Trigger 2006 [1989]:225).

Pastoralism, and nomadism in particular, presented a problem for Marxist-Soviet interpretations of history, because it neither fit within the schema of progressive social evolution nor conformed to the basic methodological principle of historical materialism that identified a one-to-one correspondence between production relations and civil order (Bondarenko et al. 2003; Kradin 2003). Thus, on the one hand, the stability of the production base of pastoralists – stock-rearing – left basic technologies and behaviors in place across centuries, leaving pastoral groups stuck somewhere along the evolutionary trajectory toward communism all societies were meant

to follow. On the other hand, because the production base remained more or less unchanged even as the socio-political superstructure varied (vacillating between tribal affiliations, nomadic empires, khanates, and other forms), pastoral groups defied the law of correspondence between base and superstructure. The result, as noted by scholars such as Gellner (1988) and Kradin (2003), was that nomadic pastoralists were removed to a wholly different social schema within Marxist historical thinking and granted their own specific "nomadic feudalism" theory, effectively separating them permanently from sedentary societies in developmental discourse (see also Bregel 1996).

In terms of archaeological practice, Western and Soviet archaeologies both face the inherent biases of a discipline based on things and tendencies to reinforce the centrality of place with respect to interaction. Central Asia is no exception to the general archaeological focus on data collection at sedentary sites; these often represent reasonably long-term occupations and unlike the short-term campsites of mobile pastoralists, the accumulations of debris associated with them are often conspicuous on the landscape as *tepe* (or *depe* – synonymous with the Near Eastern *tell*) (Figure 2.1). In an alluvial plain such as the Murghab, moreover, such visible markers of occupation are easily translated in the archaeological imagination into socio-political anchor points across temporal and physical space. This, combined with a real empirical difference in the volume and range of archaeological material between sedentary farming sites and mobile pastoral occupations, lends itself to a conceptual model that gives primacy to urban centers and downplays the contributions or influences of mobile groups in developmental trajectories.

Figure 2.1: Yaz-depe in the present day, illustrating how tepe sites dot the modern agricultural landscape of the Murghab alluvial fan. Photo: H. Azizi (2010).

The preceding pages are a necessarily generalized presentation of a large and complex set of issues,[4] designed to contextualize the research presented here. Nonetheless, it highlights the problems both Western and Soviet archaeological theory had in including pastoralists in the social explanations of "How did we get to where we are now?", because both have generally viewed human societies as following a progressive trajectory. In neither case was there an easy or consistent slot for pastoral groups to fit into, impeded as they were by seemingly unchanging economies and modes of production, which underlie social structures in both Western and Soviet paradigms. Neither did the practices of archaeology as a discipline dependent on material remains help the situation, although that has begun to change in the last decades. Potts recently suggested that the idea of nomadism as a rung on the social-evolutionary ladder had been "laid to rest" by the early twentieth century (2014:443). However, nomadism – and by extension the mobile pastoralism that underpins it – as an economic, socio-political, or cultural counterpoint to

[4] Other details of Soviet historiography are dealt with much more thoroughly and elegantly, for example, by Bregel (1996), Gorshenina (2014), and Klejn (1993).

an agricultural way of life continued (and continues) to permeate archaeological and anthropological thinking. Whether we conceptualize sedentary and mobile societies as different stages of continual social progression, as following wholly different trajectories, or paint differences in a positive or negative light, the polarization of these groups is embedded in concepts that frequently reappear in archaeological literature: state/tribe, civilized/uncivilized, cultured/wild, core/periphery, center/hinterland, urban/rural, agriculture/pastoralism. These binary notions are so enfolded into our way of thinking that they have often gone unquestioned in both the practice and theory of archaeology.

2.4 Models of Sedentary-Mobile Interaction: Dependence and Diffusion

Our collective archaeological knowledge of mobile pastoralists around the world has increased dramatically over the last few decades. Much research has been geared toward identifying the different ways pastoralism emerged in different contexts, and certainly the "cattle before crops" scenario found for Africa (Marshall and Hildebrand 2002) and the domestication of plants by camelid pastoralists in the Andes (Browman 1989) can be seen as divergent processes of pastoralist development from those that took place in the greater Near East. Eurasian pastoralism, by contrast, remains more conceptually tied to trajectories drawn for the Near East and Mesopotamia, perhaps as a combined effect of more direct geographical sightlines and the relatively recent reappearance of the region as a study subject in its own right in Western, Old World scholarship since the fall of the Soviet Union. Although a full discussion of the origins of pastoralism in Central Asia are outside the scope of the present work (see Frachetti [2012] and Potts [2014] for summaries and references), certain hypotheses are relevant for the

issues concerning interaction between sedentary farming and mobile pastoral groups because of the way they inform ideas of group formation. Again, here, terminological diversions are navigated only as necessary so as not to detract from the course of thought.

Despite the growing body of archaeological data related to mobile pastoralists and the very widespread acknowledgement of the blurry line between such groups and sedentary farmers, anthropological and archaeological models addressing inter-group interaction patterns are still largely framed within a structure of polarization and inequality. I broadly characterize these as "dependency" models and "diffusion" models, though as the discussion below will illustrate there is a good deal of overlap between them. Below I unpack some of the assumptions these models entail before turning to the specific problems such assumptions present for understanding prehistoric Central Asia.

2.4.1 Dependency Models

Perhaps the most pervasive assumption underlying the literature on sedentary-mobile interaction is that mobile pastoralists are constrained by their natural environment. From this flow a host of other, related assumptions that associate the deficiencies of pastoral subsistence, the economic uncertainty of animal-based economies, and the limits of pastoral production, ultimately converging implicitly or directly in the belief that pastoral economies cannot exist without articulating with agricultural systems (Goldschmidt 1979, Khazanov 2009). Since the reverse is not held to be true – that is, agriculture *is* viewed as a sustainable, self-sufficient economic base – the result is an almost canonical belief that pastoralists are fundamentally dependent upon agricultural communities for food, things, and ideas.

This conception can be difficult to counter because it rests in part on a very specific definition of pastoralism as specialized production within broader economic contexts, and in part on an implicit generalization of pastoralism as an adaptive strategy. A number of scholars argue that *nomadic pastoralism* is an economic specialization that can only operate in coordination with other specialized producers across societies, and moreover, that such a specialization exists to provide animal products to agricultural societies (Bates and Lees 1977; Khazanov 1994, 2009; Potts 2014; Sahlins 1968). In this setup, pastoralists occupy territory that is marginal from the agriculturalists' perspective: either of insufficient water resources for growing crops or farmed land left fallow in between cropping cycles. There is little doubt that such economic arrangements between farmers and pastoralists exist(ed) ethnographically (Soucek 2000:43; Tapper 1991), but translating these formations backward into history can be a dubious exercise, and extrapolating them even further back into prehistory may be altogether illogical (as many of the same scholars have argued themselves, see Khazanov 2009:122-123 and Potts 2014:40-46). The underlying premise, nonetheless, is that pastoralism in its own right is a deficient subsistence base, and the dietary needs of pastoralists can only be met by incorporating agricultural foodstuffs (usually cereals) (Bar-Yosef and Khazanov 1992; Irons 1979; Khazanov 1994, 2009; Rowton 1974; Zagarell 1989). Specialized pastoralists depend on cultivators, and whether their supplemental foodstuff is obtained through trade or raid, the result is an economically subordinate role of pastoralism in relation to agriculture.

To the second point, that pastoralism as a general adaptation rather than specific economic specialization is also dependent on agricultural systems, the argument rests on the perceived limits of pastoral production. As Makarewicz (2013) comments, the domestication of herding stock is generally viewed as the upper limit of pastoral technological improvement, in

contrast to agriculture which can seemingly be improved *ad infinitum* with tinkering changes to irrigation and plowing systems, fertilization, and multi-cropping techniques. Both Bates and Lees (1977:831) and Khazanov (2009:119-120) subscribe to this viewpoint, arguing respectively that in history and prehistory the only way to intensify pastoral production was to increase herd size and utilize more territory for grazing, practices they see as ultimately constrained by the household nature of pastoral production. Following similar logic for a modern ethnographic example, Shul'zhenko's (1954:22-23) observation that Mongolian pastoralists did not practice selective breeding or water and fodder storage was taken as summary evidence that Asian pastoralists in general did nothing to intensify production and were thus subject to the vicissitudes of their natural environment (see also Krader 1955). Each of these writings discounts the body of work citing the deep working zoo-ecological knowledge utilized by pastoralists, as well as the various social strategies employed to improve herd outcomes (Bold 1996; Fratkin and Smith 1994; Glatzer 1996; Tapper 1991).

In discussion of sedentary-mobile interactions, however, pastoralists are not simply presented as economically dependent on agricultural groups, but are borrowers in material and ideological realms as well. Nomadic pastoralist communities in particular are often said to be half- or part-cultures (Ferdinand 2003:201; Kroeber 1947:323), and presented within the perspective that these are specialized economic groups subsumed within an agro-pastoral economy, their lack of originality (as it were) is not surprising. Yet, non-specialized pastoral groups are not granted any semblance of cultural autonomy either. As Khazanov states, the culture of "pastoralists of the Eurasian steppes in the Bronze Age…were identical to the corresponding cultures of sedentary agriculturalists…*because* they were a component part of societies with complex pastoral-agricultural economies" (1994:93, emphasis added). The

scathing commentary of Potts also clearly lays out his belief that "nomadism in Iranian prehistory is, in my view, an illusion", although specialized "herding…was part and parcel of village life" (2014:41). If neither specialized pastoral strategies nor generally-adapted pastoral pursuits can facilitate the independence of pastoral from agricultural communities, there would seem to be yet another implicit assumption about the (this time socio-cultural) deficiency of the pastoral existence, as well as the suggestion that economic independence is *the* critical undercurrent in inter-group social and cultural distinctions. And yet, if a fully mobile lifestyle facilitated by horse husbandry is the key distinction for both Khazanov and Potts in identifying nomads as opposed to (specialized) pastoralists (as it is for others, see Fluere and Peake 1928), then we are caught in a trap of logic. If pastoralists operating within complex agro-pastoral economies cannot be socio-culturally extracted from sedentary communities until they become fully nomadic, it is precisely this nomadic pastoral specialization that renders them incapable of economic, social, and cultural independence. In sum, pastoralism – in any form imagined from prehistory onward and in any degree so defined – is understood as lacking self-sufficiency and therefore must articulate with a sedentary agricultural way of life (Khazanov 2009:120; Alizadeh 2009:129).

From the framing of pastoralists – in both specific and general terms – as having limited economic and cultural potential, their capacity for accumulating surplus, material wealth, and social credit are also capped. This effectively ostracizes pastoralists from scholarly discourse on the development of socio-political complexity and civilization as it is formulated in Western academic thought (Houle 2006). Across the Old World, agriculture is seen as providing the material surplus necessary for the accumulation of wealth, social prestige and power, and organizational and productive specialization (Mann 1986). Within these frameworks, pastoralists

and pastoralism are presented as fundamentally deficient, so that their existence flows from either direct or indirect association with sedentary agricultural groups. For example, materials and foodstuffs are gained through exchange or thievery, and ideological and socio-cultural systems are buttressed by contact. The essential problem of this perspective is that it relegates pastoralism to a static position in their relationships with other groups, divorcing human interactions from the social realm that makes them *human*. Pastoralists are left eternally stuck at the bottom of an economic and social hierarchy with no practical material or ideological means for higher-level cultural contributions. In dependency paradigms, agency and innovation are implicitly rooted not in social space, but in physical loci, and the basis for social authority is ultimately subordinate to control over an agriculturally-centered geography.

2.4.2 Diffusion Models

Diffusion models are not wholly separable from dependency models (nor vice versa), but I heuristically draw the line along passive vs. active behavior. While it is demonstrably not the case that "dependency" proponents view pastoralists as automatons acting without any degree of control or choice in their daily and seasonal activities (Khazanov [1994:117, 229], in fact, argues that pastoralists were "active" adapters), I read pastoralists' communal inability to move out of the 'invisible periphery' in dependency models as passivity. This notion is well encapsulated in Wink's (2001:295) statement that the nomadic world produced no institutions that could be maintained in the sedentary world, and thus has made no lasting contributions to sedentary society. While Wink or others might here shield themselves with semantic maneuvering that distinguishes nomads from pastoralists, blanket statements such as this belie a deep-seated

perception that sedentary farmers and mobile pastoralists are structurally unequal actors in the developmental trajectories of socio-economic institutions.

Diffusion models, on the other hand, tend to imbue pastoralist communities with a degree of active agency, and I view some of the Inner Asian state models as examples of this (Barfield 1989; Lattimore 1979). Using the agricultural, village-based Han Chinese and nomadic pastoral Xiongnu confederacy as the classic case study, the dynamic contrast between civilization and nomads has been used to explain Inner Asian history for half a century, whereby complex polities on the steppes are thought to have emerged in response to the consolidation of Chinese authority to the south (see Barfield 1989, 2001b, 2003; Lattimore 1992 [1940], 1979; Teggart 1939; see Honeychurch 2015 for more critical discussion of this view). Barfield dubs these nomadic states "shadow empires" (2001b), since they arose in tandem with Chinese states so as to stand equal in terms of military and political authority and foreign policy. The stability of nomadic empires like the Xiongnu is argued to have relied on extorting huge wealth from China, which on the nomadic side enabled elite monopolies on the highest levels but were organized by indigenous redistributive structures and loyalties at local levels. The unity of such imperial confederations, it is argued, thus waxed and waned in response to China's centralization and autocratic structures (Barfield 2001a:235-236).

The mobile pastoralists in these models effectively borrowed their socio-political complexity from agriculturally-based states and reshaped it according to their structures, so I see this as a form of diffusion rather than dependency. Although at its foundation there is the idea that complex nomadic polities did not possess the economic resources to enable long-term authoritative forms (Barfield 2001a), here mobile pastoralists are independent socio-cultural units with the autonomy to recast their role relative to agricultural societies with whom they were

interacting. Following this pattern are a number of studies crediting sedentary agrarian communities as the main economic catalysts and inspiration for innovations among pastoral groups operating on their fringe (Adams 1974; Golden 2003; Khazanov 2001, 2005).

To exemplify similar agentive action on a much smaller scale, we might recognize certain scholars' observations of pastoralists' desire to settle as the diffusion of settled ideals. Such notions emerged at least as early as the 14th century AD, when the Arab historian Ibn Khaldun remarked in his political ethnography, *Muqaddimah*, that:

> Urbanization is found to be the goal to which the dweller of the rural areas aspires. Through his own efforts, he achieves his perceived goal. When he has obtained enough to be ready for the conditions and customs of luxury, he enters upon a life of ease and submits himself to the yoke of the city. (2004 [1377]:224)

In both the large-scale example of Inner Asian nomadic confederacies and the small-scale examples of pastoralists settling to become sedentary farmers, although the behavioral changes and social repositioning were ostensibly enacted by the pastoralist(s), their agentive power is nonetheless circumscribed because it emanates *from their contact with agrarian-based social units*. On the societal scale, mobile pastoralist groups are not seen as having any need to maintain a centralized, complex social hierarchy, and moreover are not seen as capable of self-organizing beyond a certain threshold without the external pressure created by contact with agrarian states. On the individual or household scale, mobile pastoralists are viewed as living on the margins of subsistence, constantly exposed to the risk of starvation, and once exposed to the stability of settled farming will opt for this way of life.

One alternate formulation of sedentary-mobile interaction, which would on the surface appear to overcome the circumscribed agency of mobile pastoralist action, is the positioning these groups as the middlemen of cultural and technological transmission between land-based

states (Chase-Dunn et al. 2010; Christian 2000; Hall 1991). However, it still leaves mobile pastoralists as essentially vectors in a network system where the nodes are fixed, agriculturally-based population centers. In this way, mobile pastoralists still cannot be on par with sedentary farming groups, because they do not have the same sort of agency within the conceptual or analytic scheme. Moreover, this would mean that local interactions occurring between groups of mobile pastoralists were somehow not operating the same way as those between mobile pastoralists and sedentary villages. Why should we believe that these interactions were somehow less important or fundamentally different to the Eurasian trajectory?

2.5 Eurasian Interaction Models in Theoretical Context

As our collective knowledge about mobile pastoralists grows in regions across the world, but especially in prehistoric Eurasia, the dependency and diffusion models presented in the previous sections fit increasingly less well with the archaeological evidence for sedentary-mobile interactions. The basic division of "the steppe and the sown" (Fluere and Peake 1928) has figured prominently in Eurasian and Central Asian research, even in the face of much documentation that such stark polarizations are inaccurate in terms of the lived experience of people across the region. Eurasian nomads, it seems, by accident of archaeology (disperse material remains), history (the lack of their own written accounts of themselves), geography (occupation of non-cultivated lands), and academic thought (colonialist and orientalist paradigms), have been allowed to represent the antithesis of sedentary communities.

Archaeological, ethnographic, and historical scholarship in Eurasia continues to reveal the numerous and nuanced ways mobile pastoral and sedentary groups interact, highlighting the

fact that drawing an immutable distinction between these groups is at best an oversimplification and at worst a misrepresentation of reality. In terms of origins, accumulating archaeological evidence from the Eurasian steppe and southern Central Asia (including parts of south Asia) shows that mobile pastoralism often developed and existed as a stand-alone economic strategy, not directly derived from the economic or cultural inputs of settled agricultural communities as it appears to have done in the greater Near East (Shishlina 2001; Vinogradova 1994; Young et al. 2008). In current Eurasian scholarship, the role of mobile pastoralists in exchange networks is often used as a key index for assessing centralized control of resources and power, although here it is also possible to recognize the prioritizing of the agricultural and physical over the pastoral and social. Koryakova and Epimakhov (2007) have argued for the coalescence of power in agrarian communities in Bronze Age Eurasia, a model that places sedentary communities at the seat of either heterarchically (Epimakhov 2009) or hierarchically (Anthony 2009) organized systems that incorporated peripheral mobile pastoral groups. In southern Central Asia, Sariandi (2002, 2005, 2007), Salvatori (2008a), and Hiebert (1994a) argue for a model of centralized control in at least a portion of late 3rd – early 2nd millennium BC Murghab landscape, both in terms of socio-political power and manipulation of resources (see below Section 2.5.1, and Chapter 3).

Because of this discrepancy between archaeological and ethnographic observation of sedentary-mobile interaction and the theoretical models used to explore them, a number of scholars have started to move away from models that are inherently grounded in physical space, and to ask questions about interaction that are more properly rooted in social space. There is a danger here, however, of moving too far in the opposite direction, and ignoring the physical world at the expense of the social one. And though all models are at the very best simplifications

of reality, the trick is to find a model or theory that allows both physical and social relationships to affect the way people operate in their world. This is not a new idea in archaeology (Dobres and Robb 2000, 2005; Llobera 1996), but in Eurasian archaeology it has proved difficult to merge physically-rooted, object-rooted, and landscape theory into something that usefully informs archaeological practice and the questions we ask of our datasets. The problem becomes especially more pronounced when we look at how material culture and theories intersect in the case of cross-cultural interaction between sedentary agricultural and mobile pastoral communities, as in the case study presented here for the late 2nd millennium BC in southern Central Asia.

2.5.1 Prehistoric encounters in southern Central Asia

The archaeological record of the Murghab Delta in southern Turkmenistan is currently interpreted using two distinct material culture assemblages that existed side-by-side throughout the Late and Final Bronze Ages (1800–1350 BCE). These two sets of remains are distinguished by ceramics, architecture, and site location (Cattani 2008a; Salvatori 2008a), and are generally associated with the agrarian Bactria Margiana Archaeological Complex (BMAC), or Oxus Civilization, on the one hand, and ambiguously defined "steppe" pastoralists on the other. The BMAC describes the first integrated urban culture to appear in Central Asia and the earliest known occupation of the Murghab Delta (Kohl 1981, 1984; Masimov 1981; Salvatori 2008a; Sarianidi 1981). It is characterized by a regionally unique material cultural assemblage and large fortified settlements dependent on agriculture (Hiebert 1994a; Kohl 1984; Moore et al. 1994; Sarianidi 1984). The presumed occupation of the Murghab Delta by mobile pastoralists during the late BMAC period (that is, the Late Bronze Age, ca. 1800–1550 BC) is based on the recovery

of small ceramic collections and ephemeral architecture that are stylistically similar to those of Bronze Age mobile pastoral groups in the Tien Shan and Pamir mountains, part of the so-called Andronovo cultural complex (Cattani 2008a; Cattani and Genito 1998; Cerasetti 1998; Kutimov 1999, 2014; P'yankova 1994, 2002; Vinogradova 1994). Interaction between BMAC communities and mobile pastoralists is presumed from the spatial overlap of these two quite distinct assemblages. The theoretical consequences of possible mobile-sedentary interaction has engendered a good deal of scholarly debate (Hiebert 1994a; Kohl 2007; Lamberg-Karlovsky 2002, 2003; Masimov 1981; Masson 2002; P'yankova 1994; Sarianidi 2007), though to date little direct archaeological evidence has been marshaled to evaluate or characterize this relationship in any precise way (a principal aim of the data presented in Chapters 4-6).

We can fruitfully understand the phenomena of the later BMAC period as the result of one of the first protracted periods of interaction between sedentary agricultural and mobile pastoral groups. A traditional dependency or diffusion perspective might hypothesize the pastoralist groups as an outgrowth of the BMAC communities themselves, something like a population subgroup of specialized producers. However, the currently available archaeological data does not support this model, as there are no material cultural antecedents for this distinct new assemblage to be found within the BMAC remains, and the appearance of distinct ephemeral sites and their material begins only in the Late Bronze Age, that is, well after the establishment of a productive BMAC agricultural system. Given this, and the clear ceramic affinities between this new cultural assemblage and "Andronovo" steppe pastoralists, the current data is in line with an alternative model that recognizes non-local groups of mobile pastoralists moving into the Murghab alluvial plain during the later Bronze Age (Anthony 2007; Kohl 2002; Kutimov 2014).

At the same time as many issues in BMAC research are intensely debated, scholars seem to agree that the increasing presence of mobile pastoral groups in the Murghab landscape during the Late and Final Bronze Ages (ca. 1800–1350 BCE) marked a significant shift in the organization and stability of farming settlements of the BMAC and following periods. There is a correlation between the first appearance of peripheral settlements exhibiting steppe "Andronovo"-style coarseware within the BMAC landscape around 1700 BCE (Cattani 2008a:143-145; Cattani et al. 2008:43) and a disintegration of the BMAC socio-political system that had been in place ca. 2100–1800 BCE. However, to date, the lack of substantial archaeological investigation in contexts other than the large BMAC sites has created a situation in which we can really say very little about the nature of mobile-sedentary or any other local relationships during this pivotal period (see calls in Lamberg-Karlovsky 2003 and Kutimov 2014 for addressing this problem). Debates remain over whether mobile pastoralists directly caused the collapse of the BMAC system, by siphoning off the resources of the BMAC communities or antagonizing them directly (Kuz'mina 1964; Kuz'mina and Lyapin 1984; Marushchenko 1956:9; Pumpelly 1908:49; Vinogradova and Kuz'mina 1996:35), or if interaction in the BMAC was a largely peaceful catalyst for socio-political change (Kohl 2002; Kutimov 2014; P'yankova 2002; Salvatori 2008a; Sarianidi 1975), which may have even generated the local "Yaz" Iron Age cultural complex (see discussion and references in Kutimov 2014).

2.6 Non-spatial Models as Departures from Dependence and Diffusion

One important step in moving out from the shadow of dependency and diffusion models in Eurasian studies has been the recognition that polities organized around mobile pastoral social

units operate differently than those primarily composed of sedentary farming communities. J.D. Rogers summarizes this point well, saying:

> These [nomadic] polities emerged, existed, and collapsed in ways that often defy conventional understandings of what constitutes early complex societies. Such hallmarks as sedentary populations, cities, complex bureaucracies, defined territorial boundaries, and agriculture, so typically associated with early states, play less conspicuous roles in Inner Asia. Instead, mobility, scale, extralocal interactions, nonfixed property, dispersed aristocratic control hierarchies, and the economics of multiresource pastoralism serve as alternative foundations for these complex social systems (2012:206)

This line of thinking, now well-rooted in studies of Eurasian history, represents an important shift in the way social power is differently conceived of and maintained across agrarian-based and pastoral-based social configurations (Beckwith 2009).

Flexibility is the characteristic that most distinguishes the social configurations of mobile pastoralists from those primarily founded on village-based agriculture. Especially at larger scales, on the order where historians and archaeologists typically recognize organizational and material standardizations as belonging to a particular culture or civilization (e.g. the Indus Civilization, etc.), the degree of flexibility found in mobile pastoral institutions tends to be characterized as a lack of coherence and "real" culture.

To this end, M. Smith (2005) questions the traditional visualization of ancient polities as colored "blobs" on a map and the impression they give of a uniform political geography. She suggests instead a network map composed of nodes and lines, where nodes represent the punctuated, archaeologically-documented landscape of social/economic/ political/cultural investments (habitations, resource locations, ritual centers), and lines represent the archaeological connections we can draw between them (roads, trade relationships). For the Inca, Sassanian, and ancient Mauryan (Indian) domains, such a re-mapping seems to accord better

with the reality of their political hegemony, where empty spaces (zones of little investment) certainly did exist, and suggests that socio-political authority and indeed what we recognize as a coherent archaeological culture need not be rooted in contiguous and static forms of territorial control.

Smith's alternative mapping of ancient states is not directly targeted toward Eurasian mobile pastoralists, but it does highlight the way seemingly monolithic regional-scale institutions can exhibit flexibility at local scales and be organized in non-uniform ways across geographic and social space. In Eurasian historiography, scholars have gone even further, removing – or at least uprooting – physical territory as the basis of socio-political authority, and re-establishing its foundation in social negotiation. Honeychurch and Amartuvshin (2007) thus locate power in Iron Age Mongolia in dynamic, shifting relationships, where mobile pastoral leaders are able to call up and engage in social relationships across levels. Similarly, Stride et al. (2009) argue that in medieval Uzbekistan authority and power were tied not to any particular place, but in the ability of leaders to negotiate a shifting structure of social relations. Here, we find that socio-political authority is not physically grounded in a stalwart maintenance of territorial control, but rests in fluid social maps. Likewise, the flexibility of mobile pastoral social order is not restricted to human engagements, but extends also to the physical world, so that objects are imbued with transferable and reconstitutable meaning (Canepa 2010; Empson 2007).

Thus, flexibility is now being recognized as a key aspect of culture, one often mis-recognized as demonstrating a lack of coherence. This emphasizes the need for a new conceptual model of interactions characterized by variability rather than static relationships, and this has indeed been taken up by historians and prehistorians in Eurasia and elsewhere.

2.6.1 Social Fields, Institutions, and Networks

P. Kohl (2008) discusses the concept of social fields as a useful one for Eurasian prehistory, where it is a general framework of thinking rather than a specific testable model. He argues that the material objects that form the archaeologist's bread-and-butter provide ample evidence of the macro-level sharing of goods and technologies, and can be marshalled toward creating prehistoric narratives focused on interaction (ibid 2008:500). Kohl, like many other archaeologists working in Eurasia and beyond, stresses that interaction patterns are encoded in the archaeological record, even if distributions of certain material culture are not necessarily self-evident reflections of the nature of social relationships or the ideological meaning encoded in the objects themselves (ibid 2008:498; also Brughmans 2012; Jervis 2011; MacEachern 1998). Similarly, Lamberg-Karlovsky (1989:261-262) suggests the repeated, complex iconography that appears on chlorite bowls from across the Iranian plateau and adjoining areas (Mesopotamia, the Indus Valley, and southern Central Asia) in the later 3rd millennium BC is indicative of a regionally-shared "grammar of meaning", which might index a unifying ideology against otherwise diverse local cultures[5]. For more recent periods of Eurasian history, Canepa stresses the significance of intercultural contact as the interstitial space in which the meaning of objects can (actively) be transformed (2010).

Frachetti's presentation of "nonuniform complexity" (2009, 2012) builds these notions of shared social fields, grammars of meaning, and transformative significance into an operational model. He has taken a network approach, but one that operates in social rather than physical space, envisioning heterogeneous nodes as various social groups, linked by shared cultural or behavioral norms. He calls these norms "institutions", and social groups (ie nodes)

[5] For an ingress into the body of literature regarding the so-called "intercultural style", see Winkelman 2005.

simultaneously subscribe to multiple overlapping institutions across the political, economic, and ideological realms. Importantly for the model, institutions can be materialized in physical forms (an artistic convention or a particular class of artifacts) that can be traced in the archeological record, and as social groups participate in diverging sets of institutions, they create a lattice of non-uniform connections and material expressions (Figure 2.2). While some social units may share a broad set of institutional expressions (a cluster we may recognize archaeologically as a 'culture' or 'civilization') others who are nonetheless just as intimately and crucially involved in the overall network structure may only share one or two institutions – these are the flexible, mobile groups so often placed on the periphery of our civilizations.

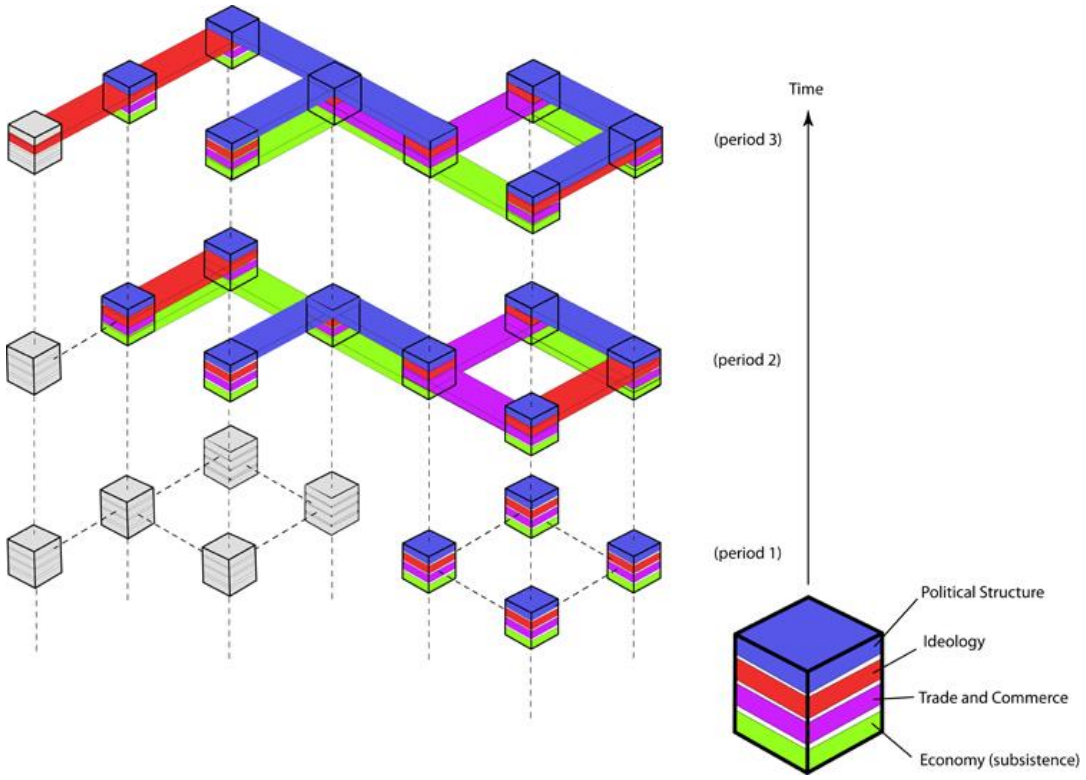


Figure 2.2: Schematic of the nonuniform complexity model proposed by Frachetti (2009, 2012). Image from Frachetti 2012: Figure 6 (Copyright © 2012, The University of Chicago Press).

Nonuniform complexity thus offers archaeologists wrestling with interactions in prehistoric Eurasia a model for decoding material patterns across vast stretches of physical space without resorting to hegemonic forces directing production and/or trade. Through this framework, the common occurrence of chariots, horses, specific metal objects, and domesticated wheat found in burials across prehistoric Eurasia can be read as evidence for a shared ideological institution that associates these items with social prestige and power, even if the specific personal meanings inscribed to them at the time of internment are not now available to us (Frachetti 2009; Frachetti et al. 2010; Frachetti and Bullion *forthcoming*). The model can also accommodate the transformation of meaning in both directions among participants, such as the way urban centers were reconceived among steppe nomads in Mongolia as "central places" tethering people to social rather than physical space (Honeychurch and Amartuvshin 2007), and the way chariots (and related technologies and perhaps people) from the eastern Eurasian steppe were assimilated into Shang-period China starting ca. 1250 BCE (Shelach-Lavi 2015). Following this, if in other parts of the world convergences of technologies, materials, objects, and meanings are used as indices of social complexity, we can begin to see how the nonuniform model explores complexity in novel ways. Pastoralists are neither outside the realm of civilization, nor are they tucked within as some sort of invisible undercurrent we can never hope to elucidate.

The myriad local expressions we see in prehistoric Eurasian mobile pastoralism can thus be explained by nonuniform complexity as purposeful, even calculated adaptations to given social connections and circumstances (Frachetti 2008a; Houle 2009; Woodfin et al. 2010). Accounting for the archaeological record as it does, this model is perhaps one of the best we currently have to explain Eurasian prehistory and the link between localized and 'global' material expressions. Importantly, the framework of institutions and networks found in

nonuniform complexity also provides a way of stepping out from under the shadow of dependency and diffusionist paradigms, positioning sedentary agricultural communities and mobile pastoral groups on the same playing field, rather than adjacent or superimposed ones. In this model, divergent local responses are not isolated, disconnected aberrations that mar our ability to identify civilization or developmental trajectories, but are critical components relevant to the functioning and structure of the entire network. If we can observe that power dynamics do not fall neatly along the cleavages defined by urban agricultural communities and mobile pastoral groups, then we must avoid being conceptually hemmed in by a way of thinking that is fundamentally driven by the kinds of relationships and interactions that define agrarian states (Honeychurch 2015).

2.7 Participation

The multi-layered, multiscalar networks of nonuniform complexity are an effective means of explaining the simultaneous convergences and diversity of archaeological material in prehistoric Eurasia, and provide an important conceptual bridge between empirical archaeological evidence and the macro-narratives of prehistoric interaction. P. Kohl (2008) sees the creation of such conceptual frameworks as the laudable and necessary task of archaeologists (in this instance achieved using some of the same archaeological materials featured in his discussion of social fields – wheeled vehicles and metals). He also contends that effort spent on interpreting the symbols, beliefs, and ideologies of the people behind the archaeological record are often wasted, since the meaning of physical objects are at best polyvalent in the absence of explicit, corroborating written reference (ibid:498). Nonuniform complexity, though, embraces

the polyvalent, simultaneous, and transitive meaning of archaeological objects in its broad, aspatial mapping of interactions, but it has been criticized for its lack of explanatory power at the most granular level of archaeology (Comments by Hanks and Doonan, in Frachetti 2012:23-24). The scholarly community of Eurasian prehistorians (and historians), thus, are not limiting themselves to describing the technologies, environments, and subsistence and exchange economies of the past, but are wrestling already with the issue of *participation* – how were broad scale institutions initiated, (re-)shaped, and made meaningful as they spread across social and physical space?

Participation addresses the link between the two scales at which archaeologists have direct access to the past: the activities and practices of daily life, experienced at a particular place and time, and the broad-scale temporal and spatial patterns of material remains. Participation is the conceptual fiber that joins practice and institution; it leverages materials and the human manipulation of their display, use, and production as entry points for addressing the social negotiations of groups across multiple scales. Such scalability is especially important for understanding interactions in Eurasian prehistory, because characterized as it was by a high degree of physical mobility, social connections were necessarily negotiated and maintained across physical space through tangible embodiments of human relationships (examples include Honeychurch and Amartuvshin 2007). By foregrounding the human relationships that underlie archaeologically recognizable networks of material connections, the concept of Participation accounts for the simultaneous and overlapping meanings of objects, articulating the relationship between the site or object (meaning-in-the-moment) and the broader spatial or temporal context (meaning-in-process).

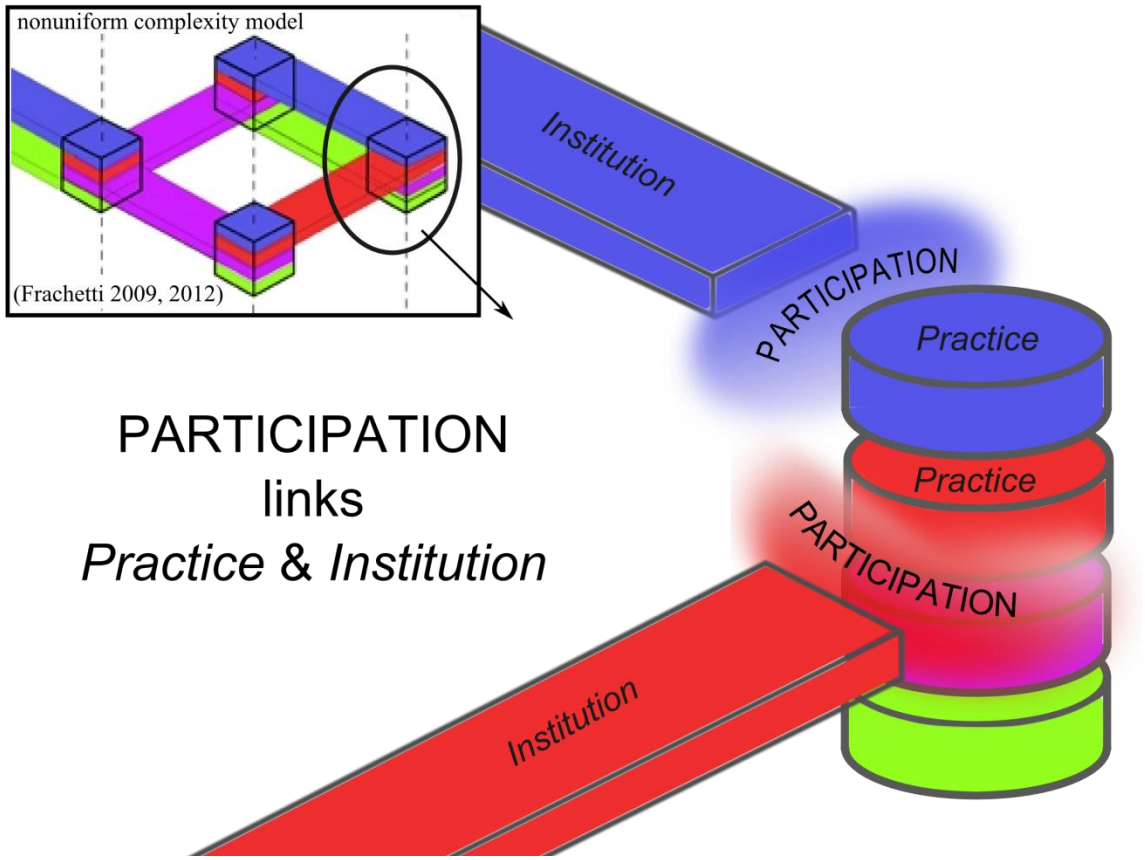


Figure 2.3: The concept of *participation* as proposed in this study.

Meaning and materials are inextricably connected, even if the relationship is not always easy to decipher (Canepa 2010). Recent developments in the archaeological application of Agency Theory and Actor Network Theory acknowledge that people shape objects and objects shape people in a dialectical relationship (Dobres and Robb 2005; Knappett and Malafouris 2008), though this is certainly not a new idea across the humanistic and social sciences (Appadurai 1986; Castells 2000; Latour 2005). For mobile pastoral societies scholars have discussed a tendency for objects to "contain" rather than "stand for" social relationships, allowing them to be enacted in the absence of shared physical space (Empson 2007). Thus, it is the human engagement that imbues meaning to any physical object or space, and underlying that mutual participation is the constant negotiation demanded in human social relationships. Like

social relationships, then, the meaning of things can be multi-layered, simultaneous, contradictory, fleeting, alterable, eroded, severed, and reconstituted.

Participation frames the polyvalent meaning of objects in terms of the nonuniform complexity model proposed for prehistoric Eurasia (Frachetti et al. *forthcoming*), but it addresses more specifically the mechanisms by which people and objects translate and assimilate meaning – through interaction – across scales. If, at the smallest scale, people engage in physically traceable practices (such as making a pot) according to cultural norms determined by their restricted, daily interactions (something like Bourdieu's [1977] "habitus"), then larger-scale *inter*-cultural interactions present opportunities for practices to be meaningfully renegotiated (changing the aesthetic or technological index for pottery-making, in our example). Participation is exactly this negotiation – rooted in social interaction but distinguished by a shared understanding of places, forms, materials, and symbols that balance the legitimacy of agents and their capacity and demand for assimilation. Material reflections of legitimacy and assimilation define the setting for diverse groups to buy-in to broader institutional norms that transcend local social realms. Participation networks are thus reconceived, neither to be represented by static distribution maps of archaeological materials nor the simple reification of cultural forms, but as social processes where engagement and disengagement are constantly negotiated by interactive parties, and lived out at individual, community, and regional scales across time (Frachetti et al. *forthcoming*).

In a practical archaeological sense, how can we recognize Participation? Instances of inter-cultural interaction provide good opportunity to see the process of social engagement and negotiation at work, especially if we are able to look at practices on either side. To this end, the archaeological record of the later Bronze Age Murghab is a tantalizing dataset, since it would

appear to mark the first protracted interactions between settled farmers and mobile pastoralists each belonging to a distinct cultural tradition. Thus, we can examine the ways subsistence strategies or material technologies changed in either or both groups as a result of contact, using Participation as a framework to understand why as well as how interaction shaped the material record. Were objects leveraged to signal group affinity, and were such expressions given through special objects or quotidian materials? Were there convergences, or assimilations of material culture in terms of aesthetic and production practices? Did the prevalence of certain classes of material change through time, signaling a shift in their legitimacy as culturally salient markers? Only through utilizing archaeological material from both farming villages and mobile pastoral campsites can we hope to answer these and other relevant questions about later Bronze Age interaction in southern Central Asia, and only through careful study of social interaction as a process will the outdated and monochromatic notions of "the steppe" and "the sown" be laid to rest in Eurasian prehistory.

Chapter 3: The Physical and Archaeological Setting of the Research

In this chapter I present relevant information about the setting of the dissertation research: the physical setting (landscape, climate, ecology), a brief outline of the previous archaeological research conducted in the Murghab and on the later phases of the Bronze Age in southern Central Asia, and the socio-cultural landscape of these periods as currently understood.

3.1 Physical Setting

Located to the northeast of what is generally conceived of as the ancient Near East, Central Asia covers the contemporary republics of Uzbekistan, Tajikistan, Turkmenistan, parts of Afghanistan, and the northern fringe of the Iranian plateau. The area is bounded by the Caspian Sea in the west, the Kopet Dagh and Hindu Kush Mountains in the south, the desert-steppes of Kazakhstan in the north, and by the Pamir Mountains in the east. Environmentally, Central Asia represents a series of geographic transitions as one travels north from the Iranian Plateau down the rainfed piedmont of the Kopet Dagh range to the arid deserts of the Karakum (Garagum, "Black Sands") and Kyzylkum (Qyzylqum, "Red Sands"), and eventually onward to the desert steppes and grasslands of Central Eurasia (see Figure 3.1). Of course many distinct micro-environments are contained within these broadly-defined environmental zones, shaped as they are by a variety of mountain ranges, deserts, and major and minor rivers; the result is a patchwork of specialized forms of plant and animal life and human adaptations. Of primary interest for the research presented here is the Murghab alluvial fan (sometimes referred to as the

Murghab Delta or erroneously as the Murghab Oasis) located in present-day southern Turkmenistan.

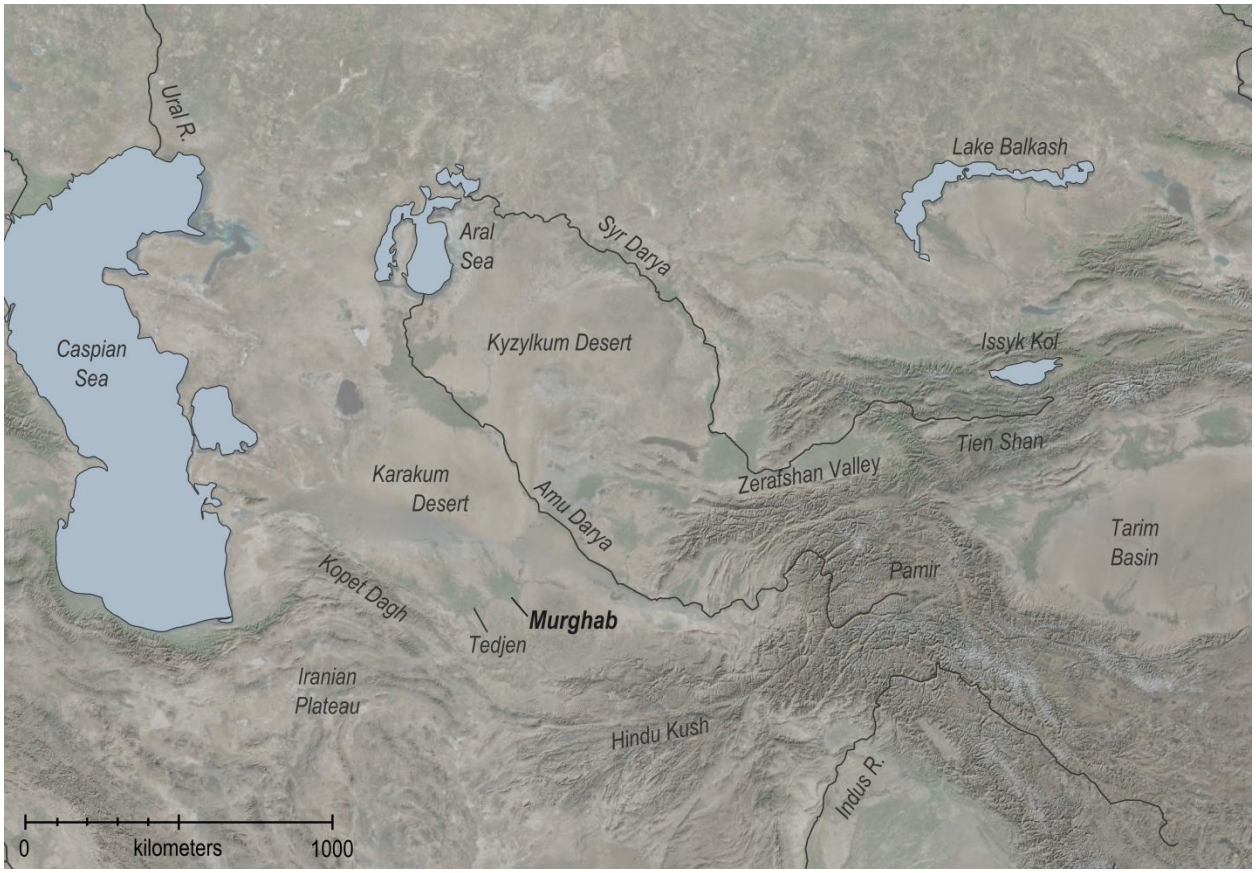


Figure 3.1: Geography and major physical features of southern Central Asia.

3.1.1 Geography and Climate

The territory of modern Turkmenistan sits at the boundary of the Middle East and Asia, and falls within or borders numerous variously-defined regions: the Iranian Plateau, the Aral Sea depression, the Inner Asian mountain chains, and the Eurasian desert and steppe zones. In geological terms, the convergence of different continental plates here produces considerable stress and regular seismic activity into the present day, and studies have suggested that major

earthquakes have tended to occur in the region roughly every 2,000 years across the Holocene[6] (Berberian and Yeats 2001; Hollingsworth et al. 2010). Geographically, Turkmenistan's position near the center of Eurasia results in strong climatic patterns characterized by high solar radiation and temperatures, extreme dryness, and pronounced atmospheric circulation cycles that result in sharp seasonal contrasts (Orlovsky 1994). The eolian desert landscape of the Karakum and its sandy desert flora were stabilized during the Quaternary after the Amu Darya turned north to flow into the Aral depression. During the second half of the Quaternary, the alluvial fan landscapes of the Tedjen and Murghab rivers were formed (Atamuradov 1994:62).

The ancient alluvial plains of the Tedjen and Murghab, along with the central Karakum north of these, are classified within "sand-clay" deserts, characterized by alternating landscapes of sand massifs and clay areas (usually *takyrs*) (Babaev 1994). Within these ancient alluvial formations, there are also patches that can be classified as "clay and loam" formations, where weakly permeable clay and heavy loam deposits sit atop alluvial deposits (Babaev 1994). Of course, within the Murghab, lands currently or recently under cultivation would have to be classified differently. Figure 3.2 presents the geophysical landforms within the borders of Turkmenistan.

Like much of Central Asia, the territory of Turkmenistan is marked by an intercontinental climate that experiences winter and summer temperature extremes (Babaev 1999; Fet and Atamuradov 1994; Suslov 1961). In particular, the geographic position of the country means that interacting atmospheric cycles create a long, stable, dry summer period and a relatively cold, moist, unstable winter period (Orlovsky 1994). Lying within the lowland plains, summers in the Murghab are absolutely dry and exceedingly hot, with daily temperatures often climbing over

[6] "The AD 1948 (Ms 7.2) Kopeh Dagh earthquake that destroyed Ashkabad, capital of Turkmenistan, was preceded by an earthquake in 10 BC±AD 10 recorded at Mithradatkert (Nesa) mound and by an earthquake in 2000 BC recorded at Ak Tapeh mound." (Berberian and Yeats 2001: 563)

50° C (122° F). Winters are cold but mild in comparison to highland plain and mountainous areas, with temperatures that can drop below 0° C (32° F) and be accompanied by light snow. Rainfall in the Murghab occurs primarily in winter and spring, but never in summer, and rarely exceeds 130 mm (five inches) per year. When this is compared to rainfall along the Kopet Dagh range, which can be as high as 350-450 mm (14-18 inches) per year (Miller 2003:127), and desert areas that may go without rainfall for up to ten years, it becomes clear why the availability of water had much to do with the location of early habitation in the region.

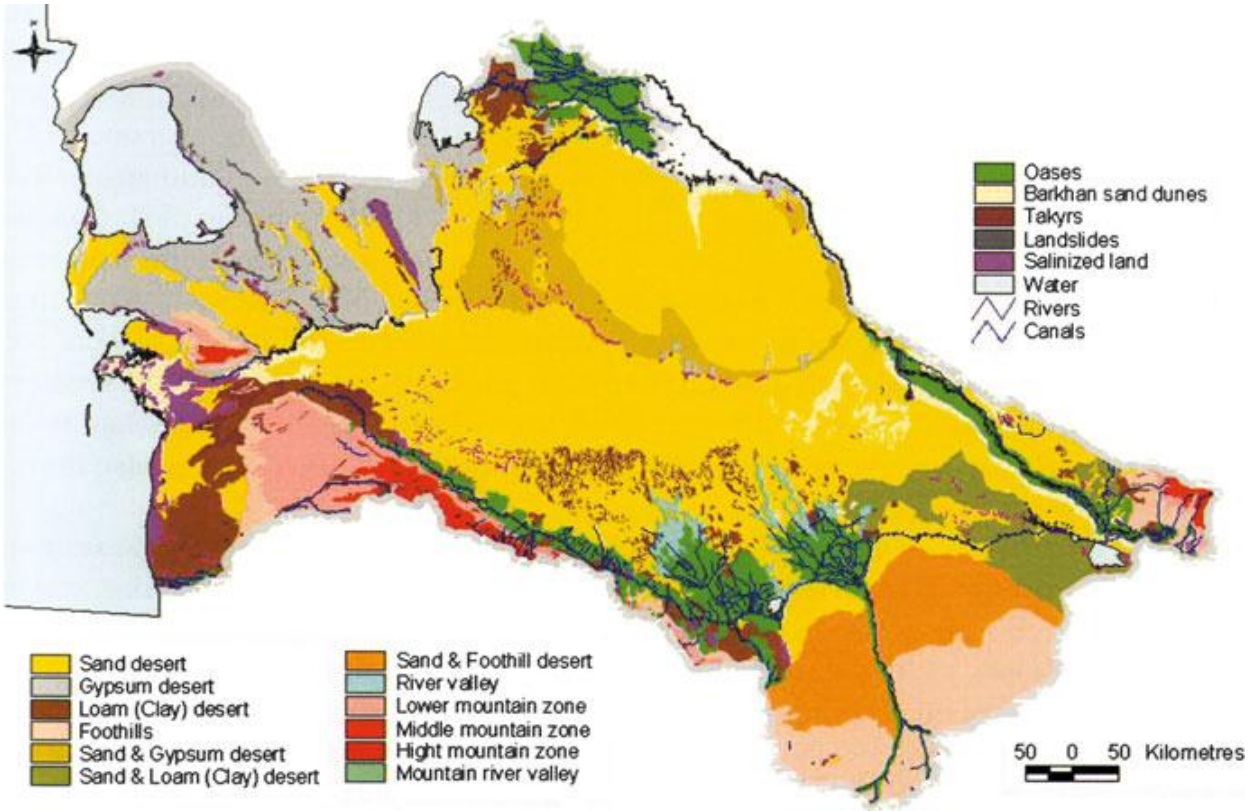


Figure 3.2: Geophysical landscapes of Turkmenistan. Adapted from Rustamov 2014: Figure 1 (Copyright © 2012, Springer-Verlag Berlin Heidelberg).

3.1.2 Hydrology

Throughout the Quaternary and early Holocene, this high tectonic activity and attendant land deformations were influential factors in regular transgressions and water-level changes in

the inland seas of Central Asia (Atamuradov 1994; Kakroodi et al. 2012); moreover, the unique flora and fauna speciation of the region (see below, Section 3.1.3) is related to recurrent isolation events stretching from the Pleistocene (less than one million years ago) to the most recent glaciations (16,000 to 10,000 years ago) (G. Fet ca. 2014). The Murghab alluvial fan is an internal drainage system, or "blind delta", that together with the Tedjen alluvial fan, the Aral Sea, and the Caspian Sea, marks one of several terminal hydrological features in western Central Asia that make up an extremely large endorheic region (Cretaux et al. 2013; Rustamov 2014). The closed Tedjen and Murghab river systems, in particular, occupy the southwest Turan plain, which is filled with the alluvial deposits of these and other river systems (including the Amu Darya) originating in the western Hindu Kush range and flowing generally in a north-northwest direction (Atamuradov 1994; Marcolongo and Mozzi 1998; Zonn and Esenov 2014). The Murghab River is the second largest river in Turkmenistan, and like all of the country's other major rivers it originates beyond the current national borders, in this case in the Paropamisus Range of the Hindu Kush mountains of northwestern Afghanistan. About 350 km of the Murghab River's 800 km total length are located in Turkmenistan (Zonn 2014a). The Murghab River flows to the northwest, forming the ca. 35,000 sq km Murghab alluvial plain before its waters evaporate in the lowlands of the Karakum Desert (Figure 3.3). The Murghab floodplain is part of the 3% of the total land located within present-day Turkmenistan that is suitable for agriculture; of the remaining territory, roughly 80% is desert and 17% is either mountain or stony desert (Babaev 1994; Lioubimtseva et al. 2014).

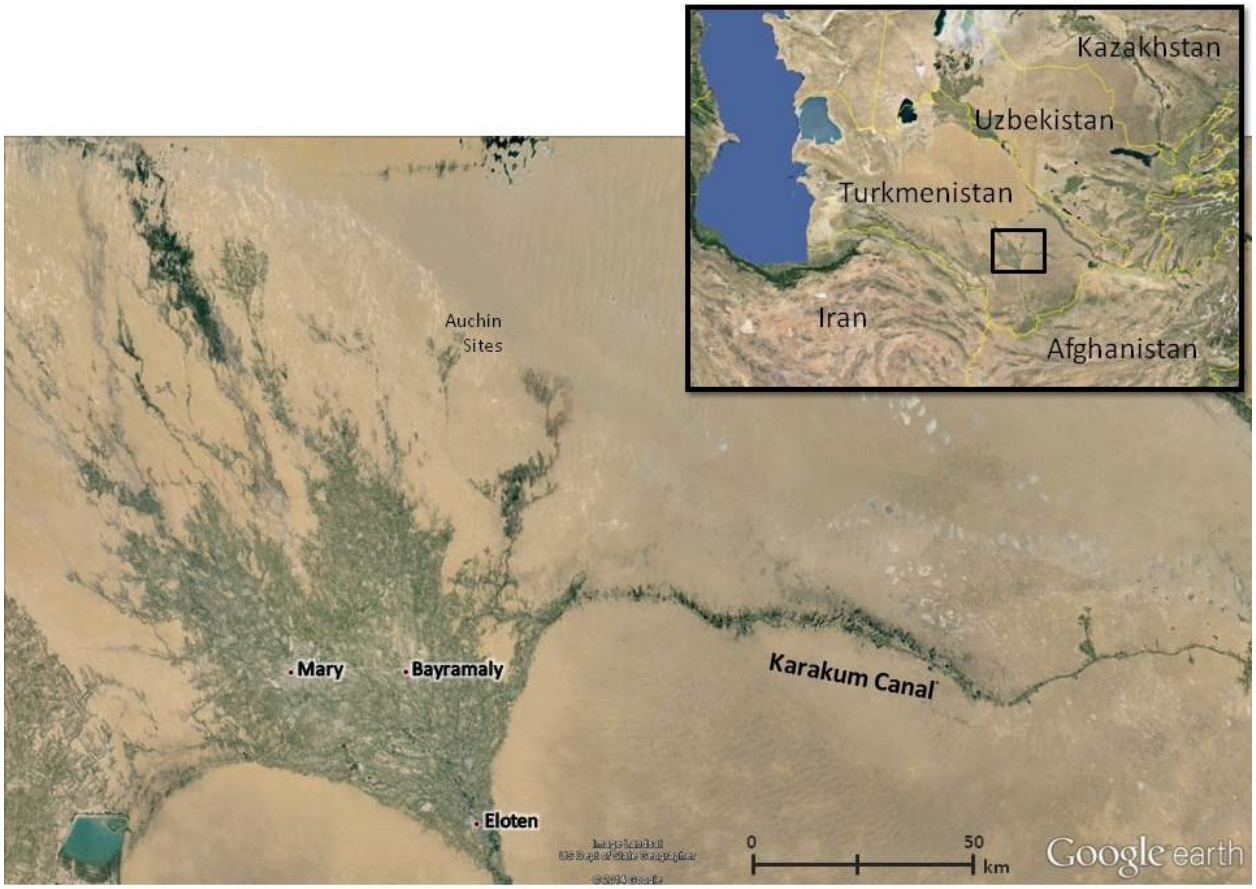


Figure 3.3: A view of the modern Mughab alluvial fan, Turkmenistan. Note the relatively clear boundary between the modern irrigated land (green/gray), the ancient alluvial plain (light tan), and the Karakum Desert (brown), the difference between the last two being especially visible to the northeast of the fan. The modern Karakum Canal enters the alluvial fan from the east, carrying water diverted from the Amu Darya river that today forms the border between Turkmenistan and Uzbekistan. Base images provided by Google Earth (Landsat).

The fluvial plains of the Murghab, Tedjen, and central Amu Darya rivers, along with the Karakum Desert, make up the southwestern lowlands of the Turan plain. The palaeogeography and tectonics of the region manifest in a downward tip of the Turan plain toward the northwest (Rustamov 2014). This regional tilt, along with active tectonics (Thomas et al. 2009), has caused both the Tedjen and Murghab rivers to shift position throughout the Holocene, generally moving toward the west. Fedorovich and Kes (1934, cited in Atamuradov 1994) noted a sequence of four overlapping fan deposits in the distal (northern) Murghab (see also Dolukhanov 1981), and evidence suggests the entire system shifted tens of kilometers to the west during the Holocene as

the combined result of the plain's gradient and the buildup of alluvial deposits (Atamuradov 1994; Marcolongo and Mozzi 1998; Markofsky 2014; Tosi and Cerasetti 2010). Two overlapping conoids are visible through high-resolution elevation data (Figure 3.4), where they are distinguished by slight differences in elevation; the southwestern "Mary" fan is younger than the northeastern "Bayram-Ali" fan and represents a shift in the hydrology that Cerasetti (2012) attributes to the Iron Age (beginning ca. 1300 BCE) (Tosi and Cerasetti 2010).

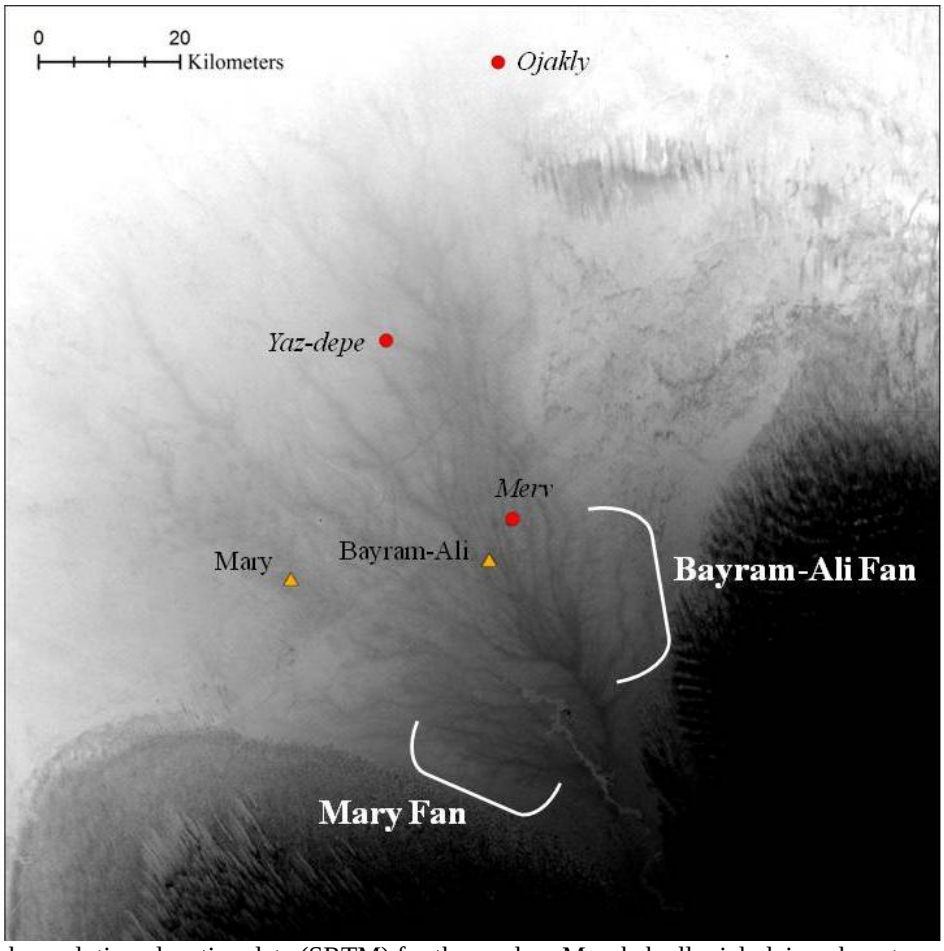


Figure 3.4: High-resolution elevation data (SRTM) for the modern Murghab alluvial plain, where two overlapping consecutive conoids are visible. Modern towns of Mary and Bayram-Ali, and archaeological sites of Merv, Yaz-depe, and Ojakly given for reference.

Alluvial fans in eastern Iran (Walker and Fattahi 2011) and streams in northeastern Iran (Hollingsworth et al. 2010) exhibit displacement by similar tectonic and geo-hydrologic

processes as those presented for the Murghab, although the shifts in the water courses of the Murghab should be considered minor in comparison to those of other Eurasian endorheic fans, such as those found in the Tarim Basin or plains of northern Afghanistan (cf. Tang et al. 2013, Fouache et al. 2012). The Mughab alluvial fan might thus be considered an unusually stable hydrologic environment in terms of its main trunk and channel patterns, even if not in flow rate (Lyapin 1996). This stability is reflected through thick sediment deposits, so that in certain more proximal areas of the Murghab archaeological material may be buried under up to 9 m of alluvial deposits (Salvatori 2007, contra Dolukhanov 1981). Alluvial sediments are deposited in a sequence of shallow descending platforms as one moves north, but the overall elevation changes less than 200 m across the entire alluvial plain and averages 120 MAMSL (Castellani 2001; Cerasetti 2012; Esenov 2014).

For both modern and ancient cities in arid southern Central Asia, rivers are critical in providing reliable natural water sources and productive agricultural hinterland. Even granting some seasonality, the overall stability of the hydrology in the Murghab would have made it an attractive habitation zone for small groups of people, although large population centers could not be supported without irrigation technology to exploit the river system and offset the lack of rainfall. The overall hydrological stability of the Murghab is, however, marked by three noticeable breaks. The first is characterized by a major retreat in the distal reaches of the fan during later phases of the Bronze Age stretching into the early Iron Age (ca. 1400–900 BCE) and may correspond to a broader, regional late Holocene phase of aridization. Another major change occurred during the Achemenid period when natural watercourses were augmented using artificial constructions, re-invigorated channels especially in the Merv area that had been active during the Bronze Age (Tosi and Cerasetti 2010). The third break in Murghab hydrology is a

decidedly anthropogenic event that relates to the modern period of mechanized agriculture, which has substantially altered the hydrological and topographical structure of the Murghab region (Ninfo and Perego 2006). Not surprisingly, both the ancient periods and modern period of discontinuity are marked by shifts in the social dynamics of the region, highlighting the entanglement of human and environmental processes in this arid region.

3.1.3 Ecology (Flora and Fauna)

Turkmenistan's position at the boundary of European, Mediterranean, Middle Eastern, and Asian biogeographic zones, along with its long and complicated geological history, has engendered a unique spectrum of natural ecosystems and abundant local biodiversity within the country's borders (Chemonics International, Inc. for United States Agency for International Development [CII-USAID] 2001; Rustamov 2014). Thus, although it is primarily constituted by desert lowlands, the richness and uniqueness of species and their global rarity have earned the territory of Turkmenistan a place on the World Wildlife Fund's "Global 200" list of ecoregions most critical to preserve for global biodiversity (CII-USAID 2001). In fact, the richest desert complex in Eurasia is formed by the southern deserts of Central Asia (Karakum and Kyzlkum, see Figure 3.1), stretching east from the Caspian to the middle of the Syr Darya (Rachkovskaja and Pereladova ca. 2014). These southern deserts, which include the sandy Karakum and parts of the Murghab alluvial plain not under cultivation, are distinguished from the northern deserts by their higher average annual temperature and aridity, and are home to specifically adapted flora and fauna. Even within the patchwork of agricultural fields, marshes, desert scrub, sand dunes, and takyr (dry clay beds) that characterize the Murghab today, there are niche micro-environments of endemic plant and animal species.

The vegetation of southern Turkmenistan as a whole is characterized by plants adapted to survive on little water (xerophytes). In the deserts, the pattern of long, dry summers means that the dominant plant species are ephemeral, having short green growth seasons generally in March-April; by the end of May many plants have finished their annual growth and remain dormant through the summer months (Rachkovskaja and Pereladova ca. 2014; Rustamov 2014). The formation of specific, localized plant communities is highly dependent on soil type. Sand dunes, or "barkhans", exhibit communities of sandy acacia (*Ammodendron conollyi*, locally called "syuzen") (Rachkovskaja and Pereladova ca. 2014; I. Rustamov 1994). Other sandy desert soils, particularly sandy hummocks, are dominated by white and black saxaul (*Haloxylon persicum, H. aphyllum*), varieties of "kandym" (*Calligonum* spp.), ephedra or "bordzhok" (*Ephedra strobilacea*), "cherkez" (*Salsola richteri*), and sandy acacia or "syuzen" (*Ammodendron conollyi*), which in various combinations form a sparse upper layer of shrubs 1-2 m high (Kharin 2002; I. Rustamov 1994; Rustamov 2014). Semi-shrubs and tall herbaceous plants form a second, lower layer - *Artemisia* spp., *Astragalus* spp., Aristiuda karelini, etc. – with a ground cover layer of perennial sedges (*Carex* spp.) and other grasses (including *Stipagrostis pennata*) (Kharin 2002; I. Rustamov 1994). Soils with more clay content tend to have lower vegetation cover, though still display a range of shrubs and semi-shrubs including black saxaul (*Haloxylon aphyllum*), perennial saltworts (*Salsola gemmascens, S. orientalis*), and sagebrush (*Artemisia* spp., especially *Artemisia kemrudica*); annual halophytes (plants preferring slightly salty water), grasses, and spring ephemers are also found in these communities (Kharin 2002; Rachkovskaja and Pereladova ca. 2014). On thin sandy soils and loamy sands, white salsola (*Salsola arbuscula*) and endemic sagebrush (*Artemisia kemrudica, A. diffusa, A. dimoana, A. arenicola*) communities are common (Rachkovskaja and Pereladova ca. 2014).

The vegetation communities that form around white and black saxaul tend to differ, so that white saxaul (*Haloxylon persicum*) grows as solitary plants 3-5 m high with 10-30% coverage and accompanied by up to 70 different species, while black saxaul (*Haloxylon aphyllum*) tends to prefer areas with closer ground water and slightly salty soils, forming dense thickets together with other shrubs, including varieties of "kandym" (*Calligonum*), milk-vetch (*Astragalus* spp.), Jointfir (*Ephedra* sp.), and saltworts (*Salsola* sp.) (Kharin 2002; I. Rustamov 1994:92-95; Rustamov 2014:13). In the ancient alluvial plains of the Murghab and Tedjen, communities of black saxaul grow 1-1.5 m high and form an ecological transition to desert riparian forests (I. Rustamov 1994:95).

Desert riparian forests, or "tugai", are intrazonal ecosystems that possess a unique vegetation community (Harris 2010:9; Moore et al. 1994:420; Rustamov 2014:17). Here, low-growing trees such as poplars (*Populus euphratica* and *P. pruinosa*) are common, as are salt-tolerant tamarisks (*Tamarix* spp.). Dense thickets are formed that can also include Persian willow (*Salix persa*), Eastern Oleaster or "jidda" (*Elaeagnus orientalis*), reeds (*Phragmites communis*), and many other herbaceous plants (Kharin 2002; Rustamov 2014; CII-USAID 2001). Tugai thickets used to cover more areas of alluvial plains and mountain river valleys, but their coverage has been greatly reduced over the last century through the expansion of farming; they continue to exist as fringe or marginal ecosystems in a few isolated valleys within the Kopet Dagh, and representatives of this vegetative community can be found along the river and irrigation channels of the Amudarya, Tedjen, and Murghab systems (Rustamov 2014).

Not surprisingly, floral and faunal and floral life are linked in the generally arid ecozones that make up Tukmenistan, and like the country's flora, its fauna is diverse and has a relatively high degree of endemism. This is especially true in sandy deserts, where rodents and reptiles are

numerous (Rachkovskaja and Pereladova ca. 2014). Comprehensive biological surveys carried out in southern Turkmenistan during the Soviet period and subsequently have identified 50 species of mammals, 238 bird species, 40 species of reptiles, 2 species of amphibian, and 5,000-6,000 species of invertebrates (E. Rustamov 1994).

Among the most widespread mammal species in the deserts of Turkmenistan are wolves (*Canis lupus*), foxes (*Vulpes vulpes*), long-eared hedgehogs (*Hemiechinus auritus*), and hares (*Lepus capensis*, *Lepus tolai*), along with many endemic species of jerboa (Rustamov 2014:14; CII-USAID 2001). Persian goitered gazelle or "dzheiran" (*Gazella subgutturosa*) have been widespread across all parts of Turkmenistan in the past, but their current population within the country is estimated as not more than 6,000 individuals (Figure 3.5) (Kharin 2002; CII-USAID 2001). Reptiles are especially numerous in the deserts, including such endemic Central Asian species as Horsfield's tortoise (*Agrionemys horsfieldii*), agama lizards (*Phrynocephalus* sp., *Trapelus sanguinolentus*), and many geckos (*Gymnodactylus*, *Alsophylax*, *Cyrtopodion*, *Crossobamon*, *Teratoscincus*) (Rustamov 2014:13, CII-USAID 2001). Other reptiles of the sandy deserts include monitor lizards (*Varanus griseus*, though their numbers are declining) (Figure 3.5) and many sand snakes, including sand boas (*Eryx miliaris*, *E. tataricus*), the steppe ribbon racer (*Psammophis lineolatus*), Iranian saw-scaled vipers (*Echis multisquamatus*), the "gyurza" viper (*Vipera lebetina*), and Middle Asian cobra (*Naja oxiana*) (Rustamov 2014:13, CII-USAID 2001). These last two, "gyurza" viper and cobra, have faced especial threat as they are harvested for their venom, although they are still possible to encounter in the northern Murghab (Figure 3.6). Little Owl (*Athene noctua*), Eurasian Eagle-Owl (*Bubo bubo*), Crested Lark (*Galerida cristata*), Isabelline Wheatear (*Oenanthe isabellina*), and Desert Finch

(*Rhodospiza obsoleta*) are common bird species encountered in the sandy desert (Rustamov 2014:14).

Figure 3.5: Two once-common but now rare species encountered in the sandy desert of Turkmenistan. At left, Persian goitered gazelle or "dzheiran" (*Gazella subgutturosa)* (photo: B. Cerasetti). At right, Grey Monitor lizard (*Varanus griseus*) on archaeological site in NW Turkmenistan (photo: A. Kotlobay).

Within the Murghab, many of the above are encountered especially in the northern fringes of the ancient alluvial plain where modern agriculture has not yet fundamentally altered the landscape and micro-ecology. Here it is still possible to encounter Persian goitered gazelle or "dzheiran" (*Gazella* subgutturosa), tortoise, fox, and Middle Asian cobra (*Naja oxiana*), even if their overall populations across Turkmenistan are declining. The irrigated areas of the Murghab alluvial plain, with their water resources, have made the region an especially diverse bird habitat, with up to 150 different species during a study conducted in the early 1990s (E. Rustamov 1994). Additionally, since the Karakum canal has connected the hydrological systems of the Amu Darya, Murghab, and Tedjen rivers, a number of non-native fish species have colonized the rivers and irrigation canals in these regions (Kharin 2002; Salnikov 1994). Other rare and endangered species that specifically inhabit the Murghab include the marbled teal duck (*Anas angustirostris*, endangered), oriental ratsnake (*Ptyas mucosus nigricens*, endangered), river otter (*Lutra lutra seistanica*, rare, occupying especially the Karakum canal), wild boar (*Sus scrofa*, rare, but may still inhabit tugai refuges), and pink pelicans (*Pelecanus onocrotalus*, rare, observed in winter migrations) (Rustamov and Sopyev 1994:216). The Turanian tiger (*Panthera*

tigris virgate), which used to occupy the tugai riparian forests, went extinct in the mid-1900s, and the Asian cheetah (*Acinonyx jubatus raddei*) and bearded (bezoar) goat (*Capra aegagrus*) have been extirpated from the Murghab since around the same time, though they can still rarely be found in other regions in Turkmenistan (Rustamov and Sopyev 1994; V. Fet ca. 2014).

Figure 3.6: Middle Asian cobra (*Naja oxiana*) encountered in the Murghab, in the vicinity of the archaeological site of Ojakly. Photos: L. Rouse and B. Cerasetti.

The "tugai" riparian woodlands form a unique habitat with mixed desert-aquatic animal species present. This has traditionally been a favored habitat of the wild boar (*Sus scrofa*), but is also the particular home of a number of birds species: the common pheasant (*Phasianus colchicus*), the "shikra" sparrowhawk (*Accipiter badius*), the common cuckoo (*Cuculus canorus*), the pallid scops owl (*Otus brucei*), nightingale (*Luscinia megarhynchos*), and various doves (*Columba oenas, Streptopelia turtur*) and other small sparrow species (Rustamov 2014:16). The scaly-bellied woodpecker (*Picus squamatus*) was once common in the Murghab tugai but due to habitat loss is no longer seen there (Kharin 2002; Rustamov and Sopyev 1994). Tugai reptiles include gecko (*Tenuidactylus caspius*), lizards (*Trapelus sanguinolentus, Varanus griseus*), and snakes (*Coluber* spp.); the semiaquatic dice snake (*Natrix tessellate*) is also

common in the tugais (Shcherbak 1994). There are also a large variety of beetles and other insects endemic to Middle Asian tugai (Kryzhanovsky and Atamuradov 1994; Tokgaev 1994).

3.1.4 The Modern Anthropogenic Landscape

Beginning in the 1950s, major agricultural projects were begun in a number of Soviet states, including the Turkmen SSR. In order to support cotton monoculture in the Murghab region, water was to be supplied from the Amu Darya by way of an enormous irrigation canal (Lioubimtseva et al. 2014; Nesbitt and O'Hara 2000; Zonn 2014b). Construction began during this period on the Karakum canal, which today carries water 1,380 km across the southern Karakum desert and is one of the largest irrigation canals in the world (see Figure 3.2) (Rustamov 2014; Zonn 2014b). The active and expanding agricultural production in the Murghab at present has pushed the natural boundary between desert and croppable land northward by roughly 30-40 km (Cattani et al. 2008), and has significantly altered the topography, hydrology, and localized ecology of the region. Prior to the major Soviet irrigation and agricultural projects, aerial photographs attest that agriculture was more or less concentrated around the population centers of Mary and Bayram-Ali (Cerasetti 2008; Cerasetti and Mauri 2002; Cremaschi 1998; Marcolongo and Mozzi 1998) (Figure 3.7). As mechanized agriculture and related construction continue to affect the modern landscape, the Karakum canal and its contribution to the now well-documented desiccation of the Aral Sea (Cretaux et al. 2013; Lindsey 2014; Lioubimtseva and Henebry 2009) serve as a salient reminder of the profound impact humans have had on the hydrology and landscape of this region throughout its occupied history.

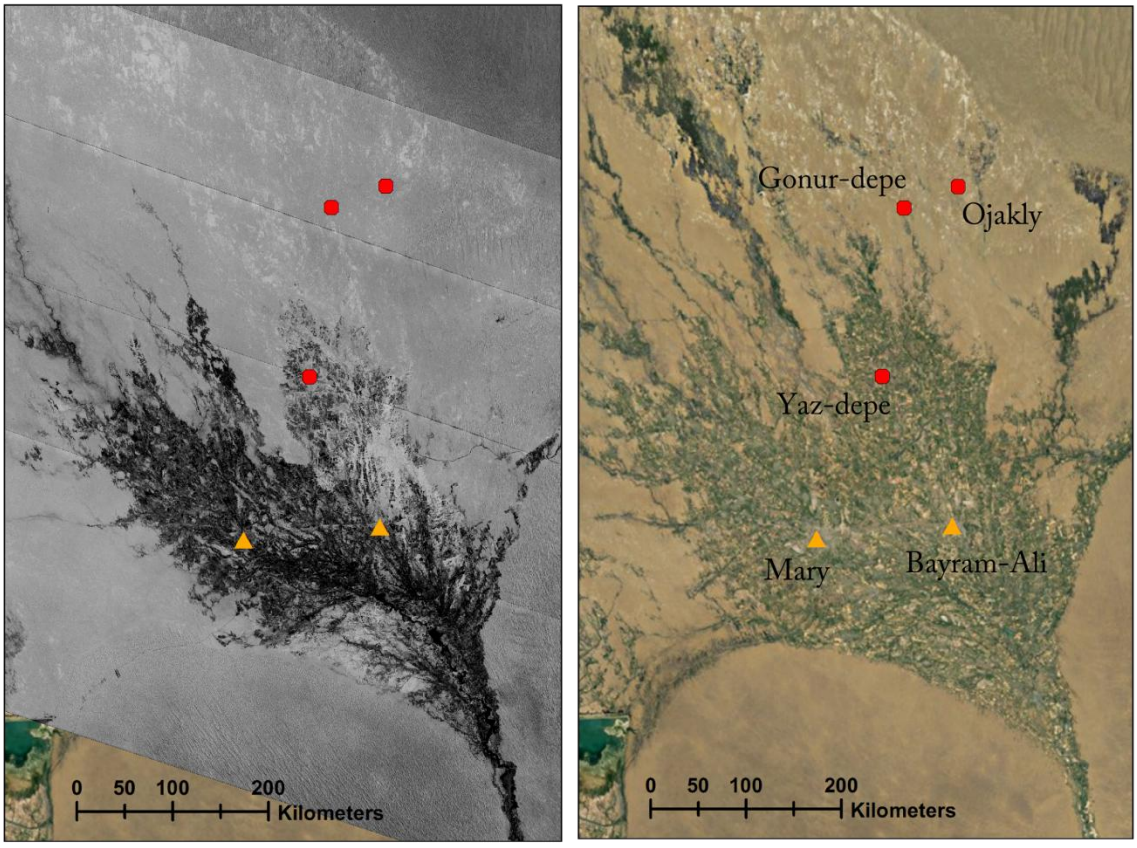


Figure 3.7: Expansion of agriculture in the modern Murghab alluvial fan. At left, 1964 Corona image. At right, 2014 Landsat Image. The same key modern cities and archaeological sites are shown in each image for reference.

All farming in modern Turkmenistan is achieved through artificial irrigation (Zonn and Esenov 2014), and the management of limited water resources in an arid country with little standing water and approximately 80% desert landcover is a key aspect of human use of the landscape. Rainfall in the Murghab averages 130 mm/year (Babaev 1994), a figure Lioubimtseva and Henebry note is significantly greater than it was 60 years ago and probably due to human-induced localized climate change in irrigated oasis zones (2009:966). This fits within the broader picture of climate change and its effects in Central Asia through time, where discrepancies and variability indicate very localized shifts that make broad generalizations troublesome (Djamali et al. 2012; Lioubimtseva et al. 2005; Lisitsina 1981; Orlovsky 1994; Spengler 2014). The empirical study of rainfall effects on vegetation in arid Central Asia by Gessner et al. (2013), for

example, demonstrated the sensitivity in localized responses that would go unseen if climatic changes were viewed at broader regional scales.

In the northern Murghab, eolian sand dunes form a discontinuous boundary between the extreme distal reaches of the alluvial fan and the Karakum Desert proper. The dunes are now largely inactive and anchored by scrub vegetation (Cremaschi 1998; Maman et al. 2011), but exposed in the intervening spaces of their north-south ridges and honeycomb patterns are flat clayey surfaces known as *takyr*, thereby creating a patchy mixed landscape of sand and clay (Babaev 1994; Fleskens et al. 2007; Markofsky 2014). In northern areas of the Murghab in particular, the takyr form patchy, noncontiguous windows into a former alluvial landscape that extended far beyond the current reach of the (now heavily utilized) Murghab River (Cremaschi 1998:16). In these areas, Bronze and Iron Age archaeological sites and palaeochannels can be identified on exposed takyr surfaces. Critically, however, the takyr neither represent the ancient alluvial soils nor equate to palaeochannels, but are themselves the result of later taphonomic surface formation processes.

3.1.5 The Alluvial Landscape of the Late 2nd Millennium BC

Although the loss of the Aral Sea might be considered one of the most devastating anthropogenic environmental disasters of the 20th century (e.g. Micklin 2007), the diversion of Central Asia's rivers for agricultural pursuits is not only a modern phenomenon. Stream-fed and runoff agriculture was practiced in the foothill regions of the Kopet Dagh from at least the fifth millennium BCE onward, evidenced at several archaeological sites including Djeitun and Anau (Harris 2010; Hiebert 2003; Lisitsina 1981). In the Tedjen and Murghab alluvial fans, however, where inadequate rainfall rendered the dry-farming techniques used along the Kopet Dagh

impossible, major human settlement occurred only after the advent of canal irrigation technology. The agricultural exploitation of the Tedjen River plain (also known as the Geoksur oasis) using irrigation canals occurred in the Late Aeneolithic (Chalcolithic) period (second half of the 4th millennium BC) (Khlopin 1964; Lisitsina 1969, 1981; Masson and Sarianidi 1972), and the Murghab fan followed suit beginning in the Early Bronze Age (first half of the 3rd millennium BC) (Dolukhanov 1981; Kohl 1984; Lyapin 1996).

Although humans probably lived sporadically in the Murghab from a very early date, the first direct archaeological evidence we have for substantial, permanent occupation dates to the early 3rd millennium BC (Hiebert 1994a; Kohl 1984; Masimov 1980; Masson and Sarianidi 1972). At this time, the Murghab experiences what can only be described as a population boom: with very limited archaeological evidence for any antecedent population, the alluvial fan suddenly appears home to several large, walled villages and satellite smaller occupations (Gubaev et al. 1998; Hiebert 1994a; Kohl 1984; Salvatori et al. 2008; Sarianidi 1981, 1993, 2006, 2008; Sarianidi and Puschnigg 2002) (see more extended discussion about these changes below, Section 3.3). The new populations were supported by irrigation-based agriculture, utilized continuously from this initial occupation period up until the present day (Lisitsina 1981; Lyapin 1996; Nesbitt and O'Hara 2000). In fact, in their major geo-hydrological study of the southern Kara Kum region Marcolongo and Mozzi (1998) comment that what appears now to be "natural hydrography" in the Murghab alluvial fan may not necessarily be so, since people have been deliberately altering the water systems for thousands of years (Lisitsina 1981; Lyapin 1996; Nesbitt and O'Hara 2000).

Based on carbonized wood from archaeological kilns, Lisitsina and Popov (1988) argue for vast floodplain forests stretching along the Kopet Dagh and expanding out into the Karakum

desert. Carbonized wood studies conducted in other foothill ecotones of southern Central Asia and South Asia have provided similar results (Cywa 2011; Spengler and Willcox 2013; Willcox 2002). The Murghab, on the other hand, is thought to have been a true alluvial plain during most of the Bronze Age (Cremaschi 1998), with meandering river branches actively depositing alluvial sediment from the 5th through the end of the 2nd millennium BC. Settlements exploited the dense network of river branches using supplementary artificial canals (Lyapin 1996). Both the branches and the canals are now recognizable as relict paleochannels. The total amount of water in the system would have been more than it is at present through much of the Bronze Age (Cremaschi 1998), and though there is some evidence that total volume decreased during the last phases of the Bronze Age (Lyapin 1996; Cattani et al. 2008; Hiebert 1994a), the exact timing and overall effect on the irrigation network is unclear (compare Lisitsina 1981, Lyapin 1996). Also unclear is the timing of the southward movement of Karakum sands into the northern Murghab, which probably started during the Bronze Age but may have been a millennium-long process (Cremaschi 1998:19) with varied localized effects.

The localized variability of the Murghab can be seen in the differences between southern (more proximal) areas of the fan, where alluvial sediments built up so as to bury archaeological sites several meters below the current ground surface, and the northern fringes of the Murghab, where sand encroachment appears to have been an increasingly real problem for settlement during the late Holocene. Maman et al. (2011) suggest the Karakum Desert dunes to the north of the Murghab alluvial fan were stabilized by the growth of vegetation during a mid-Holocene wet phase, but anthropogenic disturbances in dune vegetation during the Bronze Age could have reactivated and remobilized previously-stable dunes, as has been documented for other parts of late Holocene Eurasia (Drenova 2006). Given the intensity of human settlement in the northern

areas of the Murghab during the second half of the 3rd millennium BC (the Middle Bronze Age), overgrazing and fuel collection could reasonably have denuded stable dunes and led to their localized southward expansion, which might in part explain the documented southward shift of archaeological sites through time. A significant spatial shift is observed particularly between the later Bronze Age and early Iron Age settlements (Salvatori 2008a; Wright 2008). Salvatori (2008a) suggests that this Bronze Age-Iron Age transition period was the first time local environmental changes were primary drivers of the spatial geometry of settlements (as opposed to socio-political factors), although other researchers take a view that human-induced, localized ecological fluctuations influenced settlement patterns in some areas of the Murghab from earlier periods (Markofsky 2010). Either way, there appears not to have been a uniform environment of the Murghab during the period in question, but a patchwork of local conditions that required adaptation and adjustment.

The physical landscape of the Bronze and Iron Ages are no longer directly visible in all areas. In both northern and southern areas, archaeological sites are often buried, by sand and alluvium, respectively. In certain areas of the northeast Murghab, sites are only identifiable when exposed between dunes on the clayey surfaces known as "takyr"[7]. Although they generally correspond to the ancient alluvial surface level, takyr should not be viewed as representative of the former landscape, since they result from more recent geo-taphonomic processes (Babaev 1994; Fleskens et al. 2007; Markofsky 2014). The most visible "fossil landscape" in the Murghab is a swath roughly 140 km east-west, 200 km north-south, found between latitudes 37"20' – 38"40 N and 61"20' – 62"20' E, ca. 200 MAMSL (Cattani et al 2008:40; Cerasetti 2012). In this relic landscape, mounds and shallow sites of the Late Bronze Age are exposed on

[7] Though, notably, on the large "takyr" that alternate with "barkhan" sand dunes to the north and east of the modern Auchin canal (identified on Figure 3.3), no archaeological sites have been recorded (B. Cerasetti, personal communication).

fine alluvial sediments, which according to Cattani et al. (2008:40), were "farmed during most of the 2nd millennium BC.

3.2 Research Setting

A number of scholars have summarized the early archaeological investigations carried out in the territory of modern Turkmenistan (Atagarryev and Berdyev 1970; Coolidge 2005; Frumkin 1970; Hiebert 1994a; Kohl 1984, 2007; Salvatori 2003). Rather than re-writing this body of work, here I call out certain aspects of previous research that are directly relevant to prehistoric pastoralism in Central Asia or farmer-pastoralist interaction patterns in the Murghab region.

The earliest archaeological investigations in Turkmenistan were carried out in the 1880s and 1890s, following the Russian conquest of the area. Russian military officers explored the Kopet Dagh piedmont (Harris 2010; Hiebert 2003), while the archaeology and architecture of Margiana were first accurately documented by the Russian academician V.A. Zhukovsky (ibid, 1894). Zhukovsky recorded the first Bronze Age sites in the Murghab north of the classical period sites of Merv. Although the excavation techniques were haphazard and destructive by today's standards, these early investigations deserve credit for publishing results and establishing official museum collections of artifacts (Kohl 1984:17). They also demonstrated the time depth of human occupation in the region, as well as the keen interest in its material culture and history shown by antiquarian collectors and early archaeological explorers. Perhaps most importantly, these early forays into Turkmenistan's ancient past helped galvanize more widespread scholarly interest in Central Asia, paving the way for more explicitly scientific explorations.

One of the most famous of these was Raphael Pumpelly's research expedition of 1903-04 (Pumpelly 1905, 1908), which was ahead of its time in terms of detailed interdisciplinary analysis and scientific innovation, even if the methods used would fall short of today's standards. This international project is well-known for bringing attention to Central Asia's prehistory within a Western scholarly community interested in syntheses of development across the broader Old World (Kohl 2007:184). It also established the first comprehensive cultural sequence in southern Central Asia, stretching from the Aeneolithic (as the local Chalcolithic period is called) through Medieval periods, based on excavations at Anau, near modern Ashgabat in the Kopet Dagh piedmont. Less well-known is that Pumpelly's expedition also conducted survey in the Murghab region, recording archaeological sites north of ancient Merv (Pumpelly 1905).

Unfortunately, from a Western scholarship perspective, no significant archaeological research immediately followed Pumpelly's expedition, and within a generation the region had become closed to foreign researchers, effectively extinguishing the spark of Western interest in the region. Only after the Russian Revolution of 1918 and the political demarcation of republic borders within the Soviet Union (those of the Central Asian Republics were established in 1924-1925) did significant scientific research begin again, though now it was "highly structured, well-funded, state controlled, and oriented toward revealing the origins of communism" (Coolidge 2005:7). Namazga-depe, a large site located along the Kopet Dagh piedmont south of Ashgabat, was initially investigated during this period. A series of trenches later opened at the site by B.A. Kuftin (1956) would establish the basic Aeneolithic (Chalcolithic) to Late Bronze Age cultural sequence still used throughout Turkmenistan today (Namazga I-VI, or NMG I-VI).

Within the early Turkmen Soviet Socialist Republic, two official government entities sponsored archaeological research: *Turkomstaris* (the Turkestan Committee for the Preservation

of Monuments of Antiquity and Art, founded in 1921), and *Turkmenkul't* (the archaeological branch of the Institute of Turkmen Culture, founded around 1925). Together, these institutions organized numerous archaeological projects, including an exploration of the Merv oasis, though this work focused mainly on the identification of sites belonging to the Sasanian period and after (that is, from ca. 220 CE (Kohl 1984), and thus would have been centered on areas now known to be south of the main Bronze Age habitation zones.

Targeted research into the prehistoric occupation of the Murghab, or in the rest of Turkmenistan, did not begin in earnest until after WWII. In 1954-56, working under the aegis of IuTAKE (the Southern Turkmenistan Complex Archaeological Expedition[8]), V.M. Masson discovered and defined the Yaz (Jaz) cultural complex of Iron Age Margiana, based primarily on excavations carried out at Yaz-tepe (Masson 1959; also Boucharlat et al. 2005; Lhuillier et al. 2013). IuTAKE also sponsored surveys that resulted in the discovery and excavation of the sites of Auchin-depe and Takhirbai-depe 3 (Masson 1959; Masson and Sarianidi 1972). These excavations revealed the broad chronological and cultural correspondence of these occupations to the Bronze Age Namazga cultural sequence of the Kopet Dagh: finds from Auchin were understood to parallel the NMG V-VI transition period, while finds from Takhirbai 3 were attributed to NMG VI (Hiebert 1994a:15; Masson 1959:12-28; Masson and Sarianidi 1972:142). Additionally, the ceramics excavated from Auchin and Takhirbai 3 and their subsequent sequencing provide the chronological framework still used in Murghab archaeology today (Hiebert 1994a:15; P'yankova 1993).

[8] Also sometimes transliterated as YuTAKE or JuTAKE, from ЮТАКЭ (Южно-Туркменистанская Археологическая Комплексная Экспедиция) this expansive project began in 1946 under the direction of M.E. Masson, the "patriarch of Central Asian archaeology" (Kohl 1984: 19) and the father of archaeologist V.M. Masson, who made a number of important contributions to the study of prehistoric occupation in Turkmenistan.

In 1972, with the aim to expand the work begun at Auchin and Takhirbai 3 (Hiebert 1994a:16), the Margiana Archaeological Expedition (MAE, Маргианская Археологическая Экспедиция) was established by the Institute of Archaeology of the Russian Academy of Sciences in Moscow. Led by V.I. Sarianidi, an established member of the IuTAKE team, archaeologists revisited the Takhirbai and Auchin oases and many other areas of the Murghab alluvial plain. During more than 40 months of fieldwork between 1974 and 1985, the MAE documented more than 100 new Bronze Age sites, including the Middle-Late Bronze Age site of Gonur 1. The continuity of sites around Gonur and in the nearby Togolok sub-region with sites Sarianidi had previously explored in the Bactrian plain (southern Uzbekistan and northern Afghanistan) in the late 1960s, along with excavations there of Sapalli-tepe (Askarov 1981), ultimately allowed Sarianidi to define the Bronze Age entity now known as the Bactria-Margiana Archaeological Complex (or BMAC, discussed below, Section 3.3) (Sarianidi 1981). In 1978, a second archaeological project began in Margiana, led by I.S. Masimov of the S. Batyrov Institute of History, Turkmen Academy of Sciences. This project initially focused on mapping Bronze Age sites to the north of Sarianidi's project at Gonur, and ultimately resulted in the documentation and excavation of sites in the Kelleli, Taip, Adam Basan, and Adzhi Kui sub-regions (Masimov 1981). Both projects are still ongoing, even if their scale and focus have been reduced.

Although the theories and methods that drove Soviet archaeology may be criticized on a number of points, Soviet investigations into the prehistory of Central Asia, and on the BMAC in particular, deserve recognition for their significant accomplishments. Most notably is the discovery of the BMAC itself, which rounded out major gaps in the understanding of the interaction spheres that characterized the Old World in the 3rd and 2nd millennium BC

(Lamberg-Karlovsky 1989; Possehl 2005). Through the discovery of the BMAC, researchers have been able to demonstrate the direct cultural links between sites in Central Asia and northern and eastern Iran, Afghanistan, Baluchistan, and the Indus Valley (Crawford and Al Sindi 1995; During Caspers 1994; Meadow 2002; Olijdam 2008; Possehl 2003; Potts 1993; Shirinov 2000), not to mention the indirect but clear cultural links to Sumero-Akkadian Mesopotamia and Elam[9] (Amiet 1988; During Caspers 2008; Salvatori 2003:5-6). The formulaic nature of Soviet archaeological scholarship might also be praised for the standards it engendered through the organized system of excavation, artifact analysis and cataloging, and systematic reporting of results (Coolidge 2005:7).

The 1972 publication in English of *Central Asia: Turkmenia before the Achaemenids* (Masson and Sarianidi, ibid) provided the first general overview of 20th century archaeology in Turkmenistan available to a Western audience (Salvatori 2003). Though this text predated the discovery of the BMAC, subsequent English-language reports and the flooding of the antiquities market with looted BMAC grave goods (mostly from cemeteries in Bactria, which were exposed to danger through the upheaval of the Soviet-Afghan war of the 1980s) resurrected Western scholarly interest in the significance of prehistoric Central Asia. In the late 1970s and 1980s, a number of international conferences were held, organized specifically to bring together Soviet, American, and European scholars interested in Central Asian prehistory. The conferences organized by C.C. Lamberg-Karlovsky and colleagues from Harvard University directly resulted in additional English-language summary publications (Kohl 1981, 1984), broadening literature access to non-Russian speakers and sparking further interest in the Western academic

[9] Though Kohl cautions us against the tendency to expect that cultural interconnectedness must result in simultaneous socio-political development across broad regions (2007: 186-187).

community. Kohl's publications (1981, 1984) remain some of the most comprehensive English-language treatments of Bronze Age Turkmenistan.

Following this resurgence of scholarly communication across the Iron Curtain, a number of collaborative international archaeological projects were begun in Turkmenistan (then still the Turkmen SSR). The most significant with respect to the Bronze Age of Margiana is the Joint Italian-Turkmen Archaeological Mission to the Murghab Alluvial Fan (hereafter the Joint Mission), begun in 1990 and currently ongoing[10]. The Joint Mission has focused on regional paleohydrological reconstruction and refining Bronze Age settlement chronologies through off-site transect surveys and limited excavations. In 1989, a small-scale collaboration was established between the MAE and the Peabody Museum at Harvard University, allowing then-graduate student Fredrik Hiebert to participate in Sarianidi's excavations at the Gonur 1 mounds. Although the collaboration was short-lived, it produced a number of significant reports and a book-length scholarly treatment of the BMAC (Hiebert 1994a, 1994b; Hiebert and Moore 2004; Moore 1993a, 1993b; Moore et al. 1994) that remain valuable and relevant sources of information. University College London's International Merv Project, initiated in 1992 and continuing presently as the Ancient Merv Project, is another important collaborative effort involving Turkmen researchers and institutes. Beyond its main focus on Medieval period Merv, this project has provided specialist reports for excavations undertaken at Takhirbai-depe (Nesbitt 1994). Outside the Murghab, collaborations between Turkmen and French scholars are investigating Iron Age and later sequences at the site of Ulug-depe (Bendezu-Sarmiento and Lhuillier 2011; Boucharlat et al. 2005; Lecomte et al. 2002; Lhuillier et al. 2013) and joint German-Turkmen research at Monjukli Depe are revealing more about Neolithic-Aeneolithic

[10] It was under the Joint Mission's research agreement that the excavations and research presented here were conducted. I am grateful to Dr.Barbara Cerasetti of the University of Bologna for allowing me to serve as Co-Director of Field Projects.

(Chalcolithic) transition period (Pollock and Bernbeck 2011). The newly-approved Project for the Ancient Murghab (PAM), of which I am the Director, will represent the first joint American-Turkmen archaeological project since Hiebert's work in 1989.

Although international collaborative projects are perhaps more internationally visible in terms of publications and conference papers, they should not overshadow the important work still being carried out by Russian and Turkmen archaeologists working in Margiana. As noted earlier, excavations at the Gonur sites are still ongoing, led by the so-called "Lion of the Karakum" V.I. Sarianidi until his death in late 2013. Work continues under the aegis of the MAE by N. Dubova and collaborators, with new areas opened each field season and reported on in the Russian-language journal of the MAE and occasional dual- or triple-language books (Turkmen, Russian, English). Sarianidi himself was a prolific writer and champion of Central Asian archaeology, and as controversial as his views on the origin, organization, and dissolution of the BMAC may have been, his work nonetheless remains extremely relevant as the premier example of direct investigations into the complex culture of the Bronze Age Murghab.

3.3 Socio-Cultural Setting

Unlike the development and spread of mobile pastoralism on the Eurasian steppe, which appear to have been a regionally-specific, gradual process not explicitly or even necessarily linked to agriculture (Anthony 2007; Frachetti 2012; Kohl 2007; Kuz'mina 1994b), herding strategies in the southern belt of Eurasia seem to have developed alongside or in conjunction with farming (Abdi 2003; Harris 2010; Masson and Sarianidi 1972). Particularly in Central Asia, where domestic crops were being intentionally cultivated as early as 6000 BCE at the site of

Djeitun in the Kopet Dagh foothills, herding of sheep and goat was part of a mixed economy strategy (Harris 2010; Masson and Harris 1994). The following Aeneolithic period (equivalent to the Chalcolithic) shows a similar pattern, evidenced by faunal remains at sites such as Altyn-depe and Ilgynly-depe in the Kopet Dagh (Kasparov 1994a, 1994b) and in the Tedjen alluvial fan at the Geoksyur settlements (Khlopin 1964; Masson and Sarianidi 1972). Even in the Murghab alluvial fan, which current archaeological evidence suggests was not significantly inhabited prior to the agricultural exploitation of the urban Middle Bronze Age, sheep and goat husbandry evidently formed a part of the urban economy and was not a stand-alone subsistence strategy (Moore et al. 1994).

The cultural separation of Eurasian steppe pastoralists from the farmers of southern Central Asia is emphasized through their physical separation on either side of the Karakum and Kyzylkum deserts of the modern nations of Turkmenistan, Uzbekistan, and western Kazakhstan. But these deserts, which seemingly kept subsistence strategies from overlapping for millennia, were never cultural barriers, nor devoid of human occupation. Before the advent of modern industrial extraction of resources, desert mobile pastoralism was the viable subsistence strategy for this environment, and seasonal movements would have provided essential conduits for the sharing of ideas and goods throughout the Bronze Age. Ethnographic accounts of pastoral groups record the regular seasonal movements of mobile pastoralists through the Karakum (Figure 3.8) (Kharin 2002; Nechaeva et al. 1943; Nikolaev 1982; Niyazklychev 1973), with supporting archaeological evidence that people, goods, and ideas also flowed along the chain comprised of the Hindu-Kush, Pamir, and Tien Shan mountains to the south and east (Biscione 1985; Frachetti et al. 2010; Salvatori 2008b). Southern Central Asia thus forms an interstitial zone between several different geo-political and socio-economic spheres, and from the outset was the locus of

contact and interaction between different cultural groups, as well as an important crossroads on inter-regional trade routes, setting up the system that would later mature into the Silk Roads for which the region is famous (see Christian 2000).

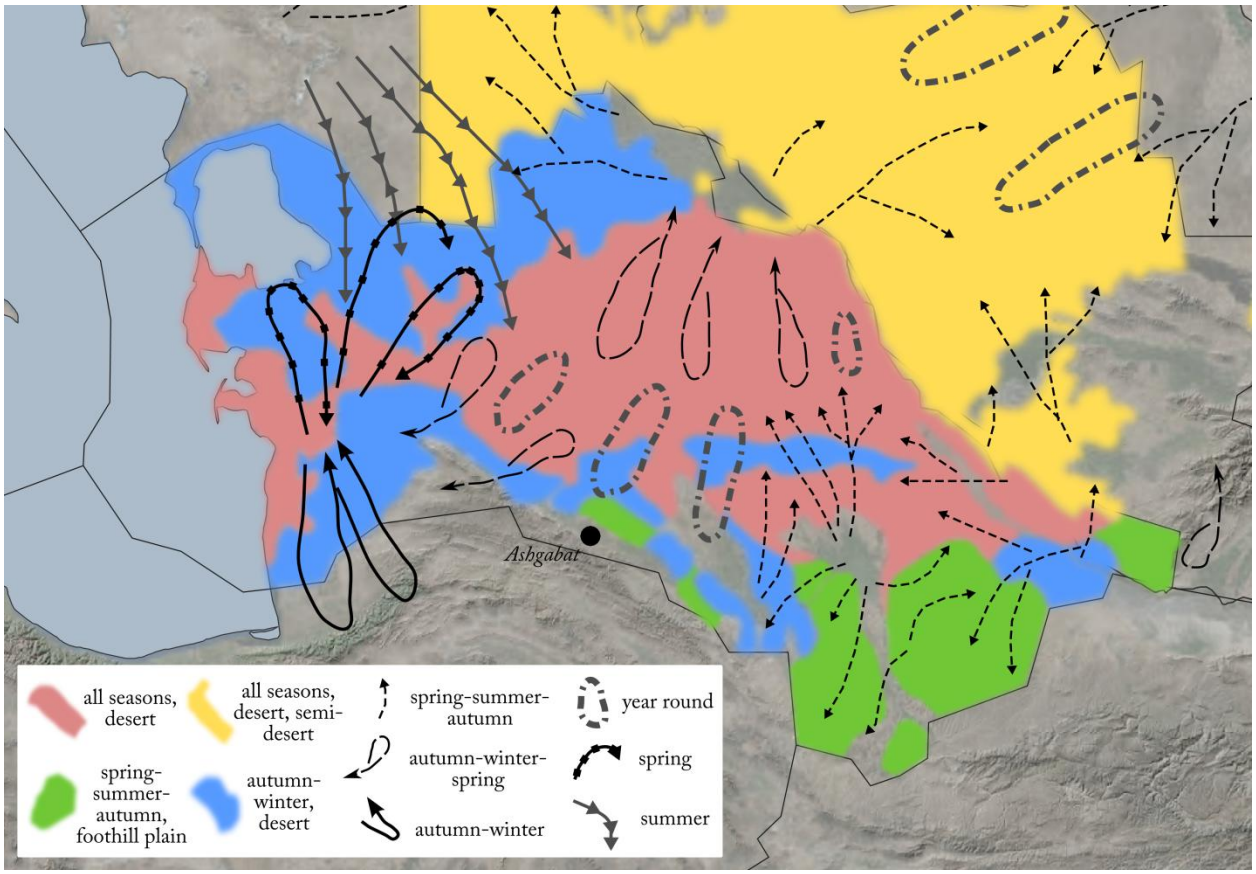


Figure 3.8: Map of Turkmenistan, with color overlays representing main sheep grazing areas in the modern era (data from Kharin 2002:Figure 2.11). Also shown are transhumance (grazing) routes used by mobile pastoralists in Russian Turkestan (dataafrom Kharin 2002: Figure 3.7 and Nikolaev 1982).

3.3.1 The Bactria-Margiana Archaeological Complex (BMAC) and the backdrop of sedentary-mobile interactions

During the last century, and especially since the discovery of the Bactria-Margiana Archaeological Complex (BMAC) four decades ago, the populations of prehistoric Central Asia have emerged on the ancient stage of the Old World, alongside those of Mesopotamia, Elam, and the Harappan Civilization in terms of their importance to interactions in the ancient world.

Although not nearly as well known in either popular or academic circles as its 3rd millennium counterparts, the BMAC phenomenon is comprehensively detailed in both English and Russian publications (Hiebert 1994a; Sarianidi 1990, 2002, 2006). Still, many aspects of the BMAC formation, operation, and dissolution as a socio-political and cultural entity should be considered hypothesis rather than established fact, in line with our generally limited and lop-sided datasets for Central Asian prehistory. We know more about the generalized, regional interaction sphere in which the BMAC participated (Possehl 2005) than we do about the localized interactions that were essential to its overall existence and the daily lives of the people that constituted its archaeological expression.

The importance of understanding the relationship between BMAC farming communities and mobile pastoral groups should not be understated, because it constitutes a dynamic that would prove to be critical in Central Asia's unique historical trajectory (Golden 2003; Khazanov 2005; Tashbaeva and Gritsina 2005). Moreover, the settled-mobile interaction that began in the BMAC period fundamentally distinguishes the agrarian polities of Central Asia from those of Mesopotamia, even though the former are often discussed in comparative terms to the latter (Kohl 2007; Zauderer 1985; but see Stride et al. 2009). In the following discussion, I focus on the relationship between BMAC farming communities and pastoralist groups as it is currently understood and discussed. What is presented here should in no way be considered a general review of the BMAC phenomenon. As the reader will see, many of the issues related to pastoralists and sedentary-mobile interactions in the Bronze Age Murghab are contested between various scholars, or can easily be challenged given the limited data. The objective of this section is to illustrate just how little we actually know about these pastoralists or their interactions with

sedentary farmers (BMAC or otherwise), and to highlight those gaps in our knowledge my own research might fill.

The archaeologically-recognized culture known as the BMAC (also sometimes as the Oxus Civilization) encompassed the Murghab alluvial fan and lowland fans that occupy parts of northern Afghanistan, southern Uzbekistan and Tajikistan along the upper course of the Amu Darya (the river known to the Greeks as the Oxus and to Arabs as Jayḥūn). It emerged no earlier than the middle of the 3rd millennium BC but quickly became a major regional player, with its distinctive material culture appearing in Indus Valley population centers (Meadow 2002; Possehl 2003; Shirinov 2000) and tombs in the Arabian gulf (Crawford and Al Sindi 1995; During Caspers 1994; Olijdam 2008; Potts 1993). By the first quarter of the 2nd millennium BC, the regional visibility of the BMAC was waning (as was that of the Indus Civilization [Kenoyer 2006; Possehl 2003]), and shifts in the material culture and settlement patterns of the Murghab around the middle of the 2nd millennium BC seem to signal the end of any archaeological features belonging to a recognizable BMAC constellation.

The BMAC subsistence economy was centered on domestic crops, including barley, wheat, and pulses, which were grown in fields irrigated by complex canal systems (Moore et al. 1994). The remains of fruits, including grapes and possibly apple and plum, also suggest an established and well-managed regime of agricultural production in the settled communities. However, herding also played an important role in the local economy, with sheep, goat, and cattle constituting the majority of recorded animal bones (Hiebert 1994a:133; Moore et al. 1994; Sataev and Sataeva 2012a). Hunting of wild fauna complemented the domestic herd animals, though never in great numbers (Moore 1993a; Sataev and Sataeva 2012a), and significantly less than that reported for contemporary sites in the Kopet Dagh (noted in Moore et al 1994:423).

Wild boar seem to have been hunted primarily in the earliest occupations at Gonur, possibly suggesting that its habitat in the *tugai* thickets along river banks had been cleared to make way for agriculture by later phases (Hiebert 1994a:133; Moore et al 1994:423). Interestingly, except for the gazelle that are ubiquitous over the territory of Turkmenistan, the number of remains for desert-dwelling wild fauna was always very low in the Gonur deposits (Hiebert 1994a:133), perhaps indicating a slightly different environment than that of the area today.

The internal organization and socio-political structure of the BMAC is not well-defined, although it is often characterized as a hierarchical system of rulership. It is variously described as a chiefdom, khanate, proto-state, or priest-kingship system (Lamberg-Karlovsky 1994, 2003; Salvatori 2008a, 2008c; Sarianidi 1990, 2002, 2005, 2007), always entailing social tiers and elite-held territory associated with fortified settlement centers. In a careful but now dated study, Hiebert argued that production was centralized and hierarchically organized around the tribe or clan group that dominated each large settlement, a precursor to the *qala* system known historically in Central Asia (1994a:163, 176-77; 1994b:386; see also Lamberg-Karlovsky 1994). Others have noted the likelihood of BMAC merchants or traders traveling around southern Central Asia under the patronage of BMAC administrative systems (Hiebert 1998; Hiebert and Lamberg-Karlovsky 1992; Possehl et al. 2004:28; Salvatori 1998, 2008b:93). During Caspers (2008) even hypothesized a merchant BMAC community residing in Mesopotamia. The point to be emphasized, however, is that no matter the view taken on internal BMAC political unity or organized control of production, the scholarly consensus seems to be that there was "a culturally unified BMAC or cultural koine [world] stretching from the plains of northern and southern Bactria to Margiana and southern Turkmenistan" (Kohl 2007:217). This is understood to be part of a broader "civilized" world quite distinct from a "barbarian" world occupied by mobile

herders (ibid:199, though note that he uses the terms in single quotation marks himself). The BMAC, however defined, stands in stark opposition to a nomadic other.

3.3.2 Nomadic Origins of the BMAC Phenomenon

The BMAC marks some of the earliest urban occupation in southern Central Asia, the first agricultural exploitation of the Murghab alluvial plain, and probably the first substantial habitation of the plain as well (Kohl 1981, 1984; Masimov 1980; Sarianidi 1981). To date, there is no evidence for any major population settled in the Murghab during the Neolithic or Aeneolithic (Chalcolithic) periods (Salvatori 2008a, 2008b), a time when large villages are recorded on the Kopet Dagh piedmont and Tedjen plain (Khlopin 1969; Kohl 1984; Masson and Sarianidi 1972; Pollock and Bernbeck 2011; Sarianidi 1965). Early Bronze Age occupations are recorded, especially in the northern Murghab (Masimov 1980; Sarianidi 1990), but unless we call into question the efforts and methods of all previous archaeological research in the plain, the emergence and flourishing of major population centers during the Middle Bronze Age should be considered a new demographic event. That these settlements (such as Gonur-depe North, Togolok 21) have carefully-arranged, symmetrical and geometric plans and exhibit monumental architecture with few documented construction phases is suggestive of pre-planned settlements, what some scholars have termed a "colonization" of the Murghab fan (Hiebert 1994a; P'yankova 1994).

The origin of the Bronze Age population of Margiana is the subject of major debate among archaeologists concerned with this period in greater Central Asia, and given the lack of a significant, earlier local population, most scholars hypothesize a process of in-migration (P'yankova 1994). Some have suggested BMAC origins are to be found in nomadic or semi-

nomadic populations, although the supporting archaeological evidence cited is sparse. Alyekshin (1980), for example, proposed an expansion of Eurasian steppe groups as foundational for the BMAC based on the presence of catacomb graves and couple burials at Sapalli-depe (northern Bactria, in modern Uzbekistan). Later, P. Amiet hypothesized that nomadic Trans-Elamite populations (itinerant craftsmen who brokered trade for the Elamite or pre-Elamite elites) settled in Margiana, their aristocratic nobility occupying fortified "castles" which became the BMAC centers (ibid 1986:190-204, 213-14; 1988). Although neither Alyekshin's nor Amiet's hypotheses have stood up against more recent data (P'yankova 1994), Kohl follows their thoughts by suggesting semi-nomadic Tazabag'yab cattle herders from the Aral Sea region (who also practiced irrigated farming) played a critical role in creating the unique synthesis of the BMAC (ibid 2002:167-169; 2005; 2007). However, "Tazabag'yab-style" ceramic sherds in the Murghab have so far only been found associated with later BMAC materials and levels (Cattani 2008b; Hiebert and Moore 2004; P'yankova 1993). It is quite likely, though, that the BMAC origins are to be found in numerous regional traditions, making it, as Kohl himself points out, "a hybrid, the product of a unique convergence of cultural traditions" (Kohl 2002:175).

Whatever synthesis it might represent, most scholars working on the BMAC agree that the Namazga cultural complex of the Kopet Dagh piedmont zone played an influential role in the formation of the BMAC in the Murghab alluvial plain (Hiebert 1994a; Kohl 2002; Lamberg-Karlovsky 2003), in terms of both cultural material and probably original population. The fluorescence of the MBA settlements in the Murghab predates the appearance of any material culture reference to steppe mobile pastoralists (P'yankova 1993), and moreover, the affinities in ceramics, figurines, and architecture between Murghab and Kopet Dagh settlements at the end of the third millennium BC are clear (Masson and Sarianidi 1972; P'yankova 1993; Salvatori

2008b; Udeumuradov and Masson 1993). Significant for this study, this indicates an unbroken continuity in, and development of, sedentary agricultural culture in southern Turkmenistan extending from the Aeneolithic (Chalcolithic) through the Middle Bronze Age. We might therefore view the BMAC as part of a region-wide cultural world, and the product of a long process of technological, economic, political, and cultural incubation in southern Central Asia. Detailed studies of material culture certainly indicate localized continuity in material types and production technologies, even if the style and motifs that distinguish BMAC artifacts represent broader geographic contacts and influences (Francfort 1994; Hiebert 1994a, 1994b; Salvatori 2008b).

On the other hand, the very same BMAC artifacts form the basis for an origin hypothesis rooted in interaction between settled farming and nomadic or semi-nomadic groups. This hypothesis rests in the observation that natural stone or metal resources are absent in the Murghab alluvial plain and would have needed to be brought in from some distant source (Hiebert 1994a, 1994b; Salvatori 2008b). The localized production of BMAC objects from imported raw materials is established by the recovery of both these raw materials and unfinished objects at BMAC sites, although it is unclear how the raw materials arrived at BMAC centers (Hiebert 1994a). By circumstantial comparison, we know that mobile pastoral groups played an important role in supplying raw stone to craftsmen in Indus urban centers (Law 2008; Possehl 1979), but Harappans themselves also had a physical, archaeologically visible presence in their highland resource zones (Law 2008:759-760), something we do not have evidence for with the BMAC. Thus, while Harappans appear to have had some degree of control over their distant resources, it is not inconceivable that the BMAC craftsmen depended on mobile pastoralist trade brokers who took advantage of their regular migration routes between zones of differential

resources in the highlands and lowlands. This mobile-sedentary interaction could have been a key factor in the development of the BMAC (Hiebert 1994a; Frachetti and Rouse 2012; Moore et al. 1994).

The problem with any nomadic-influence hypothesis for the origins of the BMAC, however, is that across years of research there is simply no convincing archaeological evidence that places substantial contact between settled farming and nomadic groups prior to the Late Bronze Age. That is, only toward the end of the BMAC fluorescence do archaeological signatures of external mobile pastoralists appear.[11] Ceramic sherds distinct from the BMAC ceramic tradition (known as Namazga ware) are not present in double-digit counts earlier than in Late Bronze Age deposits or associated with anything other than this period's Namazga VI ware. Moreover, the appearance of this new ceramic type – often referred to as "steppe" or "Andronovo" ware or Incised Coarse Ware – is accompanied chronologically by a substantial increase in the number of small, non-architectural (camp)sites dispersed across the northern and north-eastern reaches of the alluvial plain (Cattani et al 2008; Salvatori 2008a; Sarianidi 1975).

3.3.4 The Later Bronze Age

If the interactions between BMAC farming communities and mobile pastoralists in the Middle Bronze Age are hypothesized by circumstance, then the Late Bronze Age presents a comparative wealth of direct evidence. Beginning in and continuing through this period, a second, non-BMAC population becomes archaeologically visible, mainly in the guise of a distinct set of ceramics that appears alongside the BMAC ware. These conspicuous coarseware

[11] Recent work undertaken at the large Bronze Age site of Adji Kui, in the northeast Murghab, where "steppe ceramics" found in deep stratigraphy just outside the walled center had suggested early BMAC-nomadic contact, revealed the occupations to be Early Iron Age in date. Here, mobile pastoralists seem to have settled in the immediate vicinity of an abandoned or declining agricultural village (Cerasetti et al. 2015).

sherds are readily distinguishable from the Namazga ceramics of the BMAC tradition for their rougher, darker paste with visible temper and (common) incised decorations, their uneven firing and coloring, and the thick vessel walls and breakage patterns indicative of handmade rather than wheel-turned production. Extensive survey by the Joint Mission has documented hundreds of coarseware sites throughout the alluvial plain, and though the problem of equating pots and people are well known (Kramer 1977), the archaeological evidence in this case is best read as two socio-cultural groups coming into contact and occupying a shared physical landscape. As to the actual subsistence practices of these coarseware-bearing groups and whether they were in fact economically independent mobile pastoralists, evidence will be presented in Chapters 4 and 5, but for the moment recognizing the later Bronze Age Murghab as a stage for inter-cultural interaction is sufficient.

In addition to the appearance of a distinct external population during this period, the broadly coincidental timing of a re-organization in the agricultural settlement pattern and BMAC centers has led to a variety of speculations about the role of mobile pastoral groups (Cattani 2008a; Cattani et al. 2008; Hiebert 1994a; Masson 2002; P'yankova 1994; Salvatori 2008a). One basic issue is whether an apparent collapse of the BMAC social-political system (reflected in the fragmentation of the hierarchical settlement pattern [Salvatori 2008a]) preceded or was caused by the arrival of mobile pastoral groups from outside the Murghab, a point unlikely to be elucidated without more stratified excavations and serious refinement to the current chronological sequence (see below, Section 3.4). Another contentious issue is the nature of interactions between established farming communities and incoming mobile pastoralists: Were the relationships antagonistic (Kuz'mina 1964; Kuz'mina and Lyapin 1984; Marushchenko 1956; Pumpelly 1908; Vinogradova and Kuz'mina 1996) or "broadly peaceful and long-

standing" (Sarianidi 1975:25; see also Hiebert and Moore 2004; Kohl 2002, 2007; Kutimov 2014; Rouse and Cerasetti 2014)? Did the arrival of new groups upset the careful environmental balance of the BMAC subsistence economy by over-utilizing limited resources, or was there a strategy of avoidance whereby mobile pastoralists occupied only marginal, agriculturally-unsuitable zones (P'yankova 1993)? Did the arrival of nomadic groups precipitate the dissolution of the BMAC, or did these groups simply move in to an area with a crumbling settlement and power structure and merge with the farming populations still inhabiting it (Masson 2002)?

3.3.5 'Invisible' Bronze Age Pastoralists in the Murghab

Uncertainty about the causes and results of later Bronze Age interactions are no doubt fueled by lack of knowledge about the basic social structures and practices of both farming and mobile pastoral groups. In particular, there has been only limited study outside the contexts of large-scale farming village (see below, Section 3.3.6), a problem this research aims to address. Below, I briefly outline "two types of Bronze Age pastoralists" (Hiebert 1994a:134-135) to illustrate that in multiple contexts in the later Bronze Age Murghab, acknowledgement of the importance of pastoral activities is not balanced by the degree of archaeological documentation. On the one hand are herdsmen with immediate ties to the farming communities in both economic and socio-cultural terms (Hiebert 1994a; Moore et al. 1994), what is sometimes called "herdsmen" or "transhumant" husbandry (Abdi 2003; Khazanov 1994). The second "type" of Bronze Age pastoralists is formed by cohesive social units independent of farming centers, subsumed under the broad-brush label of "Andronovo" mobile pastoralists in the Central Eurasian steppe and highlands. In the case of the later Bronze Age Murghab, where both types of pastoralists appear to operate, we might describe the first type as internal and the second type as

external. At both local and more regional scales, however, the archaeological visibility of pastoralists is limited and/or circumstantial compared to that of the settled farming groups, thereby relegating pastoralists to an 'invisible periphery' of the settled farming world of the BMAC.

Based on the overall faunal remains, ethnographic accounts from the region in the nineteenth century, and field observation of modern herders, Hiebert (1994a) and Moore et al (1994) describe a system akin to Abdi's (2003) transhumant husbandry for the pastoral component of the BMAC economy. They illustrate the supposed Bronze Age system as one where sheep and goat were kept near settlements during fall and winter, and along with cattle stabled inside BMAC compounds at night. In the summer, subsets of male family members would move the herds further out into the desert, following routes along known wells for several days in search of pasture. Although seasonal herding "stations" would not have left substantial remains (Moore et al. 1994) and no such encampments have been recorded archaeologically, one could infer that such sites would show direct material ties to the larger agricultural community (Abdi 2003). Such a pattern of local herding is evidenced at/around Kopet Dagh sites and at the Aeneolithic (Chalcolithic) Geoksyur settlements in the Tedjen alluvial plain (west of the Murghab, see Figure 3.1) (Khlopin 1964). At BMAC sites such as Gonur, the abundance of spindle whorls recovered suggests herd animals were kept for economic exploitation of secondary wool products (Moore 1993a). The overall implication of such a system, however specialized the pastoralists might be in terms of their practical, lived economy, is that the herders who supplied BMAC settlements with animal products did not constitute a distinct socio-cultural group. As such, beyond what might be inferred about their daily practices and the importance of their contribution to the BMAC diet and economy, there is little to distinguish them

archaeologically from the larger socio-cultural unit to which they belong, and less to say about their role in cross-cultural interaction.

External pastoralists in the later Bronze Age Mughab are tied to more distant mobile pastoral groups through their similar material remains (mainly pottery) (Cerasetti 1998; Hiebert and Moore 2004; P'yankova 1993; Sarianidi 1975). This fact may render them more archaeologically visible than their internal pastoralist counterparts, but in terms of their daily practices and their relationship to farming settlements, they are just as invisible. Although the surveys conducted by the Joint Mission and some survey work under UCL's Ancient Merv Project provide illuminating off-site datasets, the limited nature of these coverages cannot compete with the fine-grained level of data gathered through long-term, large-scale investigations at urban BMAC centers.

In sum, the (im)balance in archaeological data related to the 'invisible periphery' has tempered our understanding of co-existing social worlds and their engagement, and implicitly granted farming villages dominance in the historical trajectories we draw for interaction. To be clear, none of the BMAC literature describes the sedentary-mobile dynamic as strictly weighted toward farming communities in terms of authority and power. However, the view of the BMAC polity (however it may be characterized in the details) as comparable to other agrarian-based civilizations of the 3rd and 2nd millennium BC demonstrates what I think is a fundamentally false conception of settled/nomadic interaction, one that enfolds social power with defined geographic space. I do not deny the BMAC centers must have had some degree of control over their territory, but to assume that all forms of authority were by default rooted to the land and agrarian surplus blatantly denies agency to the nomadic groups of Central Asia's past and

present. We cannot ignore the place of mobile pastoralists in prehistory simply because they are harder to detect archaeologically.

3.3.6 Excavations at Bronze Age non-urban sites

Despite significant work at BMAC sites over the last four decades, there has been relatively little investigation of the non-urban landscape of the alluvial fan, and even less archaeological research aimed specifically at the prehistoric strategies of mobile pastoralist groups. The research presented in subsequent chapters is intended as a small step toward building datasets for mobile pastoral groups that can be directly compared and contrasted with those from sedentary farming communities. Though distinct in its aim and scope, the excavations at the campsite Ojakly are not the first of this kind undertaken, and it is important to build on the limited data specifically related to later Bronze Age mobile pastoralist sites in the Murghab.

Gonur-N

In 1989 and 1990, Hiebert investigated a discrete scatter of predominantly Incised Coarse Ware (ICW) ceramics located approximately 1 km southwest of the fortified BMAC site of Gonur South (Hiebert and Moore 2004). This scatter, designated Gonur-N (not to be confused with the MBA mounded site of Gonur North), stood out from the otherwise ubiquitous low-density spread of BMAC ceramics for its concentration of ICW ceramics, kiln fragments, and groundstones in a 60x40m area. A small test excavation (1 m^2, depth 90 cm) found no floors, features, or non-ceramic remains (using ¼ inch screens), but did reveal in-situ cultural layers and a ceramic assemblage consisting of both ICW and BMAC pottery. Petrographic comparison with other BMAC pottery and ICW ceramics from the Aral Sea region confirmed the geographically

distinct origins of the two ceramic styles seen at Gonur-N, with only the BMAC pottery produced locally. The assemblages of both BMAC and ICW ceramics were limited to jars, plates, and footed goblets and cups, all dated stylistically to the Late Bronze Age (1800–1500 BCE). Hiebert and Moore (2004) cite these forms as consistent with the preparation, storage, and consumption of liquids. On the basis of these observations and the proximity of Gonur-N to the BMAC site Gonur South, the excavators conclude that Gonur-N represents a short-term mobile pastoral encampment, where members of independent mobile pastoralist and BMAC communities feasted together as part of negotiations over land use (Hiebert and Moore 2004). In this scenario of mobile-sedentary interaction, contact between the two groups was limited to marginal areas, and though interactions may have been formalized (through feasting), they were not necessarily regular or seen as especially essential to the survival of either group.

Site 1211/1219

In addition to Gonur-N, there is only one other published archaeological investigation of a mobile pastoralist occupation in the Murghab Delta[12]. Site 1211/1219 – which is made up of two sites that appear to be one larger site bisected by a modern canal – was excavated by the Joint Mission in 2001-02 and 2006 (Cattani 2008b). The site is roughly ten kilometers southeast of the large sedentary culture site of Takhirbai-tepe and represents the most southerly documented "Andronovo" mobile pastoralist occupation in the Murghab. Like Gonur-N, Site 1211/1219 was identified by a surface concentration of ICW ceramics, and excavations revealed thinly stratified Bronze Age deposits (Cattani 2004, 2008b; Joint Italian-Turkmen Archaeological Mission to the

[12] Excavations carried out adjacent to the fortified village of Adji Kui in late 2013 targeted mobile pastoralist occupations; however, these appear to represent a very late stage of farmer-pastoralist interaction and are not dealt with here in depth. A full site report is forthcoming, and a comparison of Ojakly (Chapters 4-6), Site 1211/1219, and the Adji Kui occupations are presented in Cerasetti et al. 2015).

Murghab Alluvial Fan [Joint Mission] 2006). Unlike Gonur-N, these sites represent a more substantial occupation, with the presence of a multi-phase sunken house and semi-subterranean storage area indicating repeated use over a long time span, with an investment in the dwelling that may have been for more than seasonal occupation. The sunken dwelling was sub-rectangular in plan (6 x 5.3 m), with vertical sides and a flat floor with storage pits and post-holes for roof supports. A clay step marked the entrance, and other features included a central clay-lined fireplace and two clay ovens in the north and south corners (belonging to discrete occupation layers). Finds included both ICW ("steppe" pottery) and Namazga VI (late BMAC) ceramics. Three radiocarbon dates place occupation of Site 1211/1219 to the Late, or more probably, Final Bronze Age (1550–1350 BCE) (Cattani 2008a:147).

Within Site 1211/1219, a large area dedicated to food storage and processing was excavated which appeared to have burned down before it was abandoned. Here a grinding stone was recovered as well as burned pots filled with charred, processed agricultural grains (Cattani 2008b) consisting of caches of free-threshing wheat, 6-rowed barley (a mix of naked and hulled varieties), green peas, grass peas, lentils, and broomcorn millet (Spengler et al. 2014a). Except for the last of these, they are all relatively water-demanding and labor-intensive crops that were unlikely to be tended by casual farmers. And, when the evidence is taken all together – the variety of domesticated grains, the grinding stone, the intentional storage area, and the site's location near farming villages and adjacent to an irrigation ditch – it points to the inhabitants of Site 12111/1219 being directly involved in agricultural production. Even if such pursuits were limited to seasonal activity, they certainly paint a much different picture than that at Ojakly (presented in subsequent chapters), and from this we can understand the intensification and

stabilization of a farmer-pastoralist relationship through time (see further discussion of this in Chapter 7).

3.4 Gaps in Our Knowledge

Research on the Bactria-Margiana Archaeological Complex (BMAC) has been intensively undertaken by a handful of scholars since its discovery in the late 1970s, and fits within the broader scope of steady archaeological research being conducted in the territory of Turkmenistan, especially since WWII. Even so, certain details about how this regionally-influential cultural complex formed, operated, and dissolved remain patchy. Chronology of the BMAC phenomenon is a related problem, given the non-systematic use of both calibrated and uncalibrated radiocarbon dates and ceramic seriations to define prehistoric periods. In the past, Western scholars have tended to figure sequences roughly 500 years later than their Russian and Turkmen counterparts (Luneau 2010; Masson 2002; Vinogradova 2008; Vinogradova and Lombardo 2002), leading to some confusion and disagreement about where the BMAC fits within wider regional chronologies, and thus, not surprisingly, contributing to the abovementioned interpretive problems. The general acceptance of the calibrated Bronze Age chronology has increased in the last decade, thanks to the publication of several comprehensive lists of calibrated radiocarbon samples (Cattani 2008a; Hiebert 1994a; Jungner 2004; Salvatori 2000; Vinogradova 2004). However, there are still very few dates related to non-BMAC occupation contexts in the Murghab (Cattani 2008a; Rouse and Cerasetti 2014), which still leaves some questions about the timing of the social and demographic changes occurring toward the twilight of the BMAC during the later part of the Bronze Age. In particular, scholars disagree

as to whether this period of the Late Bronze Age should be characterized as a post-BMAC (Hiebert 1994a:71)[13] or a final BMAC phase (Cattani 2008a) (see more extensive discussion in Luneau 2010). Part of the disagreement is based on the degree of centralized organization and control of the urban centers upon the landscape of the Murghab, which, as already discussed, depends on how the impact and role of mobile pastoralists is viewed.

In spite of some concerted efforts to characterize sedentary-mobile relationships in the Late Bronze Age Murghab (Cattani 2008a; Cerasetti 1998, 2012; Cerasetti et al. 2014; Hiebert and Moore 2004; Masson 2002; P'yankova 1994), all interpretations face the pervasive problem of the lack of substantive, direct data related to mobile pastoral groups *other than* scattered pottery finds. Basic questions still remain, not least of which is to verify archaeologically the widely held assumption that non-BMAC or non-urban populations were in fact mobile pastoralists. More broadly, did the appearance of such groups upset the careful balance struck by the Murghab farming communities that arose within the BMAC, or siphon off resources necessary to the agriculturalists' survival in any tangible way? And if these two distinct culture-economic groups co-existed for centuries, as the archaeological evidence suggests (Cattani 2008a; Cattani et al. 2008; Kutimov 2014), what influences might they have had on one another, and should we assume the earliest relationships were as antagonistic as later historical writings make sedentary-mobile interactions out to be?

The archaeological materials from Ojakly provide important data with which to address these questions, because they offer a first-hand account of a portion of the ancient population that remains chronically understudied and ambiguous, yet so clearly influential to the history of the

[13] Hiebert (1994a) distinguishes three chronological phases of the Murghab Bronze Age based on (dis)continuities in certain artifact classes: Period 1 (late Namazga V): 2200-1900 BCE; Period 2 (BMAC): 2000-1750 BCE; Period 3 (Takhirbai / post-BMAC): 1800-1500 BCE. This tripartite periodization of the later Bronze Age is followed by many scholars working in the region (See Table 1.1).

region. With these data, it is possible to address domestic and production activities at mobile pastoral sites, as well as localized trade and exchange patterns. The goal is to move the epicenter of research on interaction out of the urban context, where it has remained rooted both practically and theoretically for several decades, and give more weight to those behaviors and activities less often visible in the archaeological record.

Chapter 4: Excavation Overview and General Results

Following the questions raised about prehistoric sedentary-mobile interaction in Chapters 2 and 3, there is a clear need for concrete archaeological materials that can speak to the activities, practices, and patterns of the mobile communities engaging with settled farmers in the later Bronze Age Murghab (ca. 1800-1350 BCE). The results of excavation at Ojakly (Turkmen for "place with kiln"), presented here and in the following chapters, is a beginning step toward filling the data gap. The archaeological data follows multiple lines of investigation and represent the first comprehensive archaeological research program specifically targeted toward identifying the daily practices of prehistoric mobile pastoralists in the Murghab alluvial fan. In terms of dating and site complexity, Ojakly is currently the oldest and largest known mobile pastoral occupation site, securely dated by AMS charcoal sampling to ca. 1600 BCE (see below, Section 4.5). Since the appearance of mobile pastoral groups in the Murghab during the Late Bronze Age (ca. 1950–1500 BCE) is traditionally associated with significant changes in regional socio-political structures, these data are important for establishing the mosaic of localized strategies and their impact on the relationship between sedentary agriculture and mobile pastoral populations. In this chapter, I present the site organization and features, the habitation patterns and production activity, and the small finds as three lines of evidence for a mobile pastoral lifestyle at Ojakly. This, along with thorough faunal and archaeobotanical analyses (Chapter 5) and ceramic analysis (Chapters 6), presented in the chapters to come, highlights how Ojakly can be distinguished from nearby Late Bronze Age village settings, even as the production and trade economies between settled and non-settled groups were much more intertwined than has

previously been documented or discussed. Specifically, the presence of a ceramic kiln at Ojakly containing unfired ceramics of a type typically associated with sedentary farmers in the Bronze Age Murghab speaks to the transfer of technical knowledge between groups who nevertheless maintained distinct material cultural identities.

4.1 Site Identification and Surroundings

Beginning in the 1950s the Murghab region of modern Turkmenistan witnessed major agricultural development, a process intensified by the construction of the Karakum Canal through the second half of the 20th century (Lioubimtseva *et al.* 2014; Nesbitt and O'Hara 2000; Zonn 2014b). Today much of the Murghab alluvial fan is under intensive cultivation, primarily large-scale cotton and wheat farming (Lerman et al. 2012; Rustamov 2014). However, the impact of modern agriculture is much reduced in the northeastern Murghab, and this area consequently retains the best-preserved archaeological landscape and has been the focus of archaeological reconnaissance for the past two decades. Surveys have generally been transect-based, with sites identified by teams of walkers (Cattani and Salvatori 2008; Cleuziou et al. 1998). It was in this manner that Ojakly (originally field Site No. 1744) was first identified in 2009 by B. Cerasetti (ibid 2012), along the transect identified as C-D, approximately 6 km southwest of Auchin-depe, and 11.5 km east-northeast of Gonur-depe (Figure 4.1).

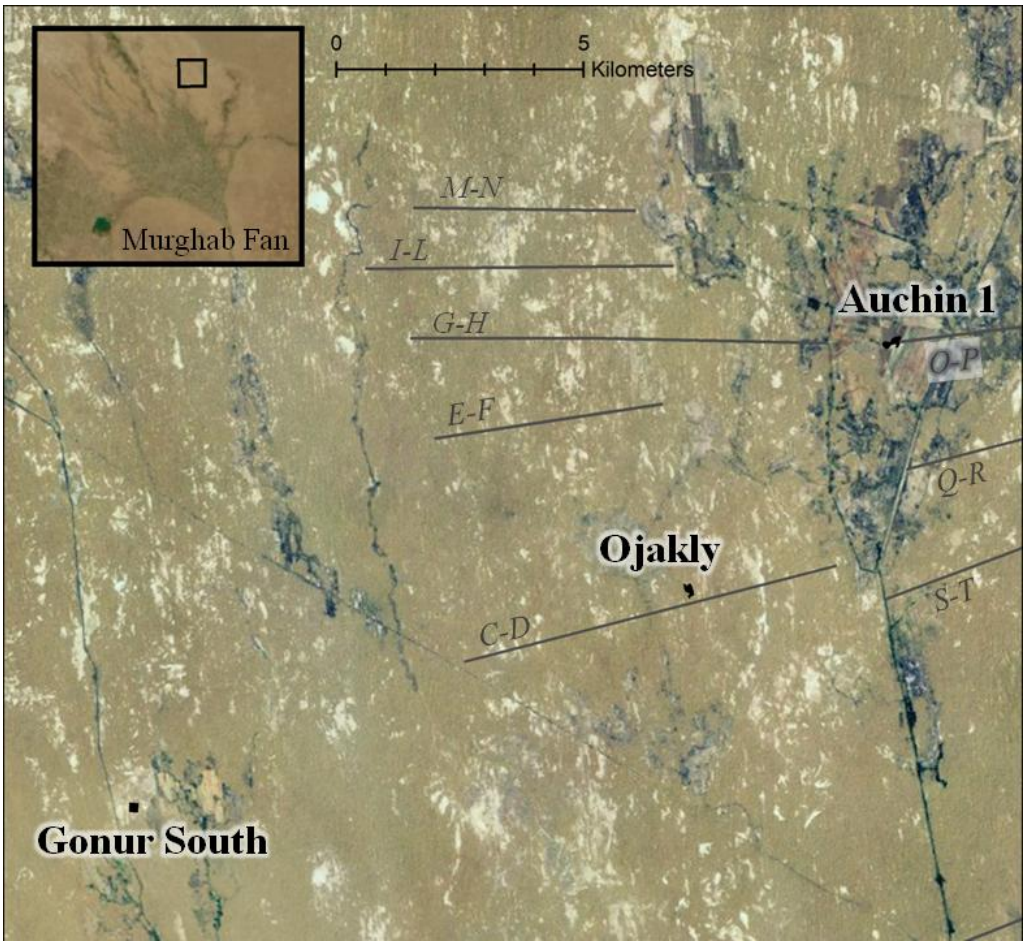


Figure 4.1: Location of Ojakly along October 2009 survey transect "C-D". Two major settlements also dated to the later Bronze Age are shown. All data courtesy of the Joint Mission.

Ojakly is located in a naturally flat area between an active sand dune, which forms the western boundary of the site, and smaller sandy hillocks that border the site on the east (Figure 4.2). A roughly north-south oriented paleochannel can be found 500 m to the northeast, evidence of an active water system sometime in the past. Though at present the precise dating of this and other paleochannels in the area is unknown (an important future research target), the presence of the paleochannel system near Ojakly demonstrates that natural water flows reached this area in the past, and would have provided water resources for both humans and animals in this otherwise arid environment.

Figure 4.2: Views from Ojakly of the surrounding landscape (note the viewer's position is not static W-E).

The site itself covers approximately 3 ha, and is distinguished from the surrounding landscape by the density and spread of surface material, mainly ceramics but also stone, which in places formed especially dense concentrations against the background surface scatter. These smaller, intra-site concentrations were originally identified as discrete sites during the October 2009 survey, but are now identified as numbered areas within Ojakly (Figure 4.3). The unique combination of Ojakly's unusually large size and the type of surface ceramics observed made it of great interest for investigating mobile pastoralists potentially belonging to the so-called "Andronovo" cultural group (see Doumani 2014 and Frachetti 2008a for discussions on the problems with this term). Surface pottery overwhelmingly (ca. 90%) consists of a certain class of handmade coarseware, often identified in the literature as "Andronovo" ware, "steppe" coarseware, or Incised Coarse Ware (ICW) (Cerasetti 1998; Hiebert 1994a; Kuz'mina and Lyapin 1984; P'yankova 1993; Sarianidi 1975). The remainder of Ojakly's assemblage is comprised of standardized, wheel-made ceramics belonging to the Late Bronze Age pottery tradition that characterizes assemblages at sedentary farming communities in the Murghab, often described as Namazga (NMG) VI ware (Cattani and Genito 1998; Hiebert 1994a; P'yankova 1989, 1993, 1996; but see Luneau 2010 for a good discussion of the issues regarding this nomenclature). A more detailed discussion of the differences between "steppe" handmade

coarseware and BMAC/Namazga VI ware is presented in Chapter 6, with a visual summary presented in Figure 4.4.

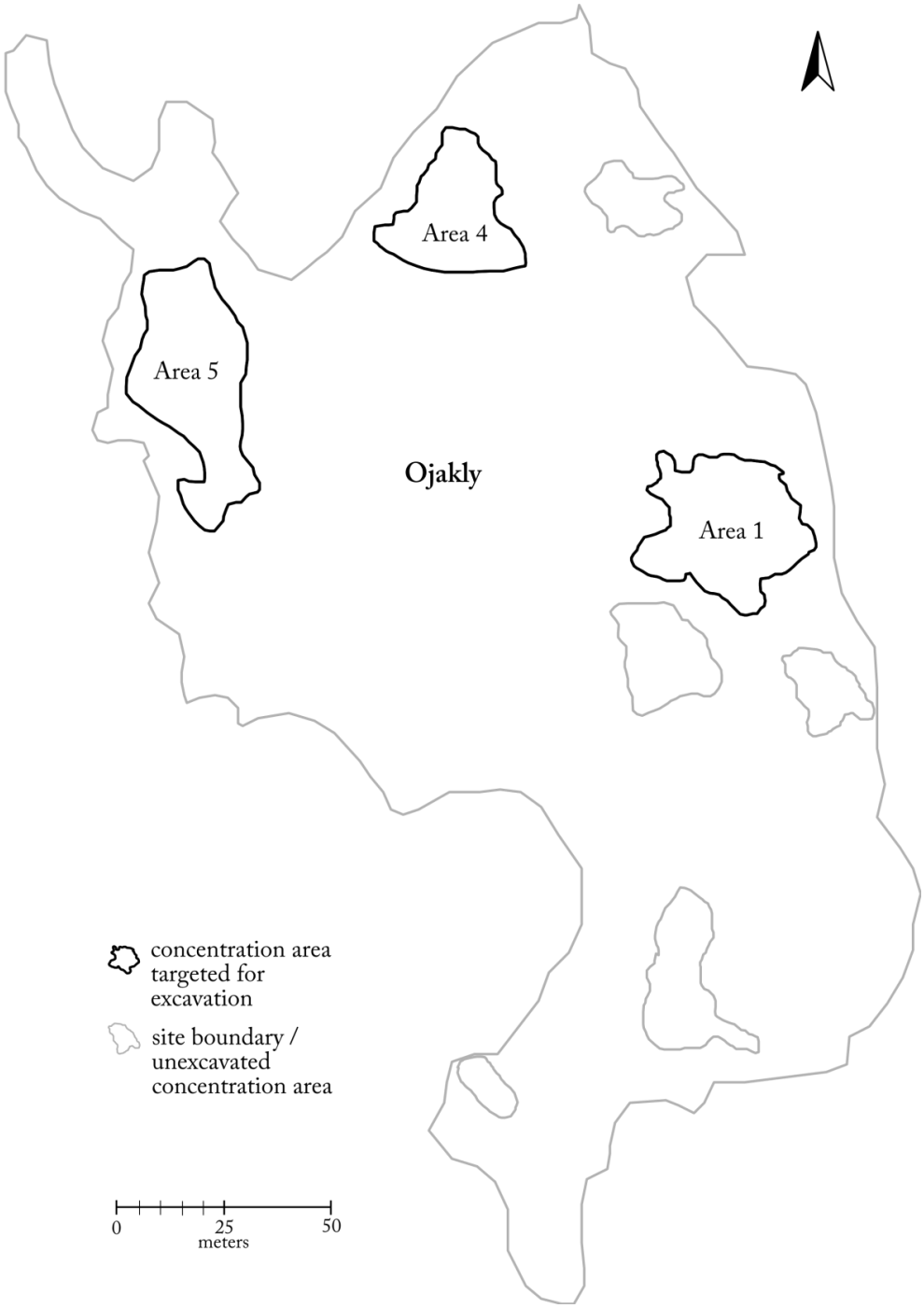


Figure 4.3: Schematic plan of Ojakly, with site boundary representing the overall spread of surface material. Internal areas of concentrated material are also noted. The three labeled concentration areas were excavated in 2010.

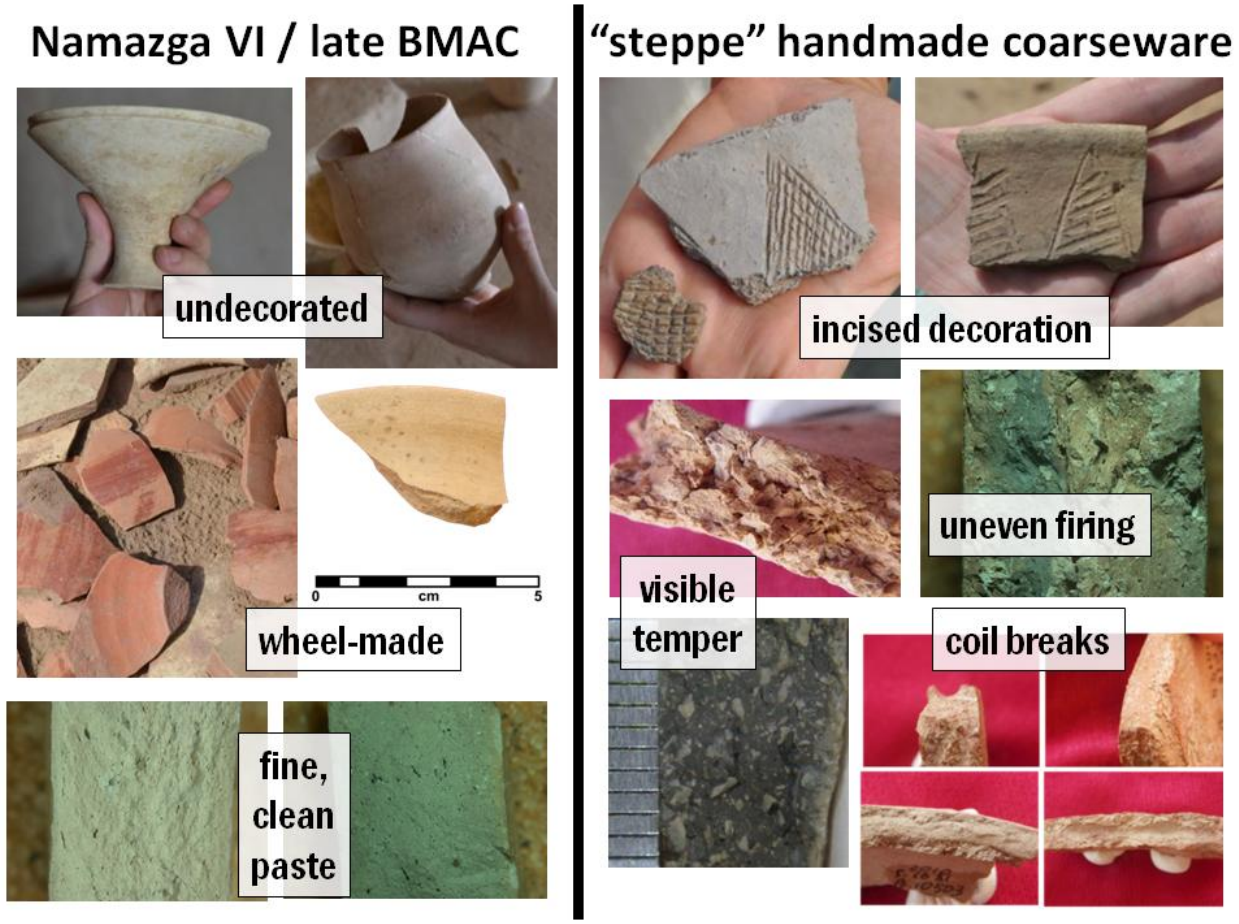


Figure 4.4: Visual comparison of differences between wheel-made ware of the Namazga VI (late BMAC) tradition and the handmade coarseware ("steppe" ware) that characterizes Ojakly's assemblage. A detailed textual description of these differences can be found in Chapter 6, Section 6.1.

Strong prevailing winds in the Murghab provide little opportunity for cultural soils to accumulate, and many sites in the northeastern zone where Ojakly is located are heavily deflated (Sarianidi 1975). Comments in Hiebert (1994a:91) and Miller (1999:13) indicate the strong Murghab winds equally affect archaeological preservation and research at architectural sites. For non-architectural sites, such as campsites, surface material is therefore reasonably representative of the limited subsurface remains (see also Cattani 2008a:145), and stratigraphy is limited. Excavation of these deflated sites is accomplished through broad horizontal exposure following

cultural and natural levels. This method produced good results, allowing the identification of at least two distinct cultural levels at Ojakly with associated archaeological remains.

4.2 Excavation Overview and Goals

The excavation of Ojakly served to address goals at different levels of the dissertation research. At the most granular level, the targeted excavations at the site have been aimed at recovering archaeological material that can directly address the commonly-held, but heretofore qualitative assumption that small, predominantly "steppe" coarseware sites such as this should be identified as mobile pastoralist campsites datable to the Late Bronze Age. To this end, a primary goal has been to use Ojakly as a baseline example for identifying the occupation patterns and daily activities of groups inhabiting similar such sites, as well as to begin the systematic collection of faunal and archaeobotanical remains that can speak to the subsistence practices and food consumption patterns of their inhabitants (presented in Chapter 5). At a broader research level, the data at Ojakly are meant to address more specifically the somewhat nebulous concept of sedentary-mobile interaction, especially as it relates to the later Bronze Age Murghab context. I have attempted to address those specific goods and practices that either overlap or diverge between Ojakly and contemporary settled farming sites in an effort to characterize localized exchange patterns and contacts. Finally, at the most theoretical level, Ojakly provides an opportunity to step beyond the paradigms of dependence and diffusion that underlie the way we think about sedentary-mobile relationships, by examining the ways localized groups participated in their social worlds, in part through the manipulation of practices, material objects, and meaning.

4.3 Excavation Methods

Excavations at Ojakly were carried out over the course of two, one-month field seasons, which took place in May and October 2010. In May 2011, an in-field ceramic analysis was conducted. The reasoning for the non-contiguous field research was driven by the extreme heat of Murghab summers (already by late May temperatures were daily over 49° C/120° F), the difficulty and expense in obtaining long-term work visas for Turkmenistan, and the scheduling of collaboration with colleagues. During the 2010 excavation seasons, the small excavation teams (3-8 people) included American, Italian, British, and Iranian members, as well as a local specialist from the Turkmen Ministry of Culture and local workmen from our host village.

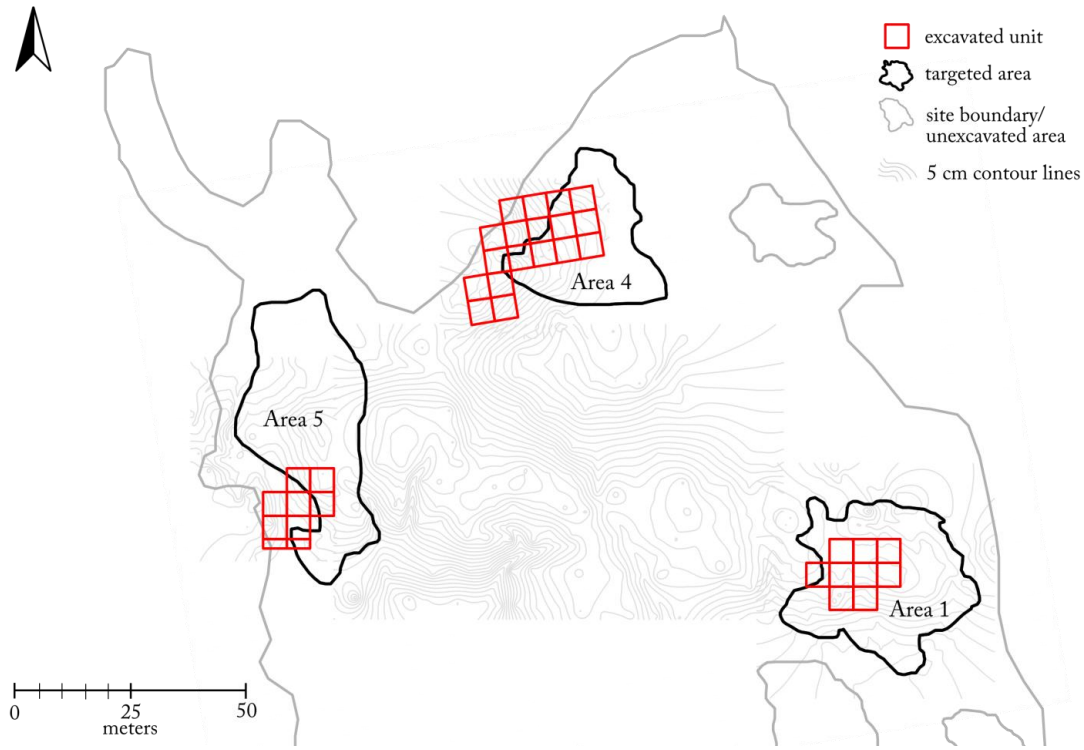


Figure 4.5: Excavation units (each 5 x5 m) at Ojakly: Areas 1, 4, and 5.

In total, three areas were excavated within the site using a system of 5 x 5 m squares tied to a Murghab-wide grid system (Cerasetti *et al*. 2014), opening a total of 845 sq. m (Figure 4.5).

Areas 1 and 5 were opened in May 2010, while work began in Area 4 and continued in Area 5 in October 2010. Unlike the artificial layers or whole-room contexts that are used to record other excavations in the Murghab (author, personal observation), at Ojakly excavations followed recognizable stratigraphic contexts, identified using a Locus recording system. Individual Locus numbers were assigned for surface clearing/artifact pickup (in this instance, assigned to 1 x 1 m squares within the parent 5 x 5 m square for greater spatial control), and initial surface scrape (the top 1-2 cm of the full 5 x 5 m square), along with all recognized features, fills, and soil discolorations. Within each Locus, Basket numbers further helped identify particular artifacts and areas of collection. Thus, Square, Locus, and Basket numbers provide spatial location in order from most general to most specific. Spatial control was also maintained using a Total Station (various Topcon models were used) fixed on a point with known coordinates, although the sandy soil and shallow stratigraphy of the site rendered it most useful for horizontal rather than vertical control. Spatial data recorded in-field is linked to databases housing both in-field and post-processing analysis results through an overall site GIS.

All excavated soil, from surface scrape down, was sieved on-site using a 2.5 mm (⅛ inch) mesh shaker-screen. Any ceramic or bone fragments not collected in-situ were picked out of the screen and added to the appropriate Basket collection. Samples for flotation were taken from nearly every Locus context across the site, with some Loci (pit fills, for example) entirely sampled. More details on flotation procedures are given in Chapter 5, Section 5.1. Each day, all collected material was transported back to the field laboratory[14], where preliminary identifications, counts, weights, and any measurements were taken during the evening work cycle. All ceramics and clay objects, stone tools, metals, and any unusual finds were

[14] The field laboratory and home base during field seasons were in a residential compound in Sovkhoz Ashgabada, a large village grown out of the Soviet-era *sovkhoz* [*совхо́з*] (state farm) then called Sovkhoz Moskva. From this village, the one-way commute to Ojakly is 2 hours and requires a 4-wheel vehicle able to traverse sand dunes.

photographed. Faunal remains, heavy and light fraction from flotation samples, and charcoal samples were exported back to Washington University in St. Louis for analysis; all remaining materials were carefully inventoried and packaged for storage at the Merv Archaeological Park (locally referred to simply as the *zapovednik* [*заповедник*] – lit. "preservation or conservation area").

4.4 Site Organization and Occupation Phases

Excavations focused on three of the areas of visibly densest surface material in the northern sector of Ojakly, each located within 100 m of one another (Figure 4.5). Each of these three areas was targeted for a different reason. Area 1 exhibited a small rise in elevation (ca. 1 m) from the surrounding ground surface, suggesting a built-up occupation area. Area 4 stood out for the presence of very thick, rough, flat ceramics not identified anywhere else within the material spread of Ojakly, which suggested specialized activity. Surface finds in Area 5 indicated a production area, with numerous large amorphous burnt-clay pieces, initially identified as and later confirmed by excavation to be kiln fragments from an in situ kiln contemporary with the rest of the site. These three areas revealed two living areas (Area 1 and Area 4) and a production or working area (Area 5).

4.4.1 Living Areas (Area 1, Area 4)

In each of the living areas, two distinct cultural levels were recognized in shallow deposits. Post-holes were distinctly present on each level, as well as associated features such as storage pits, fireplaces, oven-like structures, and in the case of Area 4 also a refuse deposit.

Although the sheer quantity of postholes (roughly 100 in each living area) makes it impossible to distinguish the footprints of individual structures, their spatial distribution and association with distinct stratigraphic levels recognized in situ suggests a repetitive use of the same location for temporary structures. Although tents similar to modern yurts cannot be ruled out, the presence of large quantities of daub (many with examples of reed or other vegetal impressions) in particular association with the postholes strongly implies these structures were non-permanent reed-and-daub constructions. Such temporary structures are still known in the Murghab region, particularly associated with mobile Baluchi Turkmen populations (observations made by Joint Mission members, personal communication, Figure 4.6).

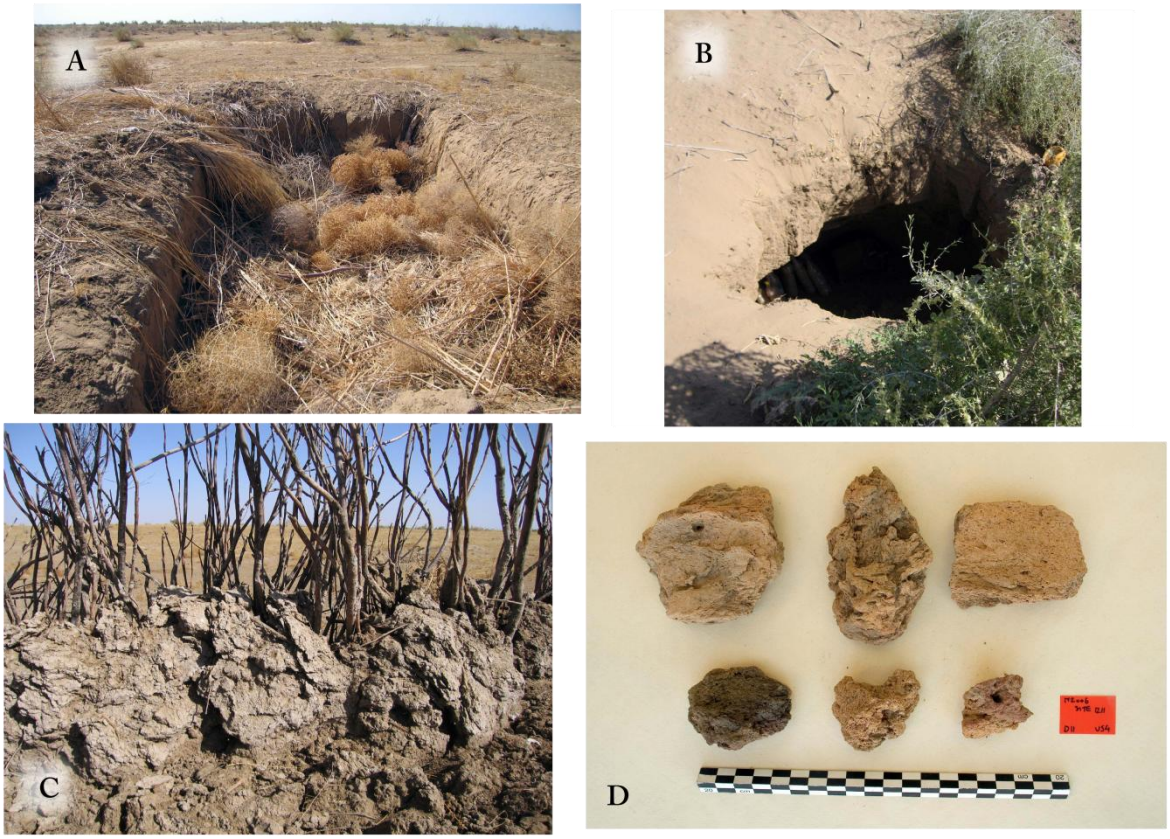


Figure 4.6: Seasonal, temporary structures made by Baluchi Turkmen in the Murghab in the present day: A) a semi-subterranean dwelling approximately one year after its abandonment; B) a temporary storage pit for keeping grain (in this case inside 1 L plastic bottles; C) detail of construction of the upper wall of a structure similar to that in image A) – note the use of reed and daub (dried clay) plastering; D) reed-impressed pieces of daub recovered from excavations at Site 1211/1219 (Chapter 3, Section 3.3.4), which are comparable to those found at Ojakly. All images courtesy of M. Cattani, B. Cerasetti of the Joint Mission (Joint Mission 2006).

In Area 1, excavated in May 2010, nine 5 x 5 m squares were opened. As with the other living area, Area 1 revealed two successive occupation phases identified by post-holes. The earlier, first phase is characterized by a large feature of red baked clay in the center of the excavation unit, which may have been a cooking-related fireplace, adjacent to a compacted platform area in the northwest of the unit (Figure 4.7). All the postholes related to this phase were found on this compacted platform, and in square R-IX a subset of these seemed to mark out a circular, sunken feature. Above the first phase, a later second phase is characterized by a compacted surface with numerous associated postholes and pits, but has no clear orientation or recognizable platform features (Figure 4.8). The red baked-clay fireplace feature from the earlier phase protruded up into the layers of this phase as well. A portion of square R-X (Locus 530) (marked on Figure 4.7) was excavated down beyond the cultural levels to ca. 40 cm, revealing alternating layers of sand and alluvial fills, 5-10 cm thick.

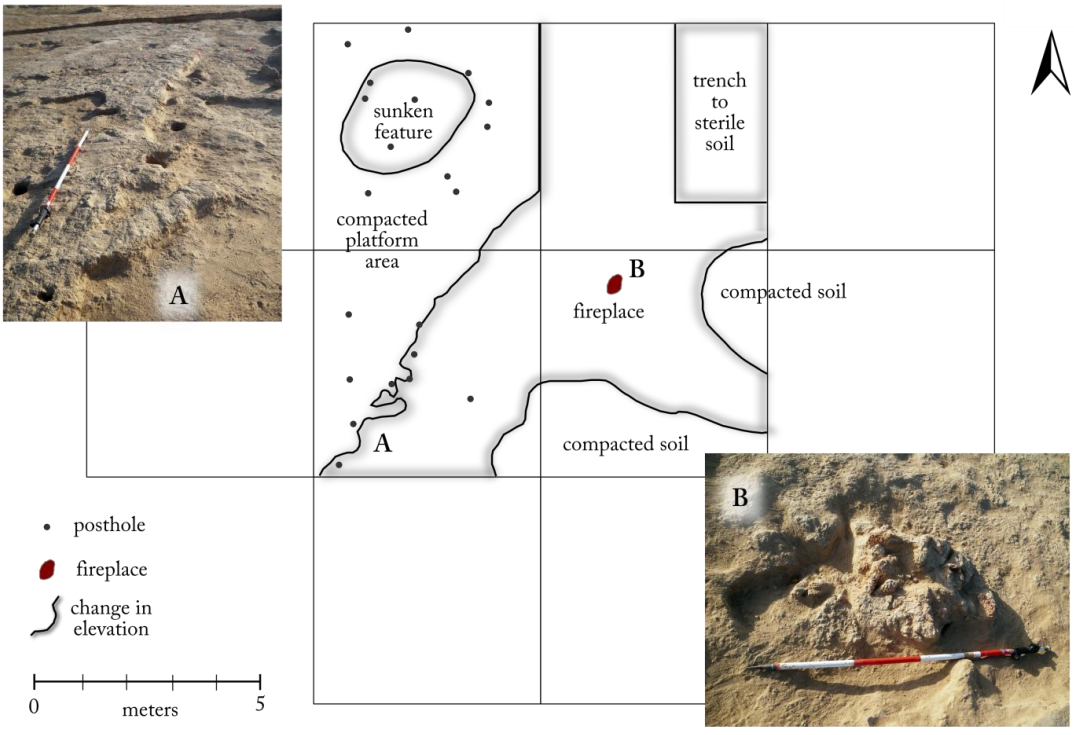


Figure 4.7: Plan of the first (lower) living phase in Area 1. A) Edge of elevated platform area. B) Fireplace structure.

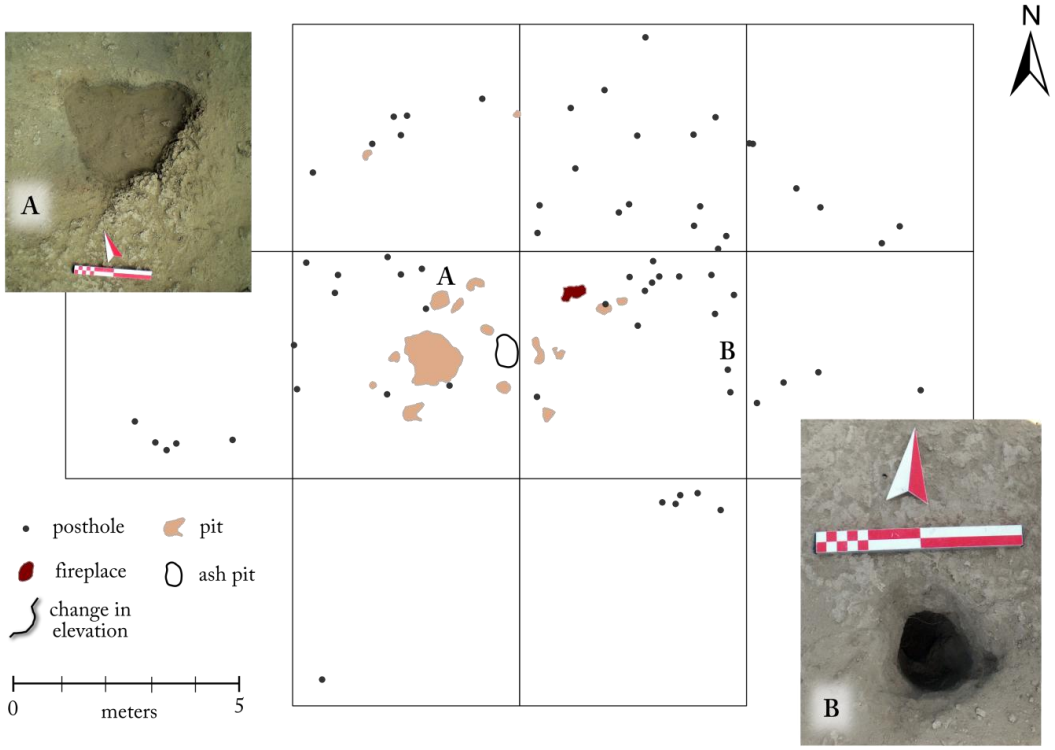


Figure 4.8: Plan of the later (upper) living phase in Area 1. A) A small pit. B) Example of a posthole.

Within the second living area, Area 4, it was possible to distinguish differentiated domestic activity areas. Here a distinct type of coarse, thick, flat ceramic not identified anywhere else at Ojakly was identified as *cookware* (Figures 4.9); the concentration of cookware around fireplaces and discolored areas of soil seemed to confirm this designation (Figure 4.10), and reveals the patterned spatial use and discard of this rough pottery. Area 4 also contained a midden where the site's inhabitants appear to have deposited and burned refuse material. From this relatively thick layer (ca. 20 cm), a large number of burnt and partially-burnt animal bones (see Chapter 5, Section 5.2), ceramic sherds, charcoal, and one specialized stone tool (see below, Section 4.5.1) were recovered. When mapped out, it is clear that cooking activities, living areas defined by the concentration of postholes, and refuse areas were kept spatially distinct from one

another, an organizational pattern common to pastoralist habitations (Marshall 1990a, Mbae 1990), and repeated across successive occupations (Boroffka et al. 2002; Kuz'mina 2007). Pits and fireplaces are also commonly found in the dwellings of Bronze Age mobile pastoralists at sites in Uzbekistan (Avanessova 1996; Itina 1977). Though no corrals or animal pens were identified at Ojakly, their separation from living areas and the swiftly-acting natural taphonomic processes in the Murghab (wind and water action) may have worked in conjunction to obscure the visible traces of such features, making them difficult to identify archaeologically.

Figure 4.9: Examples of *cookware* in Area 4: A) cookware resting on the surface prior to excavation of shallow deposits; B) and D) present two views of the same pieces of cookware to illustrate its flat, thick construction and uneven exposure to heat; C) additional examples of cookware.

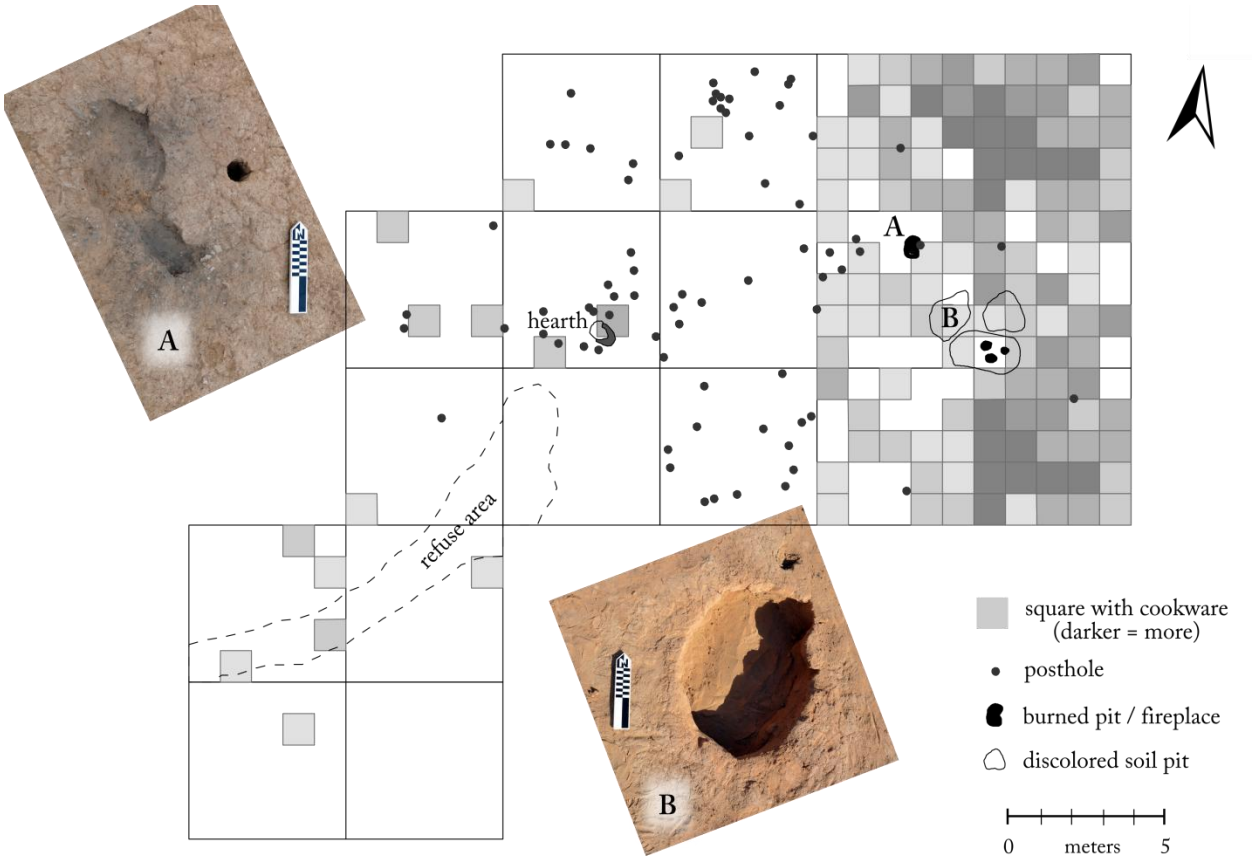


Figure 4.10: Area 4, showing the separation of refuse, cooking, and dwelling spaces. A) Fireplace and posthole. B) Large pit of orange-tinged soil.

4.4.2 Ceramic Kiln and Production Area (Area 5)

Area 5 of Ojakly (originally designated Site No. 1685 during survey in October 2009) was characterized by a significant concentration of large, amorphous, unevenly-burned clay fragments thought to be the remains of a kiln, as well as a large amount of NMG VI wheel-made and handmade ICW fragments (Figure 4.11, the surface before excavation, and Figure 4.12, kiln fragments). This unique combination of concentrated surface material warranted a more detailed investigation, and in May 2010 excavations began with the opening of a 10 x 12 m grid (four 5 x 5 m squares and two 2 x 5 m squares) that encompassed the probable kiln structure (as judged from the surface remains) as well as the immediately adjacent areas that may have been used for

related production activities. This grid was later expanded to include three additional 5x5m squares, for a total excavation area of 195 sq. meters (Figure 4.13).

Figure 4.11: View of Area 5 at first identification of the site in October 2009 (left), and at the start of excavation in May 2010 (right), roughly similar views looking NE (note the correspondence of the two large kiln fragments near the center of the photos). A large saxaul (green shrub in the photo at left) was growing atop the kiln and had to be removed; its root had grown down the length of the subsurface fuel chamber and destroyed part of the structure along the north wall.

Figure 4.12: Close up view of kiln fragments found in Area 5.

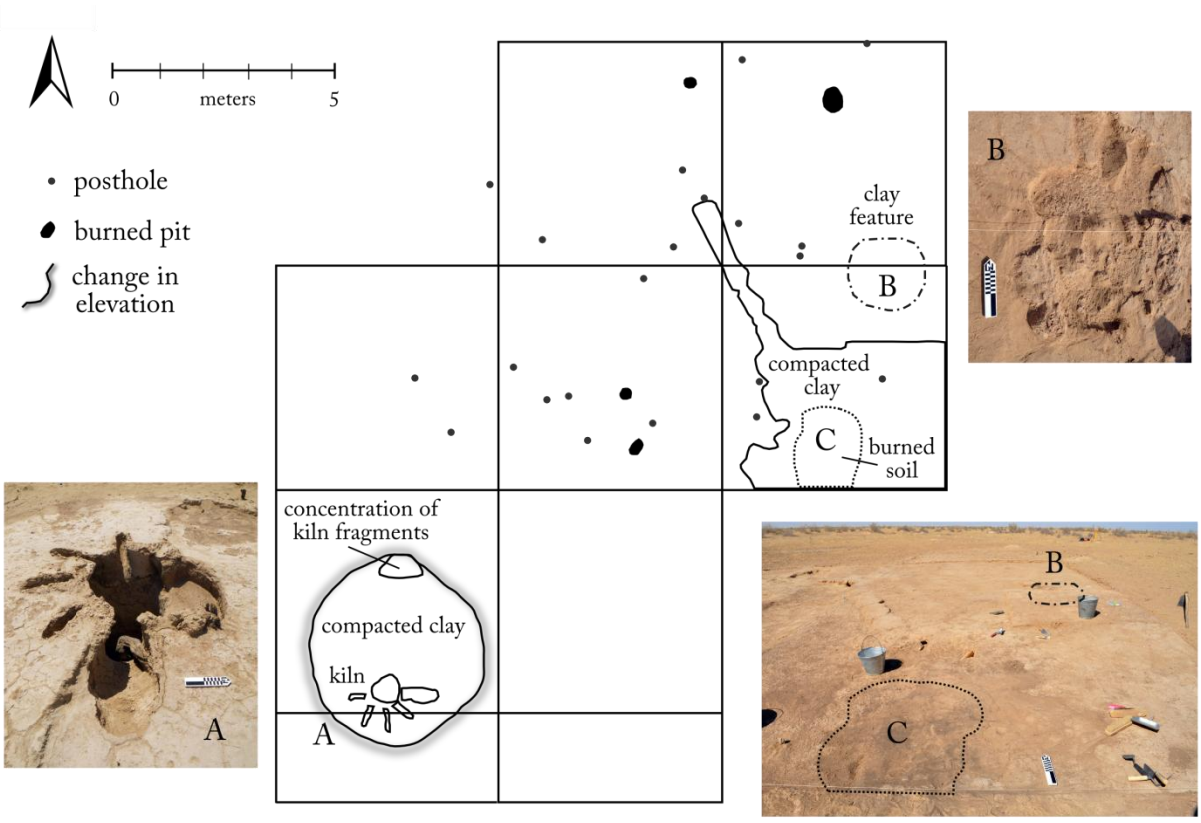


Figure 4.13: Plan view of excavations in Area 5. Note the change in north orientation in photo of kiln (A). A large circular clay feature of unclear function (B) was located near an area of discrete firing events marked by burned soil lenses (C).

The features and layout of Area 5 represent a primarily working or production area, as opposed to a habitation area like that seen in Areas 1 and 4. The most salient feature of production activity, and perhaps the most significant archaeological feature at Ojakly overall, is a subterranean ceramic kiln located in squares Q-XIII and Q-IX (Figure 4.14). Careful excavation revealed the kiln's form to be a vertical double-chamber construction, unusual in terms of size and structure for such an otherwise ephemeral site (see Bonora and Vidale 2008 and Masson 1959 for kiln comparisons). The preserved portion lies below ground level and represents the clay-lined lower fuel chamber and air conduit tunnels that radiate out and up toward the surface. The fuel chamber has its mouth opening to the east, and is square in plan with rounded corners

(75 x 77 cm). The air tunnels emanate from each of the corners of the central chamber, as well as from the middle of the south and west walls (another conduit was presumably destroyed on the north wall by the recent growth of a saxaul shrub on top of the kiln, visible in Figure 4.11). Including the air conduit tunnels and the larger fuel mouth opening to the east, the kiln reaches a maximum footprint of 2.0 m. The depth of the fuel chamber is 1.5 m, and all interior surfaces (walls, floor, and air conduits) were carefully lined with clay by hand; finger-marks are visible across this entire surface (Figure 4.15).

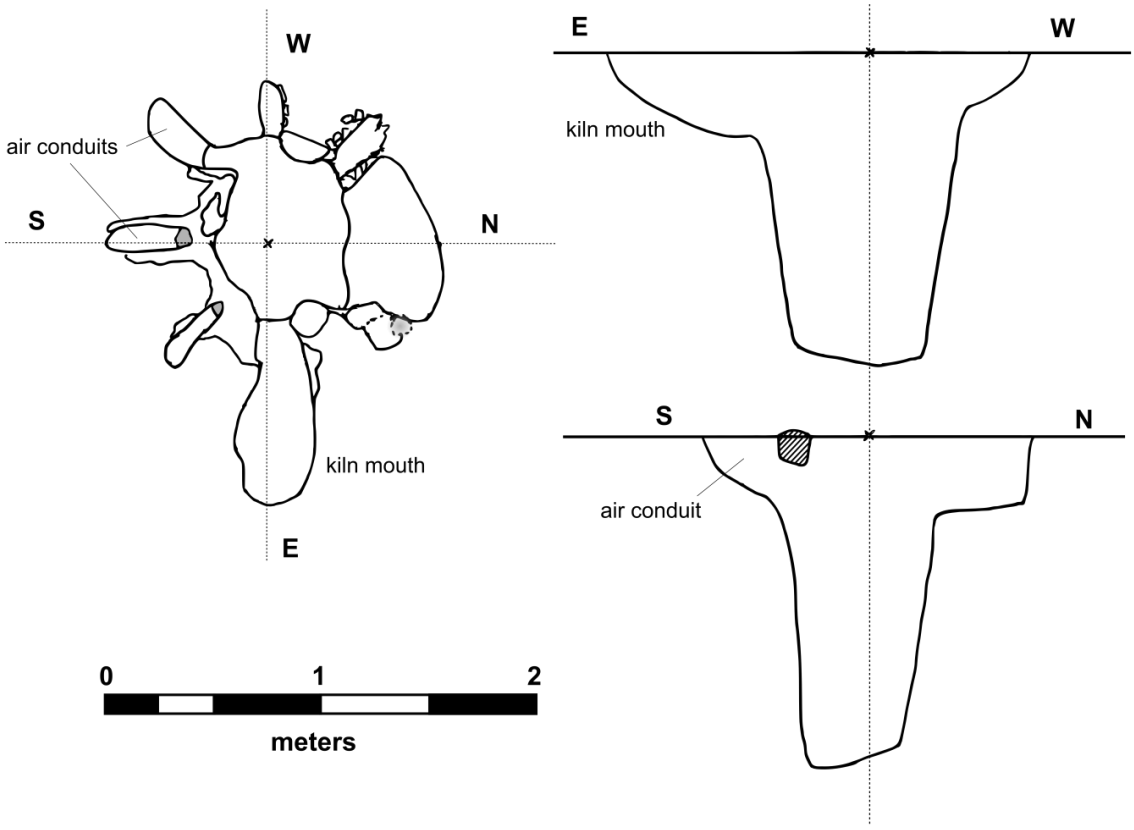


Figure 4.14: Plan and side schematic views of the subterranean fuel chamber and air conduit tunnels of the ceramic kiln excavated in Area 5. Above this would have been a removable dome superstructure housing the greenware for firing, which was represented only by the recovered kiln fragments.

Figure 4.15: A view from inside the excavated kiln, looking up through the air conduit tunnels. Notice the visible finger impressions left in the clay wall lining as it was spread by hand. Tracing the impressions it was possible to understand that the clay was spread upward by someone sitting on the surface, leaning down into the kiln.

The upper, above-ground portion of the kiln would have consisted of a removable dome structure enclosing a grate surface where the greenware to be fired rested, although neither of these features was intact in this example. Instead, the dome feature was represented by the many kiln fragments found on the surface and within the fill of the fuel chamber, unevenly baked to green, purple, and brown-red colors. That the kiln was in fact meant to be operational is evidenced by the unfired pottery found at the bottom of the interior fill of the fuel chamber (see below, also Chapter 6, Section 6.4.3.1).

The sandy fill inside the kiln was rich in archaeological material, including kiln fragments of various sizes (including some pieces weighing up to 9 kg), fired and unfired handmade pottery, faunal material, and plant remains. Notably, the fauna in the kiln was different than that at the site as a whole, consisting of non-meaty *Bos* cranial fragments and incisors from more than one pig (*Sus* sp.) (see further discussion of faunal remains in Chapter 5). Furthermore, these bones were consistently located, at differing depths, in the southeast corner of the kiln chamber, and in one instance the bones seem to have been placed together with a rounded pottery disc (function unknown). The type and placement of faunal material inside the kiln fill suggests intentional interment rather than refuse dumping. The bottom 20 cm of kiln fill was grey ashy soil quite distinct from the sandy fill above, and within this layer unfired ceramics and fired terracotta spacers (discussed below) were found, as well as a single mudbrick (Figure 4.16).

The kiln seems to have collapsed during the early stages of the firing process and been abandoned for subsequent production. This scenario explains the ashy bottom fill, where fuel had started to burn, and the disarticulated unfired ceramics and terracotta spacers within it, which fell to the bottom when the grate holding them collapsed. Field experiments demonstrated that the unfired ceramics had not reached a temperature sufficient to begin the firing process, as samples could easily be dissolved in water, and this supposition was confirmed by further laboratory analysis on the samples conducted at the University of Bologna (see Chapter 6, Section 6.4.2). This collapse during firing scenario also explains the many large pieces of the kiln structure found within the fill, which were likely part of the collapsed superstructure. Similarly, the single mudbrick found near the bottom fill (Figure 4.16, c) could have been used for airflow regulation

at the top of the superstructure (H. Miller, personal communication), and would thus also have fallen into the kiln upon the superstructure's collapse.

Figure 4.16: A) The lowest layer of kiln fill contained 20 cm of gray ash above a plastered floor. B) A number of remains were recovered in this fill, including kiln fragments, fired and unfired ceramics, and C) a single mudbrick.

In addition to the kiln, the working or production nature of Area 5 was also demonstrated by the presence of a large, circular, baked clay feature (1.5 m in diameter) and a surface layer exhibiting discrete firing events in squares L-VII and L-III (see Figure 4.13), located to the northeast of the kiln. North of the kiln and west of the firing/clay feature area, a number of postholes and several discrete compacted clay surfaces were present, though no clear association could be recognized that might indicate whether these belonged to interior or exterior floors or individual structures.

4.5 Site Dating: AMS Radiocarbon Results

Numerous charcoal samples were collected during the course of excavation, and additional carbonized grains and charcoal were recovered from flotation samples. In total, 14 samples were selected for radiocarbon analysis, 13 of which returned useable dates (one outlier, not shown, returned a modern date and can be explained by rodent activity at the site). The overall results are extremely consistent across the different areas of the site (Figure 4.17), placing the occupation of Ojakly at roughly 1600 BCE Although any phasing within the site is rather speculative, Area 1 appears to date slightly earlier than Areas 4 and 5, though their 2-sigma ranges (95% confidence intervals) do overlap. Overall, even accounting for repeated occupations or possible phasing of the site, the dates from Ojakly place its occupation firmly within the local Late Bronze Age (1950–1500 BCE), and more specifically within the Takhirbai phase (1800-1500 BCE) that has been suggested to characterize the last substantial occupation of the northern part of the alluvial fan and the decline of the socio-political entity identified with the Bactria-Margiana Archaeological Complex (BMAC) (Cattani 2008a; Hiebert 1994a; Salvatori 2008a). This period is also marked by the noticeable increase in archaeological materials related to non-urban pastoral groups in the Murghab (Salvatori et al. 2008). None of the sampled deposits from Ojakly should be considered as belonging to the Final Bronze Age (1550-1350 BCE), thereby making Ojakly the earliest mobile pastoral occupation currently documented in the Murghab.

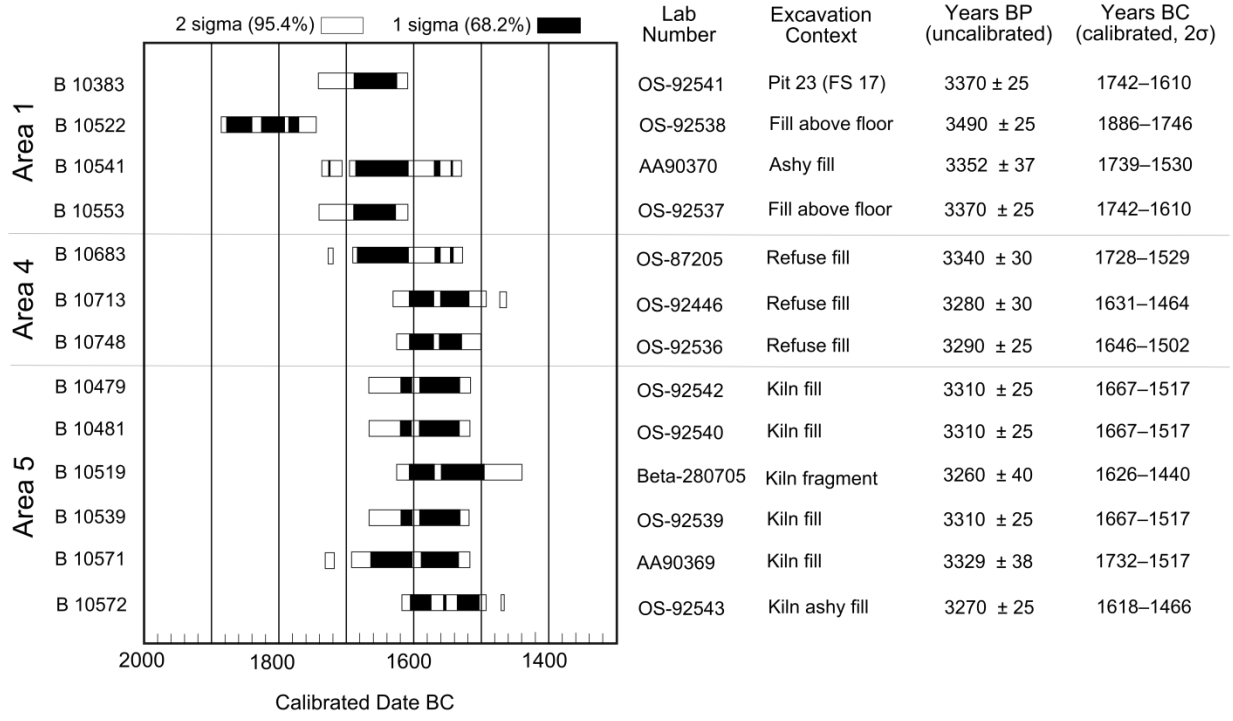


Figure 4.17: AMS dating of samples from Ojakly. Adapted from Oxcal v4·1·7, calibration curve IntCal 09 (Bronk Ramsey 2009). Image from Rouse and Cerasetti 2014: Figure 3 (Copyright © 2014, Trustees of Boston University).

4.6 General Material Results

Overall, the spatial layout and repeated, ephemeral occupations of Ojakly support the conclusion that the site was occupied by mobile pastoral groups. In the following chapters, faunal and archaeobotanical remains are presented to further support this conclusion (Chapter 5), and details of the ceramic assemblage are used to advance the conclusion that Ojakly's inhabitants belonged to a socio-cultural group distinct from that of nearby sedentary farmers (Chapter 6). Before turning fully to those discussions, however, I present data on some of the additional small finds from the site: stone objects, non-ceramic clay objects, and metal finds.

4.6.1 Stone Objects

Stone is not a naturally available resource in the Murghab alluvial fan (Hiebert 1994b), meaning that all stone present on site must have been transported there by human activity and is therefore analytically significant. Twenty-six stones were recovered in total, many of which showed significant signs of weathering due to prolonged surface exposure. Of the twenty-six recovered pieces, ten pieces were collected from the surface of unexcavated areas of the site, seven from the surface of excavated squares, and nine from secure below-surface deposits. No single piece of stone recovered during excavation exceeded 10 cm in maximum length, and most averaged around 5 cm in maximum length, making these pieces easily transportable and supporting the observation that all stones on the site were manuports.

A careful visual inspection of the recovered stone was carried out to determine which pieces could positively be identified as worked by human action and which were likely to be unworked natural stones (though still nonetheless manuports). This informal analysis was aided by Steven Goldstein of the anthropology department at Washington University in St. Louis, and revealed four categories or groups of stones, two of which should be called natural stone and two of which should be called worked stone.

Stones in the first group are small in size and are of natural, unworked granular material exhibiting thermal breaks. These were likely brought to the site to serve general, expedient functions, for example as small weights. A second group of natural stones are generally of the same material type but are distinguished by having one or more flat faces. Although there is no evidence that the faces are anything but natural, these flatter stones would have been useful as wedges in postholes to secure a better fit for wooden posts (and indeed, there were a number of postholes recorded with small stones or broken ceramics embedded in the sidewalls). Small

pieces of natural, unworked stone were likely left in and around the site for as-needed use as people reoccupied the site.

Two of the recognized groups of stones could positively be identified as worked stones (Figure 4.18). Two stones exhibited a lemon-shape that is unlikely to be natural, and both are either polished or pitted on their pointed ends, probable signs of anthropogenic use as tools rather than the effects of natural abrasion. The final group of identified stone is made up of small pieces of basalt with smoothed faces meeting at angles too sharp to have occurred naturally. All of these pieces appear to be flakes coming from larger basalt groundstones, and many of them show further use wear along their edges. Basalt is a common and good groundstone material used in many regions, including the Murghab, though the nearest sources are found in the Kopet Dagh (Hiebert 1994b), and it is likely these pieces broke off accidentally through normal use, and were subsequently re-used as expedient tools because of the scarcity of stone material in the area.

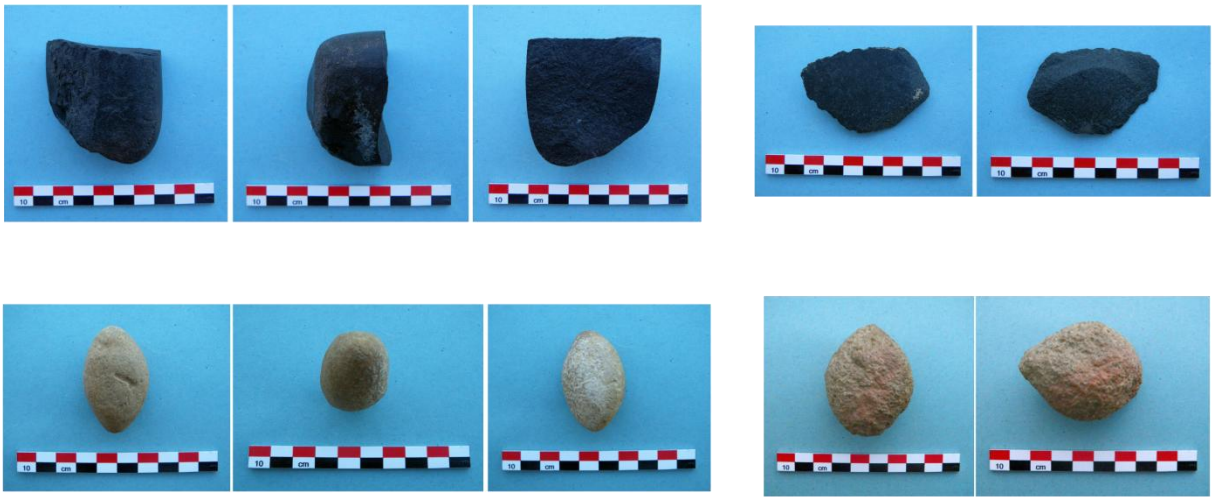


Figure 4.18: A sample of worked stone from Ojakly. Top row shows two examples of basalt fragments. Bottom row shows two examples of lemon-shaped stones.

During the 2009 survey that first identified Ojakly, an interesting stone disc was recovered from the surface of Area 5 (Figure 4.19). Since it was not collected during excavation

in gridded squares, the exact context of this stone and its association with the production activities that seem to have been taking place in Area 5 are uncertain. The stone disc is approximately 12 cm in diameter and 5 cm thick. One of the circular surfaces is slightly convex, while the other and all the way around the edge are slightly concave. There is a slight resemblance and size parallel to the so-called "Bactrian Disks" often sold at auction houses, although this example would be missing the groove bisecting one surface. Even so, the function of this stone remains unclear, although it would appear to be for a specific rather than a general purpose.

Figure 4.19: Stone disc of unknown function recovered from the surface of Area 5 during survey reconnaissance in October 2009.

Finally, within excavated contexts, a single unique and clearly identifiable tool was recovered from the refuse deposit in Area 4 (Figure 4.20). Made of a smooth greenish stone, possibly steatite, this implement was purposefully shaped and polished into an oblong piece with one flat side and one working side. On the working side there is a grooved notch at each end, while in the middle where the width is thickest there is a clear depression that appears to have been worn away through use rather than intentionally created at the outset. Scratches are also

visible on this working side, leading to a supposition that this piece was used as a knife sharpener.

Figure 4.20: Stone tool, possibly a knife sharpener, found in the refuse deposit during excavations in Area 4.

Overall, the stones and stone tools recovered at Ojakly do not exhibit any clear pattern or indications of use related to one particular type of activity, but are more consistent with expedient and generalized tool use. Despite the presence of flakes that clearly came from basalt groundstones, we cannot assume that basalt groundstones were ever present on site (given that none were recovered), as the already-broken pieces may have been brought from elsewhere. Save for two examples – one without a clear associative context and one that may have been accidentally lost during refuse dumping – the lack of any clear, single-purpose stone tools is probably best explained by the scarcity of stone in the region, making such tools valuable implements that served multiple functions and were unlikely to end up in archaeological habitation deposits.

4.6.2 Non-ceramic Clay Objects

Although not numerous, non-ceramic clay objects from Ojakly are worthy of note. Thirteen fired clay lumps can be tentatively identified as fragments of crude animal figurines. These are not part of the broader Namazga III-V figurine tradition where stylized human figures are represented in flattened, violin-shaped forms (Hiebert 1994a, 1994b; Kohl 1984; Masson and Sarianidi 1972, 1973). Rather, the Ojakly figurines fit within the long-standing Central Asian

tradition of free-standing, naturalistic representations of animals (Hiebert 1994a:143), although all the samples recovered during excavation were fragmentary (Figure 4.21). Larger fragments resemble animal torsos, and many smaller fragments could be interpreted as legs. The Ojakly figurine fragments appear to be simply and quickly formed, without any serious investment of labor time. Parallel examples can be found in the habitation sites of Bronze Age mobile pastoralists of the Tazabag'yab groups, who occupied areas south of the Aral Sea (Itina 1977:Figure 69; see comparison of these and Ojakly samples in Figure 4.21). Hiebert (1994a, 1994b) also reports free-standing animal figurines from Late NMG V and NMG VI sites in the Murghab, although finds from the Takhirbai period (when Ojakly was occupied) are not specifically mentioned. If the inhabitants of Ojakly were heavily involved with animals in their daily life, naturalistic animal figurines would not be out of place.

Figure 4.21: A sample of the simple figurine fragments excavated at Ojakly. These might represent fragments of animal figurines like those found in the occupations of Bronze Age Tazabag'yab mobile pastoralists, south of the Aral Sea (cf. Itina 1977:Figure 69).

4.6.3 Metal Fragments

Fewer than 15 pieces of copper metal were recovered during excavation at Ojakly (the majority from Area 5), none bigger than 1 cm. Ten of these should be identified as copper droplets: spheres of copper metal with a diameter of < 1 cm. Additionally, excavations recovered two copper beads (both measuring < 1 cm) and two thin, flat, slightly curved fragments (length 1 cm) that appear to be from a small band. Figure 4.22 gives some examples of these small fragmentary pieces of copper. Three small mold fragments were also recovered: two re-fittable fragments from the surface of Area 5 collected during the initial survey and identification of the site in 2009, and one found within the kiln fill during excavation in 2010 (Figure 4.23). Despite these finds, there is no clear evidence for copper smelting or metal working anywhere on Ojakly in the form of slags, crucibles, or stained stone or ceramic tools. Taken together with the scarcity and fragmentary nature of the metal finds (none of which are associated with the molds whatsoever), it would be a substantial leap to suggest copper production was an activity practiced at Ojakly. Rather, the inhabitants seem to have had access to metal, perhaps in small quantities, but were not metallurgists by trade or engaged in any way in metal production at the site, an observation contrary to documented practices of Late Bronze Age "Andronovo" mobile pastoralists recorded in southern Tajikistan (Boroffka et al. 2002; Vinogradova 2004; Vinogradova and Kuz'mina 1996) and in central Eurasia more generally (Kuz'mina 1994a).

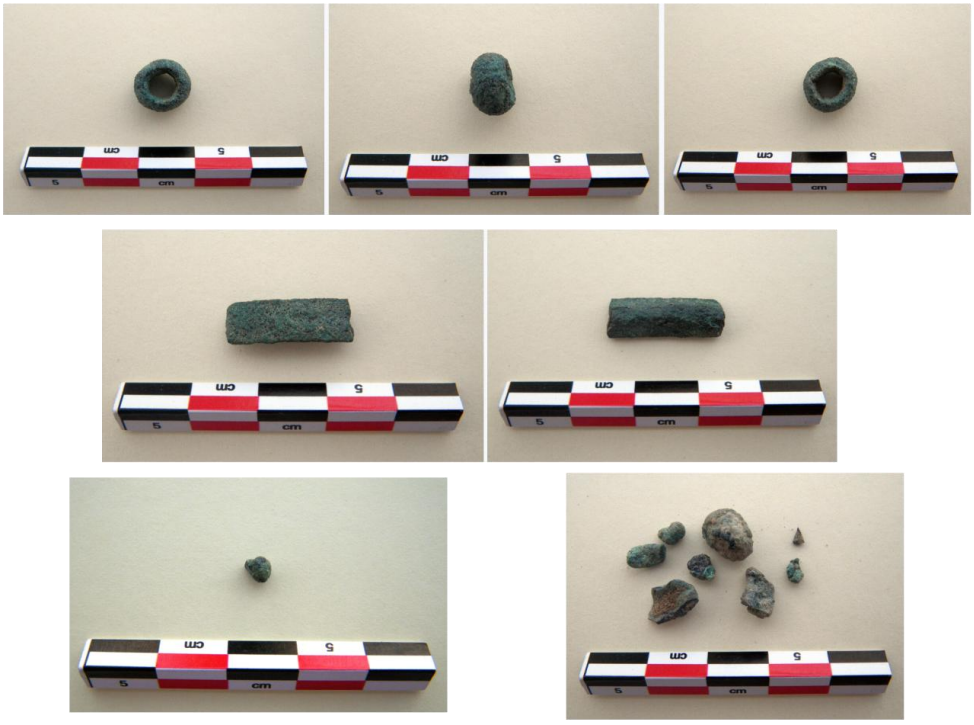


Figure 4.22: Samples of copper metal fragments recovered during excavation at Ojakly. No recovered metal fragments exceeded 10 cm, and most were not of identifiable shape.

Figure 4.23: Mold fragments found at Ojakly: A) two re-fittable but fragmentary pieces found on the surface of Area 5 during survey in October 2009; B) three views of a fragment of a different mold type found within the kiln fill. All mold fragments exhibited minimal copper staining, and none correspond to the metal fragments found at the site.

Chapter 5: Faunal and Archaeobotanical Remains

Having described the archaeological site of Ojakly in terms of its basic structure and dating (Chapter 4), there appears solid reason to recognize its occupation by mobile pastoralists during the Late Bronze Age. Two major goals of the excavation, however, were

1) to provide direct archaeological demonstration of the links between small, Incised Coarseware-dominated sites in the Murghab, and with this satisfied, then
2) to characterize the subsistence economy of these mobile pastoralist communities in more detail, establishing Ojakly as a baseline study for future research

If the previous chapter has made progress toward the first goal, then what follows in this chapter is aimed at achieving the second. Here I present the results of analyses on the faunal and archaeobotanical remains from Ojakly, which are the first such datasets to have been systematically excavated, analyzed, and reported for a non-village site in the prehistoric Murghab.

Across Eurasia, research over the past two decades has increasingly pointed to the use of mixed economic strategies in prehistory, undermining the monolithic ideas of purely "agricultural" or "pastoral" subsistence practices and muddying the distinctions, and relationships, between them. Moreover, archaeologists are demonstrating the extremely localized ways groups responded to their natural and social environments, and how these strategies changed through time (Bendrey 2011; Spengler 2014). Thus, the analyses presented here fit within the vein of identifying localized socio-economic adaptations of mobile pastoralists, especially as they blur traditional notions of "nomadic" and "farming" economies. At the same

time, they add to larger datasets of temporal and regional relevance, and they are discussed within broader patterns known from published and unpublished material.

5.1 Faunal and Botanical Remains: Sampling and Analysis Methods

To address issues of subsistence economy and related activities at Ojakly, faunal and archaeobotanical remains were systematically collected throughout the site, and analyzed by specialists affiliated with Washington University's anthropology department. Dr. R. Spengler participated in a subset of field excavations and conducted preliminary field analysis in Turkmenistan before completing the comprehensive analysis of all the Ojakly macrobotanical samples in the paleoethnobotanical laboratory in St. Louis, where he utilized a comparative Eurasian collection gathered through his extensive work in the region. The animal bones collected from Ojakly were analyzed by Dr. H. Woldekiros using the comparative specimens in the zooarchaeological laboratory in St. Louis. Published reference materials were also used, and a Central Asian goitered gazelle (*Gazella subgutturosa*) specimen on loan from Dr. K. Moore (University of Pennsylvania). Dr. Moore, and Drs. R. Meadow and A. Patel (Harvard University) visited the laboratory during analysis and also offered helpful comments. Recording of taxon, size category, and bone modification followed methods used by Dr. F. Marshall (Washington University) building on analytical recording approaches developed by Gifford and Crader (1977). Measurements of complete elements or long bone ends followed von den Driesh (1976) and are given in Table 5.1 (below, Section 5.2.1). Body part groups were used in analysis and the skeletal elements falling into groups including head, axial, forequarter, forefoot, hindquarter, hindfoot, and foot are summarized in Table 5.2 (Section 5.2.3). Epiphyseal fusion and dental

eruption and wear categories were used for age estimation (Greenfield and Arnold 2008; Noddle 1974; Payne 1985). Because of the fragmented nature of the assemblage, only three age classes were used: juvenile (< 1 year), young (1-2 years), and adult (2+ years).

Archaeobotanical material was collected through soil samples taken from all excavated areas at Ojakly. Thirty-five samples (totaling 192 L) were processed in the field using bucket flotation as described in Fritz (2005, pp. 780–784) and broken down using water separation by means of manual agitation. Samples were processed in 1.0 L increments, decanting until no buoyant material was observed, with the light fraction caught in a 0.35 mm geological sieve. Heavy fraction samples were taken using a 1 mm geological sieve, and sorted in the field with a 5x magnifying hand lens for separation of carbonized organic remains, ceramics, microfauna (see below), metal flecks, or other artifacts. In total, just seven of the 35 flotation samples produced any identifiable macrobotanical remains; each of these seven samples came from a sealed sub-surface feature (Figure 5.1), indicating the negative impact wind deflation and exposure had on the archaeobotanical remains from the site. During laboratory sorting of macrobotanical remains back in St. Louis, all identifiable carbonized material was separated out. Seeds and rachises from the Ojakly flotation samples were sorted down to 0.35 mm, while grass culm fragments and camel thorn leaves and pods were sorted down to 1.4 mm.

Unlike archaeobotanical remains, which were restricted to sub-surface features, animal bones were present across Ojakly both on the surface and within nearly all excavated contexts, although the refuse deposit in habitation Area 4 provided the bulk of the samples and most of the best-preserved bones. The other most significant context for faunal remains was the ceramic kiln (Figure 5.1). All *in situ* faunal remains were collected by hand during excavation and during on-site screening of all excavated soils, and fragments were assigned bulk identification numbers

based on Locus (context) and Basket (collection unit; see Chapter 4, Section 4.3 for excavation methods). Microfauna collected during flotation was also assigned general Locus and Basket information relative to its collection context. Especially large or unusually well preserved bones, when found *in situ* during excavation, were given their own identification numbers linking them to a specific spatial location. The entire faunal assemblage was exported back to St. Louis and analyzed in the zooarchaeology laboratory.

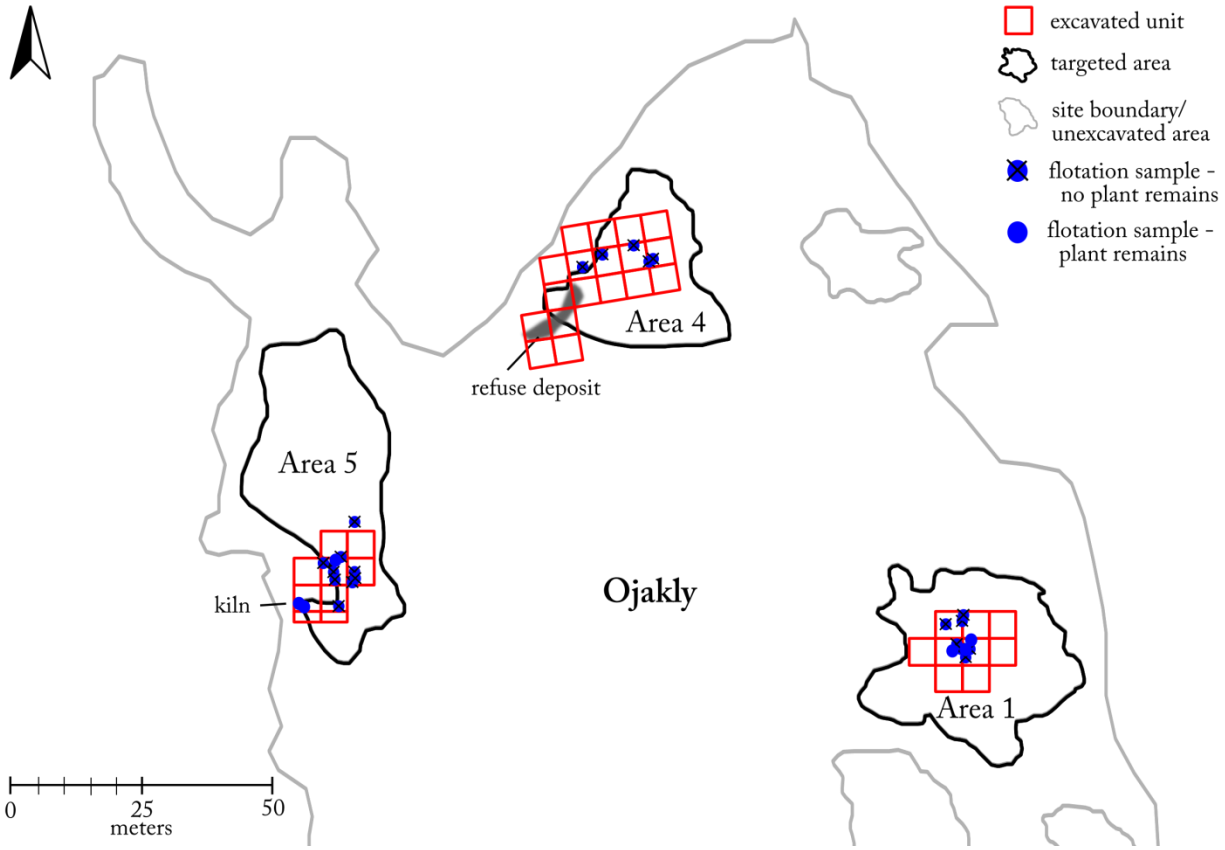


Figure 5.1: Plan view of the site of Ojakly, showing excavated units in each area. Blue points indicate soil samples that produced identifiable macrobotanical remains, while those with an "x" represent soil samples in which no such material was identified. Faunal remains were collected from across the site, though two significant contexts are indicated: the refuse deposit in Area 4, where most of the best preserved and complete bones were recovered, and the ceramic kiln (fill), where some of the most unusual bones were found.

5.2 Faunal Analysis Results

To my knowledge, Ojakly's faunal assemblage represents the first from the Murghab to be formally analyzed and published for its potential as representative of prehistoric mobile pastoral populations. This makes it an extremely important collection for both initially improving our understanding of the subsistence and animal use patterns of communities outside the major urban agricultural centers of the Late Bronze Age, and also for future comparative analysis with similar non-architectural campsites.

5.2.1 Assemblage Overview

The faunal assemblage is made up of 3049 specimens, consisting of macrofaunal remains collected from the surface and excavated contexts of Areas 1, 4, and 5. The macrofaunal assemblage is the focus of the analysis reported here. Faunal remains recovered from flotation samples were identified as largely made up of small fragments of long bone shafts from larger mammals. Scans of the flotation assemblage did not indicate the presence of rodents, birds, reptiles, or fish. If these bones were ever present in the Ojakly deposits, they have not preserved for archaeological collection.

Overall, bone preservation at the site has been highly affected by taphonomic processes of exposure and weathering, observable in the eroded surfaces of almost all the bones (following Behrensmeyer 1978). Many of the bones show mineralization stains due to exposure to rain and/or from the acidic sandy soils. This is particularly seen in the bones from the kiln fill, which although generally well preserved as far as being intact, were extremely friable and eroded on their surfaces. Most of the best preserved and most complete bones were recovered from the ashy fill of the refuse deposit in habitation Area 4. These bones were calcined, having been exposed to

sustained, high levels of heat that can best be explained by refuse burning (K. Moore, personal communication).

As an assemblage, the bones are highly fragmented and present numerous instances of cut marks, hacking, deliberate splitting, and other percussion marks that indicate heavy and intentional processing (as opposed to unintentional trampling). Certainly, heavy processing of bones is indicative of maximum nutritional extraction (Prendergast et al. 2009), and based on percussion marks on long bone shafts, marrow extraction may have been a regular activity (Bunn and Kroll 1986; Noe-Nygaard 1977). In addition to human activity, some of the bones exhibit carnivore gnawing and appear to have gone through carnivore digestive tracts (see Brain 1981). Non-fragmented, measured specimens are given in Table 5.1 (following methods given in von den Driesch 1976).

Measured Specimens, *Ovis aries/Capra hirca* (sheep/goat)

Element	*Measurement**	*Value*
First Phalanx (complete, R)	Greatest length (GL)	37.87
	Greatest breadth of the proximal end (Bp)	10.4
	Smallest breadth of the diaphysis (SD)	9.08
	Greatest breadth of the distal end (Bd)	9.8
First Phalanx (complete, R)	Greatest length (GL)	40.52
Second Phalanx (proximal, L)	Greatest breadth of the proximal end (Bp)	14.77
Second Phalanx (distal, R)	Greatest breadth of the distal end (Bd)	9.94
Astragalus (complete, L)	Greatest length of the medial half (GLm)	33.12
	Greatest depth of the medial half (Dm)	21.04

** after von den Driesch (1976)*

Table 5.1: Measured faunal specimens from the Ojakly assemblage.

5.2.2 Animal Species Identification

The state of preservation of the bones, along with their high fragmentation, resulted in conservative identification of species. One-quarter of the assemblage (673 of 3049 specimens) was identifiable to genus, size class, or finer taxonomic level (Figure 5.2). Small numbers of bones can be identified as *Bos* or domestic caprines (sheep and goat), with only a few specimens identified as *Sus* or Equid remains. Based on specific bone landmarks and internal structures, a larger number of bones are identified as "bovid". Within this category, some bones were assigned to the size class "medium bovid", but could not be further distinguished between sheep, goat, and gazelle. Although in this region the small size of local gazelle (*Gazella subgutturosa*) probably leaves domestic sheep and goat as the only species attributable to the "medium bovid" size class, in the discussion below sheep/goat and medium bovid are given as distinct categories in order to present the most conservative results. "Medium mammal" and "large mammal" categories are used for long bone shaft fragments when size could be determined but no order-level landmarks could be identified. Specimens identified simply as "mammal" were also recognized.

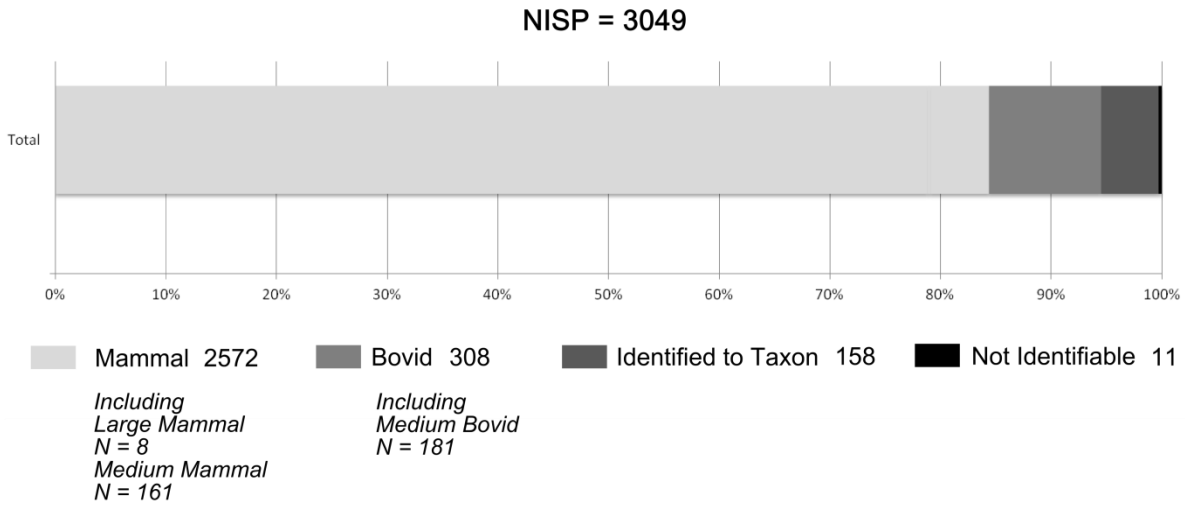


Figure 5.2: Summary of analyzed animal bone remains from Ojakly.

Specimens identified as mammal (including large or medium mammal) make up 84% of the total number of identifiable specimens (NISP) (see Figure 5.2). Specimens identified to more specific taxa make up 5% of the assemblage. Within this group, cattle (*Bos taurus* or *Bos indicus*), sheep (*Ovis aries*), and goat (*Capra hircus*) are the dominant species identified (148 of 158, 93%). The proportions of sheep/goat and cattle are relatively similar, with *Bos* making up 49% of the assemblage (77/158) and sheep/goat 45% (71/158) (Figure 5.3). However, if the assemblage is divided between the bones found inside the kiln fill (which appears to constitute a special intentional deposit, see below Section 5.2.5) and those recovered from the rest of the site (representing refuse deposits), there is a rather stark imbalance in the proportion of cattle and sheep/goat remains (Figure 5.4). Here, we see that cattle dominate the kiln deposits (65 of 79 specimens), with sheep/goat represented by many fewer bones (3 of 79). In contrast, if the site deposits other than the kiln are examined, sheep/goat make up a larger proportion of the remains than do cattle (15% and 3%, respectively). In the site deposits, medium bovid specimens make up the bulk of remains (342 of 421, or 81%). Although the possibility exists that these include remains of gazelle, it is worth noting that no positively-identified gazelle bones were found in the assemblage, and that no reported assemblages from the Bronze Age in this region contain more than 10% wild animals. It is therefore possible that many bones in the medium bovid category belong to sheep/goat.

Summary of Identified Fauna

Taxa	NISP	%	ID Color
Caprini (Sheep/Goat)	66	42	
Capra hircus (Goat)	2	1	
Ovis aries (Sheep)	3	2	
Bos taurus/indicus (Cattle)	77	49	
Equidae	1	1	
Sus	9	6	
Grand Total	158	100	

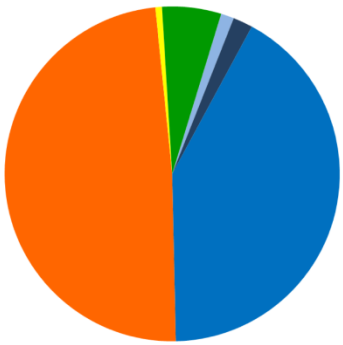


Figure 5.3: Positively identified fauna from Ojakly, based on number of identified specimens (NISP).

Summary of Identified Fauna, by context

Taxa	Kiln		Rest of Site		ID Color
	NISP	%	NISP	%	
Medium Bovid	1	1	342	81	
Caprini (Sheep/Goat)	3	4	63	15	
Capra hircus (Goat)	0	0	2	1	
Ovis aries (Sheep)	0	0	3	1	
Bos taurus/indicus (Cattle)	65	82	12	3	
Equidae	1	1	0	0	
Sus	9	12	0	0	
Grand Total	79	100	421	100	

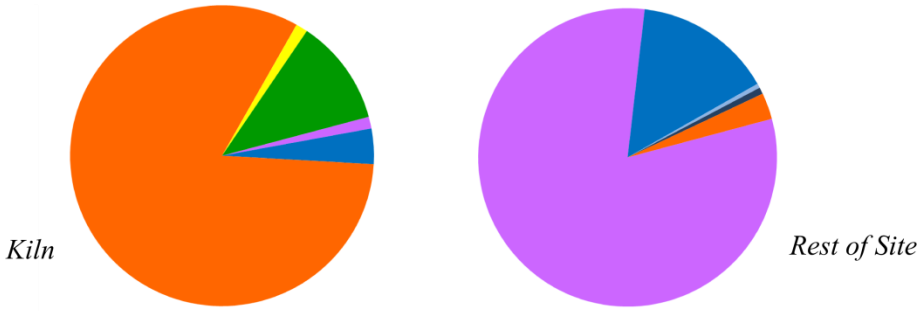


Figure 5.4: Summary of identified fauna from Ojakly, separated by context. The kiln fill likely represents an intentional deposit, while deposits in the remainder of the site are better representative of daily use and refuse dumping.

Discrimination of sheep from goat is difficult (Boessneck 1969) and landmarks that allow such differentiation were only present on five specimens. Three sheep and two goats were identified. Cattle remains are from domestic animals though they could not be identified as either

Bos taurus or *B. indicus*. As Moore (1993a:166) notes, however, depictions of cattle from the region during this period show a clear hump. One fragmentary Equid toe bone and nine pig (*Sus* sp.) teeth were also found (see below, Section 5.2.3). Potential equids could include horse (*Equus caballus*), domestic donkey (*Equus asinus*), or kulan (onager) (*Equus hemionus*). Of these, kulan is the only equid taxon confirmed so far for this period in the Murghab (Moore 1993a; Moore et al. 1994). It was not possible to determine whether the nine *Sus* sp. teeth represent wild or domestic animals, as their size fit within the range for both. Potential suids in the region include wild boar and domestic pig, both of which are designated as *Sus scrofa*, although faunal reports generally report wild boar rather than domestic pig for this period in the Murghab (Moore 1993a; Moore et. al 1994) or do not differentiate (Sataev and Sataeva 2012).

5.2.3 Animal Body Part Identification

Sample sizes are small for body part analyses, skeletal elements are summarized in Figure 5.5 and Table 5.2. The cattle sample is dominated by cranial specimens (66 of 77), compared to sheep and goat specimens where the distribution of body parts is more uniform (just 7 of 71 are cranial specimens, for example). Notably, the meaty hindquarters, as well as the forequarters are better represented in sheep/goat and medium bovid specimens than in cattle specimens. Although it is possible that cattle bones were more heavily processed than sheep/goat bones and are therefore now analytically unrecognizable as cattle, another explanation for the different skeletal patterns of these animal classes is that Ojakly's inhabitants had different access to sheep and goats than cattle. The skeletal pattern for sheep/goat is consistent with animal herds having been kept, processed, and consumed onsite, a point further emphasized by the burn and cut marks recorded on a majority of these bones. The inhabitants of Ojakly also had access to

cattle, although the body parts present (mainly crania, but also lower limbs) are not necessarily revealing as to whether cattle were kept on site or not. Larger animals are more valuable in mixed herds and would not have been killed at the same rate as small stock, which could explain the lower overall frequency of cattle compared to sheep/goat in the Ojakly assemblage outside of the kiln (see Figure 5.4). On the other hand, and could have been acquired second-hand, for example through trade for the less-meaty parts of animals who were butchered elsewhere (Zeder 1991).

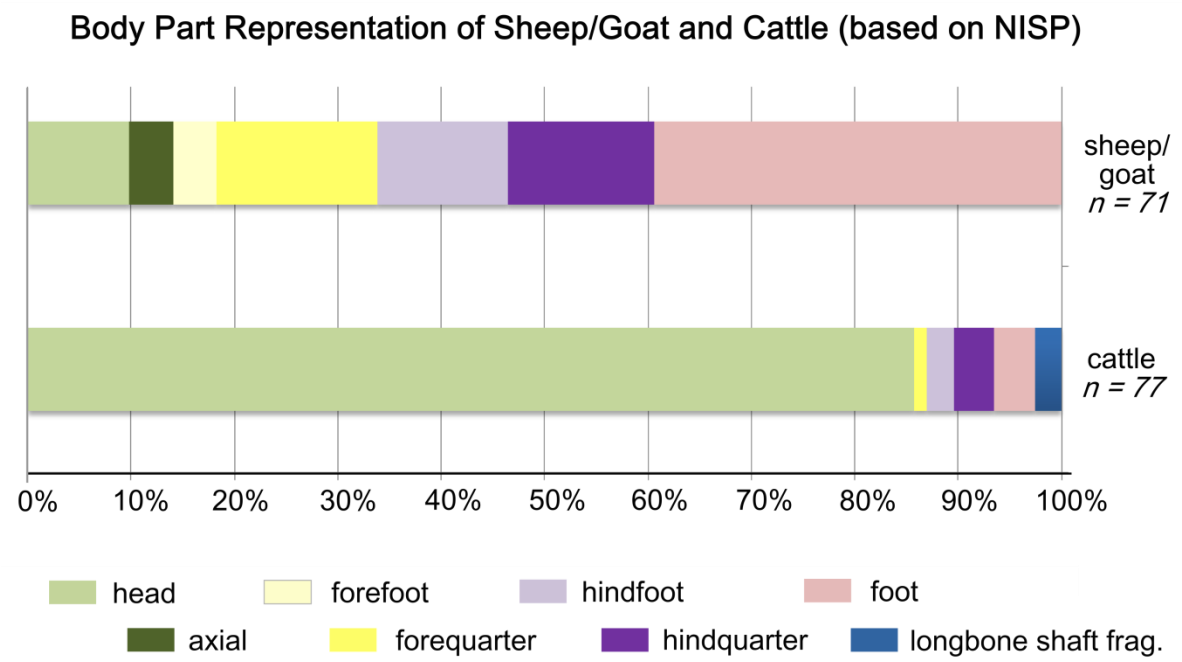


Figure 5.5: Summary of body part groups represented in the Ojakly assemblage for sheep/goat and cattle, based on identified skeletal elements. Darker shades correspond to generally meatier body parts.

Body Part Group	Element	Cattle	Sheep/goat	Medium Bovid	Bovid	Equidae	Sus	Medium Mammal	Large Mammal	Mammal	*Total*	%
Head												
CRA	Cranial	55		4	4					5	*68*	
HC	Horn core		1								*1*	
ORB	Eye orbit		1								*1*	
PET	Petrosal	2									*2*	
TEM	Temporal	2									*2*	
LPM	Lower Premolar			2							*2*	
TTH	Teeth	7	5	45	57		9				*123*	
	Sub-Total	***66***	***7***	***51***	***61***	***0***	***9***	***0***	***0***	***5***	***199***	***6.6%***
Axial												
RSF	Rib shaft fragment			79	1						*80*	
VERT	Vertebra		3	24	32					3	*62*	
	Sub-Total	***0***	***3***	***103***	***33***	***0***	***0***	***0***	***0***	***3***	***142***	***4.7%***
Forequarter												
HUM	Humerus		6	4							*10*	
RAD	Radius		2		1						*3*	
SCAP	Scapula		2								*2*	
ULN	Ulna	1	1								*2*	
	Sub-Total	***1***	***11***	***4***	***1***	***0***	***0***	***0***	***0***	***0***	***17***	***0.6%***
Forefoot												
LUN	Lunate		1								*1*	
METC	Metacarpal		2								*2*	
	Sub-Total	***0***	***3***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***3***	***0.1%***
Hindquarter												
SAC	Sacrum	1									*1*	
FEM	Femur		3	2							*5*	
FIB	Fibula		1								*1*	
ILIS	Ilium plus Ischium	1									*1*	
PAT	Patella		1								*1*	
PEL	Pelivs	1	1	2							*4*	
TIB	Tiba		4	2							*6*	
	Sub-Total	***3***	***10***	***6***	***0***	***0***	***0***	***0***	***0***	***0***	***19***	***0.6%***
Hindfoot												
AST	Astragalus		2								*2*	
CAL	Calcaneum		3	1	1						*5*	
CUNL	Cuneiform-Lateral		2								*2*	
EUNC	Unciform-External		1								*1*	
METT	Metatarsal	1									*1*	
NAV-CUB	Naviculocuboid		1	1							*2*	
TAR	Tarsal	1									*1*	
	Sub-Total	***2***	***9***	***2***	***1***	***0***	***0***	***0***	***0***	***0***	***14***	***0.5%***
Foot												
PHX	Phalanx			3							*3*	
PHX 1	First Phalanx		8	1							*9*	
PHX 2	Second Phalanx	1	8	3	1	1				1	*15*	
PHX 3	Third Phalanx		4	1	1						*6*	
SES	Sesamoids		2								*2*	
METP	Metapoidial	2	6	6	1						*15*	
	Sub-Total	***3***	***28***	***14***	***3***	***1***	***0***	***0***	***0***	***1***	***50***	***1.6%***
Other												
LSF	Long bone shaft	2						161	8	38	*209*	
PID	Possibly Identifiable				28			1		1856	*1885*	
NID	Not Identifiable									500	*500*	
	Sub-Total	***2***	***0***	***0***	***28***	***0***	***0***	***162***	***8***	***2394***	***2594***	***85.4%***
Grand total		*77*	*71*	*180*	*127*	*1*	*9*	*162*	*8*	*2403*	*3038**	*100.0%*

* note 11 further specimens, NID to class, are not included in total

Table 5.2: Analyzed faunal remains, NISP by skeletal element.

5.2.4 Ageing and Seasonality from Faunal Remains

The high degree of fragmentation of the bones meant that neither sex nor season at the time of death could be determined for any significant number of specimens (only the *Sus* teeth – nine mandibular incisors and canines – could tentatively be identified as female). For the same reasons, age at death could not often be determined (Figure 5.6). Of the 413 sheep/goat specimens, 36 were ageable. Eighteen were identified as young (referenced by unfused foot elements, an acetabulum, and tooth wear stages), 3 as juvenile (one proximal first phalanx epiphysis, one proximal second phalanx epiphysis, one distal epiphysis of a radius), and 14 as adult (foot elements). The three cattle specimens (3 of 77) that could be aged are all adult (represented by a distal metapodial fragment, a second phalanx fragment, and an M1/M2 molar). The different patterns of age-at-death for sheep/goat and cattle are based on very small numbers, but could be consistent with these two groups of animals serving different purposes for the inhabitants of Ojakly.

Aged Specimens (NISP)

	Cattle	Sheep/Goat	ID Color
Adult (2+ yrs)	3	14	
Young (1-2 yrs)	0	13	
Juvenile (< 1 yr)	0	3	
Indeterminate	74	115	
Grand Total	77	145	

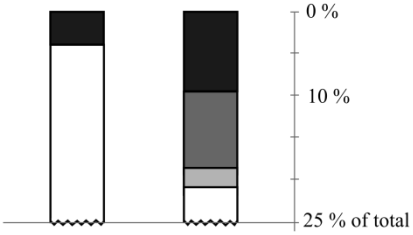


Figure 5.6: Age-at-death observations made in the analysis of Ojakly faunal remains, based on identified specimens of cattle (*Bos*) and sheep/goat (*Ovis aries/Capra hircus*).

5.2.5 Observations on Contextual and Spatial Patterning

Since the majority of the collected fauna from Ojakly came from the refuse area, which spanned multiple occupation events without discrete stratigraphy, it is not possible to assign

remains to different phases of Ojakly's occupation. There are, however, a few patterns that can be recognized with respect to spatial distribution. The bones found within the kiln are one such interesting context (Figure 5.7), given that their deposition appears deliberate and the species and body part representation differ from those of the general site fauna. Here, *Bos* fragments make up a significantly higher proportion of fauna than at the site overall (refer back to Figure 5.4). The kiln fill is also the only context of the site where Equid remains were recovered (a fragmentary proximal second phalanx). The only *Sus* bones at Ojakly also appear in the kiln fill, where the lower canines and incisors of more than one female animal were deposited. Within the kiln fill it appears that complete bones were intentionally deposited; although their integrity had degraded over time, the amount of preserved bone and the elements recovered suggests two complete pelvises and two intact crania were placed in the kiln (one each of *Bos* and sheep/goat). This pattern again differentiates the kiln fill from the overall site fauna, which was highly fragmented and exhibits burning and cut marks. The intentional deposition of the fauna in the kiln is also supported by the observation that remains were always recovered in the southeastern quadrant of the kiln, even though the fill between them suggested different depositional events.

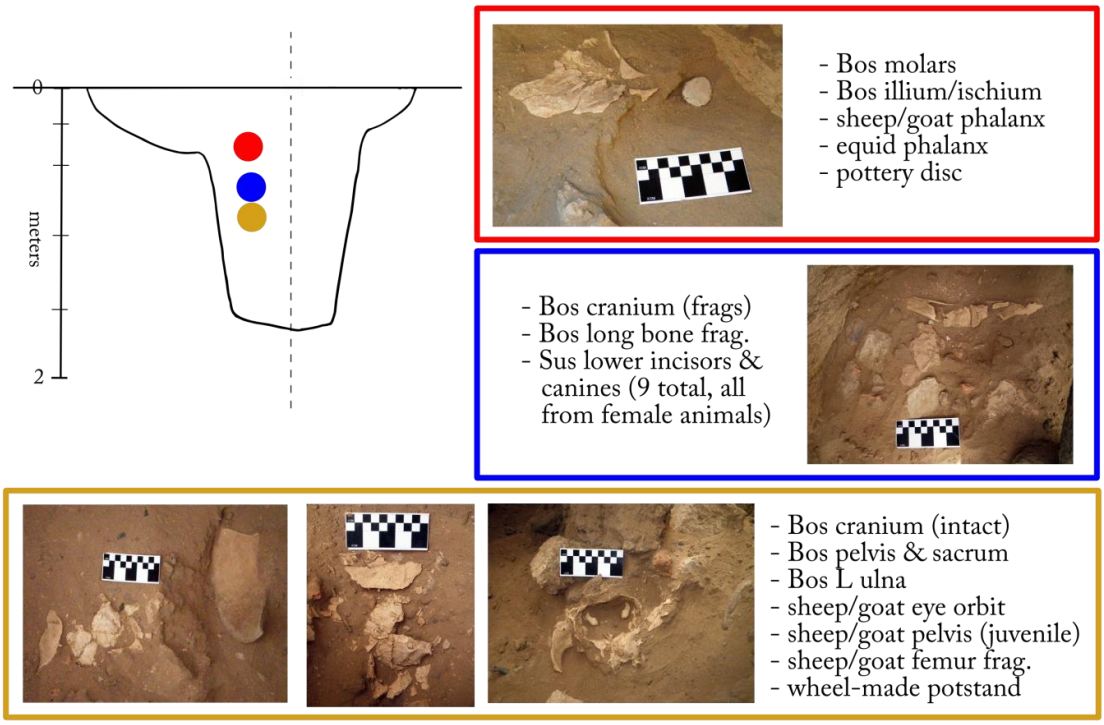


Figure 5.7: Placement of faunal remains inside the kiln.

Comparing faunal material from different deposits across the site, two interesting patterns emerge. First, cattle remains from the kiln are overwhelming cranium fragments (61 of 65 of the specimens), while the cattle remains from other areas of the site come from the limbs (2 of 12) or feet (5 of 12). Lower limb elements can be brought in on hides traded in from elsewhere, but crania are unlikely to be traded. The differential pattern of cattle remains (cranium elements inside the kiln, lower limb elements outside) may thus point to two different patterns of cattle use at Ojakly. The second pattern of note relates to Area 4 with its refuse deposit and cooking area (associated with cookware ceramics, Chapter 4, Section 4.4.1). All the recorded cut and hack marks in the Ojakly faunal assemblage come from Area 4. These marks are most prevalent on the long bone fragments assigned to the medium mammal category, though they also appear on sheep/goat remains (but not on cattle or general bovid remains). Cut marks appear more frequently on fauna from the cooking area (5 of 8 recorded cut marks), while hacking marks are

more often found on bones from the refuse deposit area (43 of 45). All body part groups are represented for sheep/goat, medium bovids, and general bovids in the refuse deposit. No forequarter or hindquarter *Bos* elements were recorded in Area 4.

5.3 Archaeobotanical Analysis Results

A total of 35 soil samples were floated from across excavated contexts at Ojakly, although just seven of these samples contained identifiable macrobotanical material (refer again to Figure 5.1). The contexts of these seven samples include only sub-surface features: pits, hearths, and the fill of the kiln. That only sealed contexts produced samples speaks to the taphonomic power of wind deflation at the site, and the potential loss of significant archaeobotanical material from living surfaces[15]. Still, the contexts from which remains do come represent a variety of activities at the site, including cooking, possible storage, and intentional interment, and thus can speak to both regular domestic and other 'special' activities that must have taken place there. The results of archaeobotanical analyses are summarized here, first by individual plant species and then by context.

5.3.1 Archaeobotanical Remains by Species

The seed assemblage from Ojakly Areas 1 and 5 consists of 88 % wild seeds (Table 5.3), the diversity of which indicates the immediate natural environment around the site (or at least, nearby accessible locations) was moister and more biologically diverse than the landscape

[15] Orlovsky (1994:38) notes the Murghab as home to some of the strongest winds in Turkmenistan, with speeds recorded up to 18 m/sec.

present around the site today. The only plants recovered archaeologically that still grow around Ojakly are the arid land grasses *Cyperaceae* and *Alhagi* sp.

	Area 5														Area 1											Area 4							Total
Sample #	FS 1	FS 2	FS 3	FS 4	FS 5	FS 6	FS 7	FS 8	FS 18	FS 22	FS 24	FS 25	FS 23	FS 27	FS 9	FS 10	FS 11	FS 14	FS 15	FS 16	FS 17	FS 17b	FS 19	FS 20	FS 21	FS 26	FS 28	FS 29	FS 30	FS 32	FS 34	FS 35	
Volume (L)	4.75	4	5.25	6	6.25	8.25	5	5.5	5.25	5.25	2	5	6	6	4	6.75	10.75	1.75	19.75	4	10.75	36	4.75	1	5.25	3.5	1.5	1.5	0.5	0.3	1.3	4.5	***192.35***
Wood																																	
Wood (> 2.oo mm) Ct. (LF only)										*9*				*1188*			*1*				*1*	*23*											***1222***
Wood (> 2.oo mm) Wt. (LF only)										*0.07*				*8.27*			*0.01*				*0.02*	*0.13*											***8.5***
Domestic Grains																																	
Barley (*Hordeum vulgare var. vulgare*)														*38*							*1*	*1*											***40***
Bread Wheat (*Triticum aestivum/turigidum*)														*8*																			***8***
Broomcorn Millet (*Panicum miliaceum*)										*1*				*8*							*3*	*6*											***18***
Cerealia													*1*	*16*					*1*			*2*											***20***
Barley Rachis (all 6-rowed)														*130*																			***130***
Wheat Rachis (all Hexaploid)														*6*																			***6***
Sub-Total	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***1***	***0***	***0***	***1***	***70***	***0***	***0***	***0***	***0***	***1***	***0***	***4***	***9***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***86***
Poaceae																																	
Culm or Node														*46*																			***46***
Poaceae					*1*																												***1***
Panicoid-Type														*41*																			***41***
Panicoid A														*72*																			***72***
Panicoid B														*2*																			***2***
Setaria (*cf. viridis*)					*1*									*49*																			***50***
Stipa -Type														*4*																			***4***
Sub-Total	***0***	***0***	***0***	***0***	***2***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***168***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***170***
Amaranthaceae																																	
Amaranthaceae													*14*									*2*											***16***
Chenopodium spp.										*2*				*6*					*1*														***9***
Sub-Total	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***2***	***0***	***0***	***14***	***6***	***0***	***0***	***0***	***0***	***1***	***0***	***0***	***2***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***25***
Rubiaceae																																	
Galium sp.														*14*																			***14***
Solanaceae														*15*																			***15***
Malvaceae																																	
Malva														*5*																			***5***
Asteraceae																																	
Asteraceae (Pampus-form)														*9*																			***9***
Xanthium sp. (Fruit Coat)														*4*																			***4***
Polygonum spp.														*3*																			***3***
Boraginaceae																																	
Echium (Mineralized)														*9*																			***9***
Fabaceae																																	
Fabaceae													*2*	*3*																			***5***
Camel Thorn (*Alhagi* sp.)														*72*																			***72***
Camel Thorn Pod Frag. >1.0														*82*																			***82***
Camel Thorn Leaf >1.0														*33*																			***33***
Sub-Total	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***2***	***190***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***192***
Brassicaceae														*2*																			***2***
Cyperaceae														*3*																			***3***
Unidentified Seed														*8*																			***8***
Unidentifiable Seed Fragments										*13*			*2*	*33*			*4*		*2*			*1*											***55***
Total (without Unident./Non-Seed Parts)	***0***	***0***	***0***	***0***	***2***	***0***	***0***	***0***	***0***	***3***	***0***	***0***	***17***	***383***	***0***	***0***	***0***	***0***	***2***	***0***	***4***	***11***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***1822***

Table 5.3: Summary table of flotation samples from Ojakly analyzed for macrobotanical remains.

In number, *Hordeum vulgare* (naked and hulled six-rowed barley) grains were the most prevalent domestic crop collected in the Ojakly samples: 38 grains came from the kiln deposit (FS 27), and 2 barley grains were found in a pit feature in one of the living areas (Area 1, FS 17).

Additionally, the kiln deposit contained 130 six-rowed *Hordeum* rachises (see below; these are not counted in Table 5.2). Both hulled and naked varieties of barley were present at the site, and the naked *Hordeum* grains recovered have a split apex (possibly due to the lack of hard glumes) and are relatively short and plump (Figure 5.8).

Figure 5.8: Barley (*Hordeum)* grains recovered from flotation sampling at Ojakly.

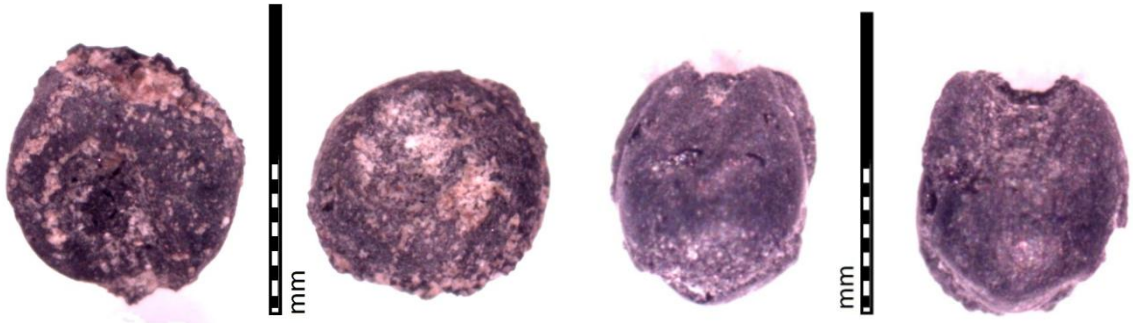


Figure 5.9: Broomcorn millet (*Panicum miliaceum*) grains recovered from flotation sampling at Ojakly. Two individual grains are shown (left two images, right two images) with top and bottom views.

In total 18 millet grains were recovered from samples in habitation Area 1 and production Area 5. Nine grains came from a large pit in Area 1 (FS 17), nine from the kiln fill (FS 22 and FS 27). Based on morphology these all appear to be *Panicum miliaceum* (broomcorn millet) (Figure

5.9), though the small sample size and fragmented grains can make differentiating between *P. miliaceum* and *Setaria italica* (foxtail millet) difficult.

Eight free-threshing wheat grains (*Triticum aestivum/turgidum*) were recovered from the kiln deposit at Ojakly (FS 27). Overall, very few of the wheat grains analyzed here would fall into a typical size range for lax-eared wheat, as they fall along a spectrum better described as compact to highly compact (highly compact grains being almost spherical) (see Figure 5.10).

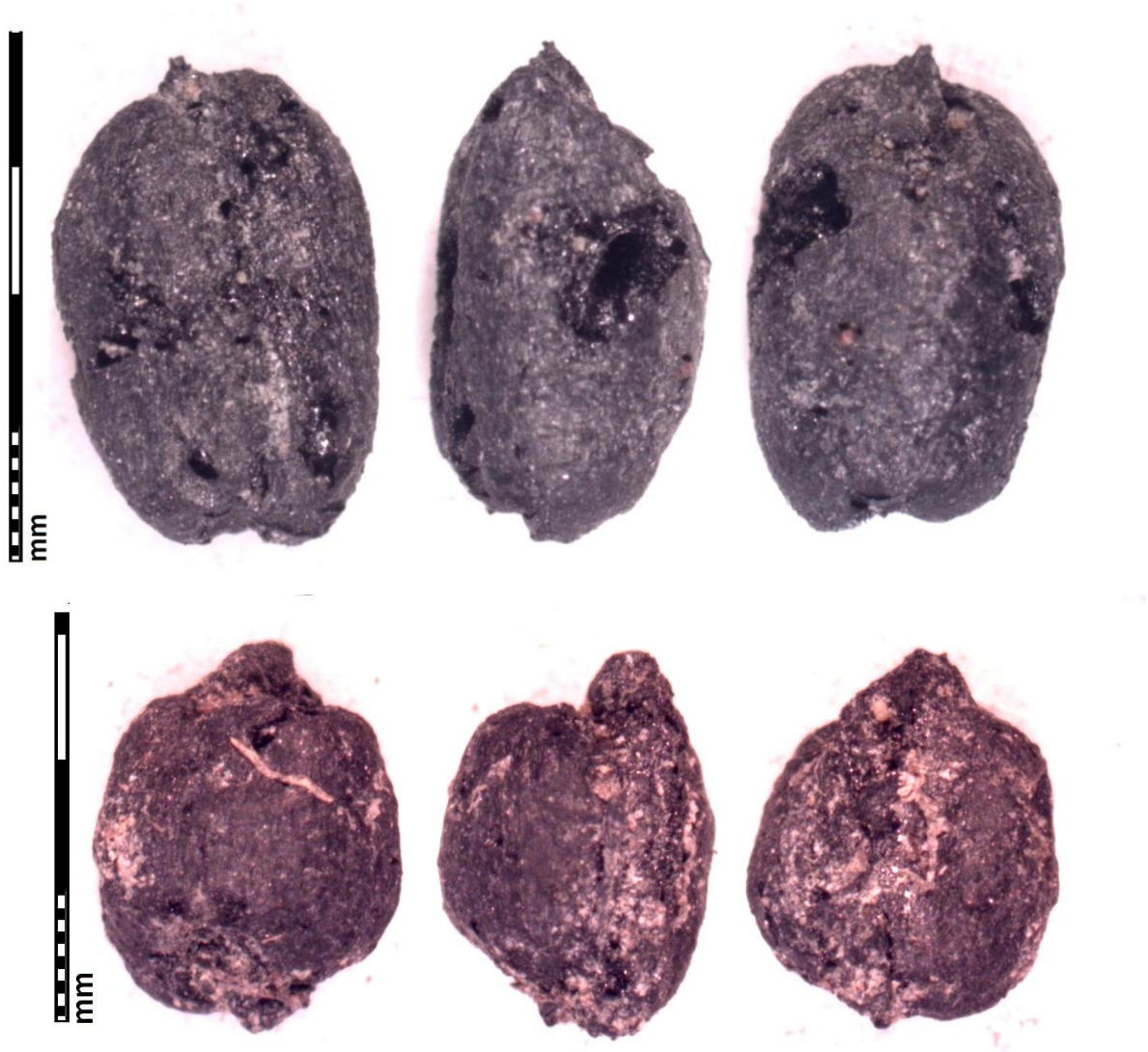


Figure 5.10: Wheat grains (*Triticum aestivum/turgidum*) recovered from flotation sampling at Ojakly. Two individual grains (top row, bottom row) are shown in three views.

5.3.2 Contexts of Archaeobotanical Remains

By far the highest abundance of macrobotanical material came from the bottom, ashy layer of the ceramic kiln fill in Area 5 (sample FS 27, Table 5.2). Charred wood of unidentified type was the most abundant material, followed by a variety of wild plants, including camelthorn (*Alhagi* sp., inedible to humans but commonly eaten by goats in the region) and a variety of wild herbaceous plants known to grow in more well-watered areas. Domestic grains include significant numbers of barley, both naked six-rowed and hulled varieties (*Hordeum vulgare*) free-threshing bread wheat (*Triticum aestivum/turigidum*), and broomcorn millet (*Panicum miliaceum*), as well as rachises (chaff) that helped identify the grains to species and varietal level. The presence of the rachises, together with the high concentration of wild plant remains, is suggestive of the use of dung fuel (see below, Section 5.4 for a discussion of dung use for fuel). The overall density of material in sample FS 27 – at 65.2 seeds per liter of soil – is inconsistent with windblown accumulation, and together with the charred wood fragments most likely represents in situ burning of both animal dung and wood as fuel inside the kiln.

Within this kiln deposit (FS 27), there were 130 six-rowed *Hordeum* rachises (still-articulated segments were counted as one). A number of these rachises were infected by a fungal disease known as ‘‘covered smut’’ (*Ustilago bordei*) (Figure 5.11). This disease can cause major reductions in crop yields and contaminate entire harvests, and because the fungus is contained inside the glumes until it dehisces it is difficult to tell if a plant is infected until it is fully consumed by the fungus and the soil and grains for the following year are already contaminated. Just how prevalent this disease was in the past is unclear, although the fungus is more likely to be associated with intensive cropping (Cappers 2006). Infection rates for Roman-period agricultural sites in Egypt are reported at 7-11% (Cappers 2006), and the 10.8% infection rate

found in the Ojakly samples is in line with this, suggesting the barley was being grown in long-term managed fields and not occasionally in small isolated stands.

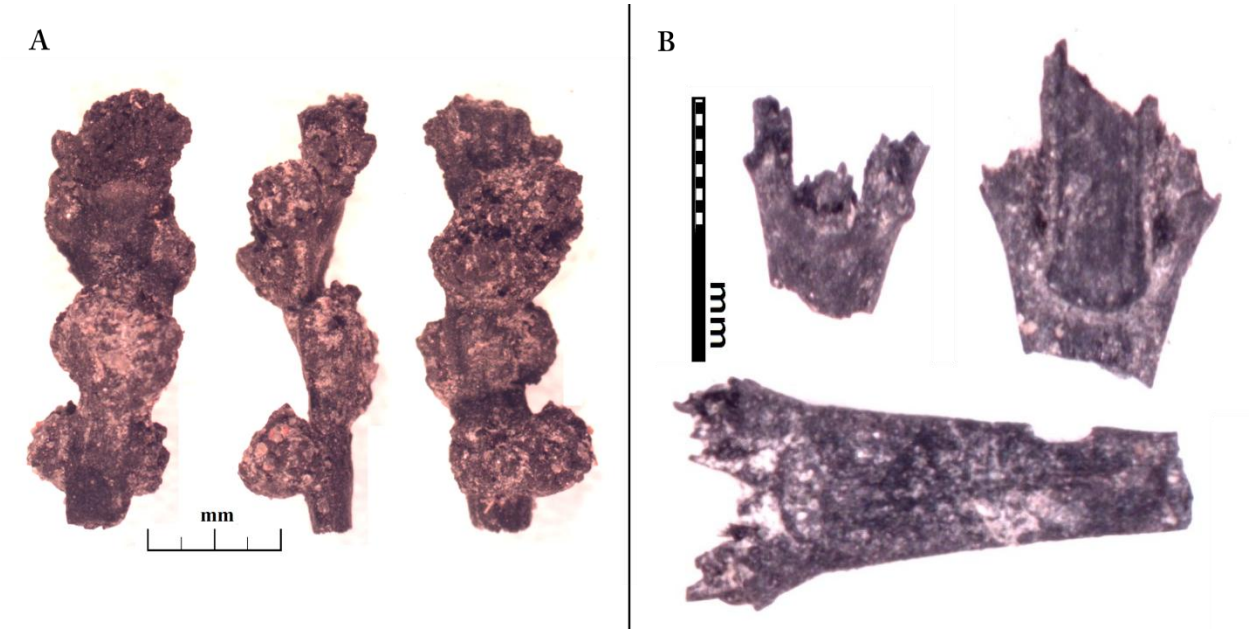


Figure 5.11: A) Barley (*Hordeum vulgare*) rachises infected with the fungal disease "covered smut" (*Ustilago bordei*) found in the kiln deposit (FS 27) at Ojakly. B) Uninfected rachis from the same context. 10.8% of the barley rachises at Ojakly exhibited this fungus.

Other important archaeobotanical remains came from sample FS 17, taken from a large pit feature in Area 1 (see Figure 4.8, in previous chapter). Here nine broomcorn millet grains were recovered (one of which was directly radiocarbon dated to 3370 ± 25 B.P., OS-92541, see Figure 4.17, previous chapter), as well as two cerealia grains and two dozen wood pieces. Cerealia was also recorded in FS 15 (pit feature, Area 1) and FS 23 (hearth/fired feature, Area 5), and one broomcorn millet grain was recorded in FS 22 (upper kiln fill, Area 5). Although a total of seven soil samples were taken from hearth features and the refuse deposit in habitation Area 4, none of these samples contained any preserved organic material.

5.4 Summary of Ojakly's Subsistence Economy and Local Environment

The faunal and archaeobotanical analyses presented here represent some of the first focused investigation of such remains outside the major population centers of the Bronze Age Murghab. There seems little doubt that the inhabitants of Ojakly were invested in the herding of sheep and goat, above any agricultural practices they may have been engaged in. The people living at Ojakly had access to cattle, but given the limited *Bos* body parts represented at the site overall and the higher proportion of sheep/goat compared to cattle bones in contexts other than the kiln deposit, it appears that sheep/goat comprised the everyday meat animal for site inhabitants. Additionally, the total absence of identified wild species commonly hunted by settled villagers in the region (see below) indicates the Ojakly population deliberately concentrated on production from herds of small stock suited to the arid environment. The high levels of bone modification (cut and hack marks) and fragmentation is further indication that meat and marrow from healthy domesticated herd animals formed a significant and regular portion of the diet, which is common among many pastoral groups (Marshall 1990b). The herds kept by Ojakly's inhabitants would have needed to move in cyclical feeding patterns, since even the richest micro-environments would have been quickly depleted in the generally arid Murghab. The temporary but clearly repeated use of living space at Ojakly is indicative of the mobility that would have been required of the site's inhabitants as a primarily pastoral community.

Combined with the faunal evidence for an intense focus on sheep/goat resources, as well as with the spatial arrangement and small finds discussed in Chapter 4, the archaeobotanical evidence *in toto* from Ojakly argues against the site's inhabitants being part-time agriculturalists. If the recovery of (relatively) water-, time-, and labor-demanding domesticated field crops at

Ojakly were taken by itself, out of context, it might seem the inhabitants practiced some form of agriculture themselves. However, other than a handful of pits whose contents may have been varied, there were no dedicated storage areas or large vessels that might indicate regular stores of grain were kept on site, and no processing tools or farming implements were found to suggest agricultural pursuits were regular activities (in contrast to Sites 1211/1219 – see Chapter 3, Section 3.3.4, and Chapter 7; also Cerasetti et al. *forthcoming*, Spengler et al. 2014a). The most probable explanation here is that wheat and barley came to Ojakly through exchange relationships with nearby agricultural communities (for whom these formed staple foodstuffs), or in the guts of their herd animals after feeding on stubble fields or fodder.

The macrobotanical remains from Ojakly present a mixture of crops, wild plants, and wood that appears to largely be the remnants of fuel burning, rather than storage or activities related to the processing of plant foodstuffs. In particular, the amount and variety of carbonized wild seeds found in the kiln ash suggests animal dung was a common fuel source (Miller 1984, 1996), and the inclusion of grains as well as rachises in this probable dung may be evidence that Ojakly's herd animals grazed both along water channels and on agricultural field stubble at certain times of the year. As suggested for the "negotiation camp" of Gonur N (Chapter 3, Section 3.3.4), agreements with settled farming neighbors over the shared use of land may have been a regular part of social life at Ojakly. If true, this indicates a symbiotic, non-hostile interaction between mobile pastoralists and settled farmers.

The wild seed remains from Ojakly might best be understood as representing the local environment of the site, both natural and perhaps resulting from human intervention. The site's inhabitants seemed either to have lived in the vicinity of, or had access to, moister environs than are present around the site today, given the biological diversity of species represented in the

sample compared to the more restricted number of species now present. Based on the wild seeds in the archaeobotanical sample, there was likely a spring or palaeochannel drainage near the site at the time of occupation – perhaps the one identified ca. 500 m to the northeast of the site (Cerasetti 2012). Given the lack of clear evidence for wild animals in the faunal assemblage, the animal bones from Ojakly cannot contribute much in the way of determining the local environment, other than to note that it was rich enough to support herds of sheep/goat for stretches of time or with enough frequency to allow Ojakly to leave archaeological traces of habitation. Cattle require more water on a daily basis than do sheep/goat, and are not kept in the Murghab today except in the immediate vicinity of irrigated fields. The faunal sample at Ojakly is too small to rule out cattle having been kept at the site, though if it were better-watered than it is today it is possible a few cows were kept as part of a mixed herding strategy. More on the strategies of cattle-keeping in the Bronze Age Murghab will be given in Chapter 7, when Ojakly's faunal assemblage is compared to assemblages from Murghab sedentary farming villages.

Unfortunately, neither the macrobotanical nor faunal assemblages analyzed here can reveal the season(s) of occupation at Ojakly. There are too few aged animal bones or complete teeth to construct a reliable seasonal profile of animal death, and the domestic grains and/or chaff could have been stored and used as fodder at any time of the year. Moreover, the seasonal breadth of wild species recovered is too great to be useful in assessing discrete annual periods. With larger datasets of both faunal and archaeobotanical material, and given the strong climatic seasonality of the Murghab and the presumed winter/summer crop cycling of prehistoric agriculture here (Moore et al. 1994), it would be possible and quite useful to determine recurrent seasonal practices at both farming settlements and mobile pastoralist occupations. Examination

of pollen datasets might also be useful in examining these seasonal interaction patterns.[16] To summarize, although the possibility of a mixed agro-pastoral economy cannot be definitively ruled out at Ojakly, the evidence as a whole is rather more indicative of the site's inhabitants being full-time mobile pastoralists who engaged in limited trade with farming neighbors no more than a day's trek away.

[16] Roughly thirty-five pollen samples were taken at Ojakly, but have not been analyzed to date. Samples remain in storage in Turkmenistan.

Chapter 6: Ceramic Analyses

Like many archaeological sites in the Murghab and elsewhere, ceramics form the largest single artifact class at Ojakly, and the concentration of surface pottery is a primary identifying feature of the site. Unlike other Murghab sites, however, Ojakly is unique for the *type* of pottery forming those concentrations, consisting of mainly coarse, handmade wares commonly referred to in the regional literature as "incised coarse ware (ICW)", "steppe ware", or "Andronovo" ceramics, reflecting its presumed connection to Bronze Age mobile pastoralist groups (see discussion below). In fact, more than 90% of the analyzed ceramic assemblage from Ojakly belongs to this ware type (which I consciously refer to here using the term 'handmade coarseware' in an effort to be as neutral as possible), while the remaining 10% of the analyzed assemblage is made up of fine-pasted, wheel-made ceramics more akin to the local Namazga ceramic tradition.

Given the unprecedented composition, size, and context of the Ojakly ceramic assemblage, this chapter explores some basic but fundamental features of it, revealing for the first time variations in local production practices and aesthetic choice, and constructing a previously absent handmade coarseware typology for the Bronze Age Murghab. Through macro- and microscopic compositional analyses, along with geochemical and mineralogical sampling of the assemblage, we build on Kutimov's recognition of the variability within "nomadic" pottery (1999, 2014) by describing its heterogeneous components in more detail. Recognizing these, we can begin to address some of the social questions that underpin ceramic production. For example, were diverse aspects of potting a conscious choice or a result of circumstance, and what relation does this have to other areas of material culture? Were ceramics used to mark out social

boundaries and/or relationships? These questions will be returned to later in this chapter and in the broader discussion (Chapter 7). What follows is a summary of the results of several ceramic analyses conducted along with a suggested interpretation of those results.

6.1 Ceramic Traditions of the later Bronze Age Murghab

Chapter 3 (Section 3.3) provides a more detailed discussion of the social aspects thought to be represented by the ceramic proxies of wheel-made and handmade coarseware sherds, but it is useful here to formally describe the ceramics themselves. Table 6.1 lists the attributes commonly cited for the different wares, which can be summarized as follows: wheel-made ceramics of this period have a medium-fine paste and chaff inclusions, rarely display any decoration, and take a variety of open and closed forms of different sizes with footed, flat-bottom, and inward-sloping bases; handmade coarsewares, by contrast, use a more gritty clay often tempered with grog, and primarily take the form of a jar-shaped vessel (for summaries, see Cerasetti 1998, Hiebert 1994a, Hiebert and Moore 2004, Kuz'mina 1994a, 2007, Kuz'mina and Lyapin 1984, P'yankova 1989, and Salvatori 2008a with references). Importantly, scholars caution against confusing handmade coarseware with the rough-made "kitchen ware" found in otherwise wheel-made contexts, but note that such "kitchen ware" imitates wheel-made forms and has a well-levigated paste that always includes at least a chaff temper (Cattani 2008a:143; Hiebert 1994a:61; Hiebert and Moore 2004:294). Unless otherwise noted, all the coarseware ceramics from Ojakly are of the mobile pastoralist variety, and not part of the Namazga "kitchen" coarseware tradition.

Characteristic	**Wheel-made "Oasis" ware**	**Handmade "Steppe" Coarseware**
Manufacture	wheel-formed, visible striations	hand-formed, coil breaks visible
Paste	fine, well-levigated	coarse, uneven
Color	rosy, red to reddish-brown; rose tints to red, yellow or orange; reddish buff to light red	gray to reddish-gray; rose, gray, black
Firing	even, high temperature	uneven, low temperature
Inclusions	chaff	grog and/or sand
Form	diverse range	jar-shaped
Decoration	unusual, applied	not uncommon, incised
Size	huge range	small range

Table 6.1: Summary of differences cited between the later Bronze Age ware types of the Murghab, often referred to as Namazga VI ware and steppe/Andronovo/Incised Coarse Ware (ICW). Throughout the discussion presented here, I refer to this second type simply as handmade coarseware. Data from Cerasetti 1998, Hiebert 1994a, Hiebert and Moore 2004, Kuz'mina 1994a, 2007, Kuz'mina and Lyapin 1984, P'yankova 1989, and Salvatori 2008a.

Whatever label one chooses to give either ware, by focusing on the ways handmade coarseware differs from the primarily wheel-made assemblages at more permanent, sedentary agricultural sites, we have been left with a rather monolithic notion of pottery associated with mobile pastoralists in this period and region, reified in the ubiquitous "nomadic jar" – an all-purpose, multi-functional vessel of relatively uniform shape and size (see images in Kuz'mina 2007; Figure 6.1). Although mobile pastoralist pottery appears in a variety of archaeological contexts in the Murghab during the later part of the Bronze Age, we are confronted with an assumption that an undifferentiated handmade coarseware accommodated all the behavioral and technological needs related to such contexts, while the varied daily needs of agriculturalists were met using an array of different vessels. In effect, a homogenized view of handmade coarseware reflects an oversimplified view of the role the bearers of this ware played in the Bronze Age Murghab.

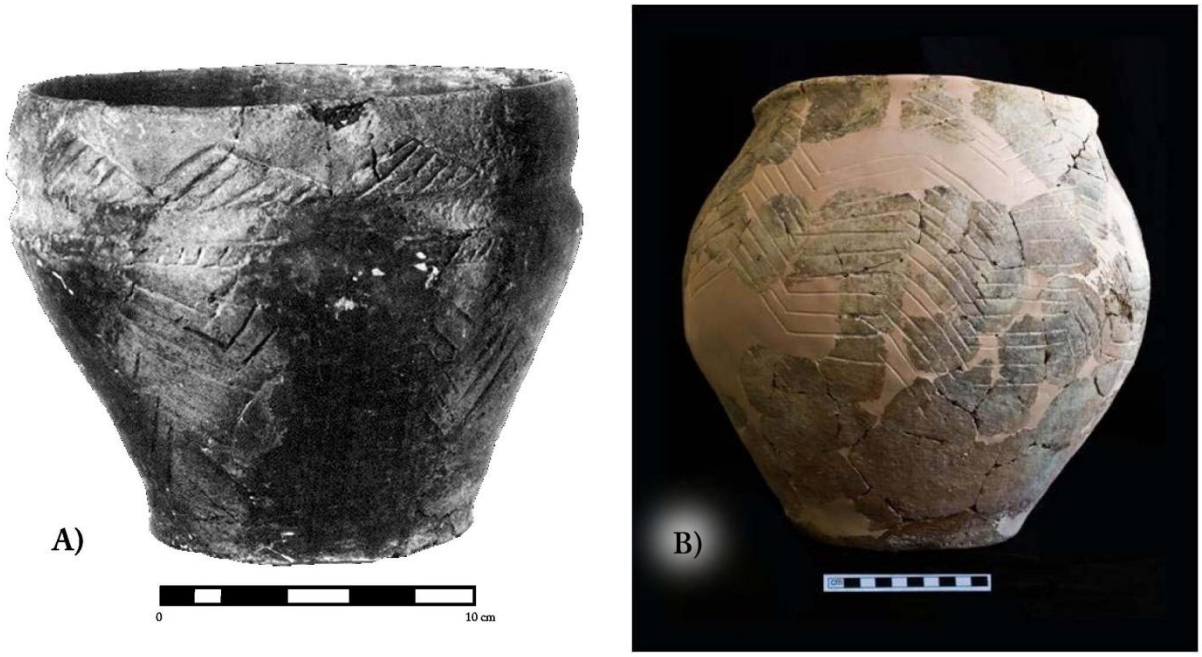


Figure 6.1: Typical "nomadic jars" from later Bronze Age Murghab contexts. A) A complete steppe vessel found during excavation at Takhirbai 3 (Sarianidi 1975:Figure 4). B) Reconstructed vessel from sherds found during excavations at Sites 1211/1219 (Joint Mission 2006).

As the analysis below will show, Ojakly's ceramics are certainly *not* uniform, and are comprised of a range of sizes, shapes, and presumable functions beyond the all-purpose "nomadic jar". However, lacking any formal typology within which to situate or analyze the variety of Ojakly handmade coarseware in its Murghab context, it became necessary to create a wholly new typology based on the material contained in the assemblage itself. With over 500 analyzed diagnostic sherds from across excavated contexts at the site, there was ample material data to meaningfully examine and use for generalizations. Thus, Ojakly can provide a baseline ceramic typology for mobile pastoralist occupation in the Murghab, with which other non-permanent or non-agricultural sites might be internally compared to give a more differentiated picture about activities taking place outside the more permanent agricultural villages and urban centers during this period of apparent social change in the alluvial fan.

6.2 The Ojakly Assemblage and Analyzed Sample

As already noted, Ojakly's ceramic assemblage is unusual for its very high proportion of handmade coarseware relative to wheel-made pottery, with the former dominating every excavated context (Table 6.2). This collection thus presents a counterpoint to the majority of published ceramic material from Bronze Age Murghab sites, which focuses on wheel-made forms of the local Namazga tradition. Given the history of archaeological investigation in the Murghab and the concentration of excavation efforts at long-term sedentary occupation sites (Chapter 3), it is therefore not surprising that to date there is no formal typological description of later Bronze Age handmade coarseware for the Murghab. Where steppe/Andronovo/ICW pottery is discussed, in a handful of archaeological publications and unpublished reports (Cattani 2008a, 2008b; Cerasetti 1998; Genito and D'Angelo 2009; Hiebert 1994a; Hiebert and Moore 2004; P'yankova 1989, 1993; Sarianidi 1975), the recurrent theme is the differentiation of this ware from coeval wheel-made forms and pastes.

Analyzed Diagnostic Ceramics, by Area and Ware Type

Location	*Handmade*	*Wheel-made*	*Unidentified*	*Row Total*
Area 1	128 (93.4 %)	7 (5.1)	2 (1.5)	*137 (26.7 %)*
Area 4	247 (95.7)	9 (3.5)	2 (0.8)	*258 (50.3)*
Area 5	93 (78.9)	22 (18.6)	3 (2.5)	*118 (23)*
Grand Total	**468 (91.2)**	**38 (7.4)**	**7 (1.4)**	**513 (100 %)**

Table 6.2: Percentages of analyzed diagnostic wheel-made and hand-made ceramics by excavated area, representative of the uncommonly high ratio of handmade to wheel-made ceramics at Ojakly.

Ojakly's ceramics are highly fragmented – no complete vessels were recovered, and there were no sherds large enough to reveal an entire profile from rim to base. The creation of any

useful typology, then, needed to rest on attributes that could be recognized across different base, body, and rim sherds, and be correlated to understand the relationships between them, thus enabling a 'reconstruction' of whole vessels based on internally-shared characteristics. A combination of descriptive (macroscopic) observation and laboratory analyses (geochemical, mineralogical, and petrographic) provided details about pastes and inclusions, firing conditions, and vessel form, size, and aesthetics, without having to rely on the physical presence of complete vessels. All of these analyses included some basic observation of manufacturing techniques and conditions, as well as technical measurements and some statistical calculations as appropriate. Together, the datasets they provide allow a more robust picture to be drawn regarding raw material use and manufacturing processes than any single line of investigation could provide on its own (see the call for such an integrated approach to ceramic analysis in Braekmans et al. 2011, and Kibaroğlu et al. 2011).

The sherds chosen for ceramic analysis were intended to be a representative sample of the overall Ojakly assemblage, which contained more than 100 kg of pottery in total. Analyzed sherds came from each of the three distinct areas of the site (living Areas 1 and 4, and the production-oriented Area 5, see Chapter 4), and included both diagnostic (rim, shoulder, base, and decorated) and non-diagnostic pieces (plain body sherds), as well as both handmade and wheel-made forms. Six samples from the interior plastered wall of the ceramic kiln in Ojakly's working area were also analyzed. In addition to samples from Ojakly, the analyses included comparative samples from excavations at Site 1211/1219 – a Final Bronze Age mobile pastoralist occupation roughly 30 km south of Ojakly (see Chapter 3, Section 3.3.4) – and decorated sherds collected during survey work in the Murghab in 2006-2007 (Joint Mission 2006). Finally, the analysis also included one sherd from a Bronze Age habitation context at the

site of Tamgaly in the Semirech'ye region of Kazakhstan, since its identification as a BMAC sherd by Kazakh excavators and its presumed Murghab origin made it interesting to examine alongside samples actually collected in the Murghab[17].

6.3 Methods of Analysis and Analytical Goals

Three complementary avenues of investigative analysis were used to examine the selected sherds and plaster samples: macroscopic observation of paste and inclusions, geochemical and mineralogical descriptions, and petrography. The macroscopic descriptive analysis took place during a dedicated field season in May 2011, where a 30x hand lens was used to examine the cross-section of a fresh break. Over 500 mostly diagnostic sherds from Ojakly, thirty from Site 1211/1219, fourteen from previous Murghab survey, and one from Tamgaly, Kazakhstan were recorded, described, and photographed by L. Rouse and K. Grillo[18]. Thirty of the analyzed Ojakly sherds, representing the most common and most distinct attributes recognized during macroscopic observation, were then selected for further detailed geochemical, mineralogical, and petrographic analyses, along with the kiln plaster samples, the Murghab survey sherds, and the Tamgaly sherd. Geochemical and mineralogical analyses were conducted by Eleonora Rotondaro, and petrographic analysis was carried out by Roberta Piermartiri, both in the Department of Biological, Geological and Environmental Science (BiGeA) at Bologna

[17] Thanks are given to Dr. P. Doumani Dupuy and Dr. A. Rogozhinsky for this Kazakhstan sherd.
[18] K. Grillo has extensive experience with ceramic analysis in mobile pastoralist and other archaeological contexts. At the time of analysis, she was a PhD candidate in Anthropology at Washington University in St. Louis, and is now an Associate Professor in Anthropology at the University of Wisconsin, La Crosse.

University, Italy[19]. For clarity, the breakdown of samples collected and analyses conducted on each are summarized in Table 6.3.

Ceramic Samples Analyzed by Various Methods

Site/Context	*Excavation Unit*	*Sample Count*	*Analysis Method*		
			Macroscopic	*Mineralogical/ Geochemical*	*Petrographic*
Ojakly					
Area 1	Sq. R-V, R-IX	147	●	●*	●*
Area 4	Sq. B-1, B-4, C-5	268	●	●*	●*
Area 5	Sq. L-II, Q-XIII, kiln plaster	135	●*	●*	●*
Site 1211					
sampling	SU 1, 2, 5	30	●		
Murghab Survey					
surface collection	n/a	14	●	●	●
Tamgaly (Kazakhstan)	House 3	1	●	●	●
Total Samples		**595**	**589**	**51**	**51**

Table 6.3: Totals of ceramic samples analyzed using various methods. Note the * symbol indicates not all samples underwent given analysis (for example, kiln plaster samples were not subjected to macroscopic analysis).

The overlapping lines of analyses allowed for some correspondence between datasets, and helped identify patterns and trends in pottery manufacture and use across Ojakly as well as situating this in broader context. Macroscopic analysis focused on identifying a variety of paste attributes (clay matrix and temper), aesthetic variables (decoration, size), and gross manufacture techniques (firing, handmade vs. wheel-made practices) in a large sample, which might then be used to recognize common constellations of attributes and stylistic forms in a new typology for mobile pastoralist sites. Laboratory analyses focused on uncovering aspects of production that could not be gleaned from the macroscopic analysis, such as firing temperature and environment, as well as more precisely describing and characterizing the mineralogical makeup of the paste

[19] Both these analyses constituted the project work related to a Masters Thesis granted by BiGeA, and were supervised by Professor Giuseppe Maria Bargossi, with Prof. Vanna Minguzzi, Dr. Barbara Cerasetti, and myself serving as thesis committee members.

and inclusions. Ultimately, these analyses can be synthesized to discuss general trends in ceramic production in mobile pastoral groups in the Late Bronze Age Murghab, and to examine the correspondence of these practices to what is known from urban production centers from the same period. Understanding the relationships of pottery production between these two communities ultimately benefits a more complete picture of broader social interactions between mobile pastoralists and sedentary farming communities.

6.4 Summarized Results of Ceramic Analyses

Macroscopic analysis results are presented first, since the observations therein informed the selection of sherds for subsequent laboratory analyses. The primary goal of the laboratory analyses was to expand on the insights gained through macroscopic analysis, for example, by identifying the specific matrix composition of recognized paste and inclusion types, and by revealing specific firing practices (temperature and atmosphere). Identifying the provenience of raw clay sources used in pottery manufacture was explicitly NOT a goal of these analyses, and comparisons are made internally to the sample assemblage, between the different analyzed sherds themselves, and not with any modern clay sampled from the region. Finally, the results of some contextual ceramic analysis are presented.

6.4.1 Macroscopic Analysis Results

The macroscopic analysis was based on observable attributes, and as such, the qualitative dataset it produced is not amenable to strict mathematical analyses such as correlation coefficients, significance models, etc., as these would give a false sense of black-and-white

results. Still, the large number of samples and attributes recorded for each made intuitive recognition of patterns impossible. To analyze this dataset, I have used the visually-based statistical software JMP (v. 11)[20] to identify constellations of standardized, qualitative attributes that commonly co-occur, as well as those attributes that rarely occur together on a single sherd. By parsing out patterns in attributes this way, and identifying groups of similar sherds based on overlapping attributes, we can begin to develop a sense of the diversity within a ceramic class that would traditionally be described as homogeneous. Moreover, recognizing how such groupings reveal themselves across base, body, and rim sherds provides a good idea of just what complete pots might have looked like.

Breakdown of Analyzed Ojakly Sherds

Location	Rims	Bases	Decorated Body	Total
Area 1	92	17	28	*137*
Area 4	141	28	85	*254*
Area 5	89	14	15	*118*
Grand Total	*322*	*59*	*128*	*509*

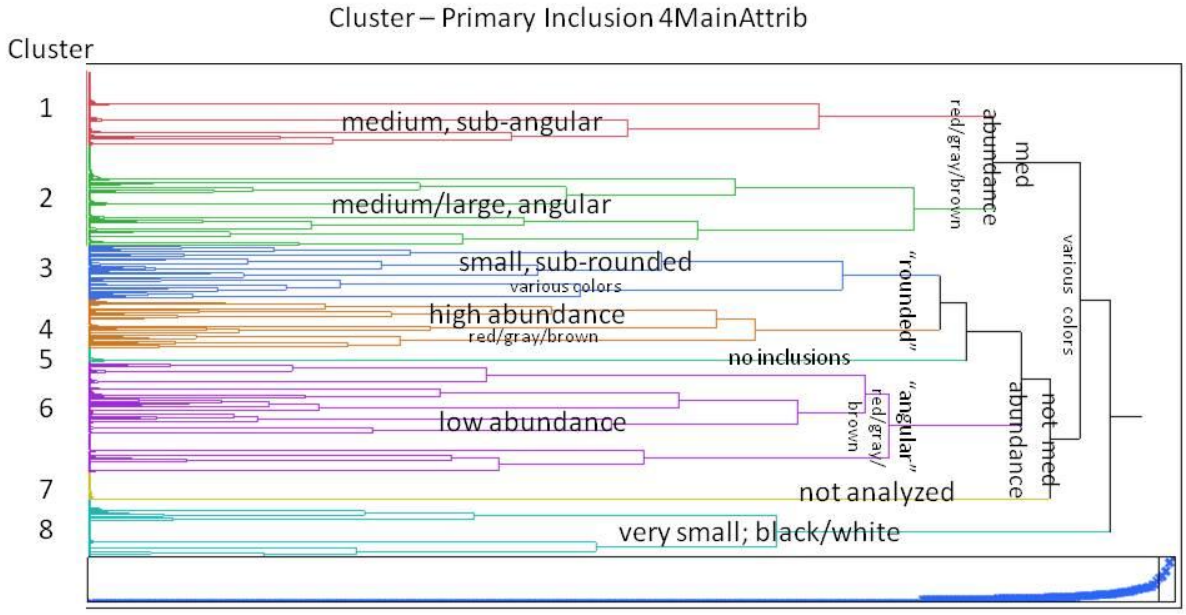
Table 6.4: Summary of occurrence of rim, base, and decorated body sherds by Area within Ojakly.

Inclusion Types

A qualitative cluster analysis based on inclusion attributes (size, shape, color, and abundance) revealed the use of two tempering agents: grog and sand (see the cluster groups identified in Figure 6.2). Grog was by far the most common temper used, appearing in nearly 70% of the sherds recorded, and was recognized by its red/gray/brown color in conjunction with its angularity and medium to large size. Sand, by contrast, was recognized as very small, black and/or white inclusions, and appeared as the primary temper in just over 10% of the sherds. For

[20] Pronounced /jump/, this software allows users to visualize and explore patterns in large datasets that include both measured and qualitative data. For more information on JMP, see www.jmp.com.

the most part, grog and sand seem to have been used independently, though in about 10% of samples the wide variability in inclusion attributes suggests they were mixed (Figure 6.2, Cluster 3). The use of chaff temper (recognized by distinctly-shaped voids left in the cross-section) was extremely rare in the Ojakly samples overall (just 19 sherds), but interestingly, occurred in sand-tempered, grog-tempered, and mixed temper sherds. Only 3% of the Ojakly sherds had no use of visible temper at all, and the remaining 6% of samples were so small that the temper used could not be recognized.



Cluster	Inclusion Type	Cluster	Inclusion Type
1	grog, medium abundance	5	no inclusions
2	grog, medium abundance	6	grog, low abundance
3	mixed grog and sand	7	not analyzed (too small)
4	grog, high abundance	8	sand

Figure 6.2: Results of the qualitative cluster analysis performed on inclusion characteristics (size, color, shape, abundance), showing the differentiated use of grog and sand temper in the analyzed Ojakly ceramics.

General Paste and Manufacturing

Outside of inclusions, macroscopic evaluations were made for the general paste composition of every sherd analyzed. The overall paste color was assessed and standardized according to a range of colors observed during analysis (light brown, brown, reddish brown, reddish gray, red, gray, purplish gray, greenish gray, black). Similarly, the angularity of the matrix in the fresh break was assessed as ranging from 'highly angular' to 'fine'. Since the general macroscopic paste observations are largely superseded by the petrographic analysis they will not be dealt with further here (see Figure 6.3). Macroscopic observations on the manufacturing technique of each sherd were also recorded (again, largely confirmed by petrographic analysis of voids). Wheel-made ceramics were identified by the presence of the horizontal striations and even surfaces typical of such pots. Hand-made ceramics were identified by both the absence of wheel marks and relative irregularities in form. More specific manufacturing techniques for hand-made ceramics, such as those evidenced by visible coil breaks (Figure 6.4), were noted when observed.

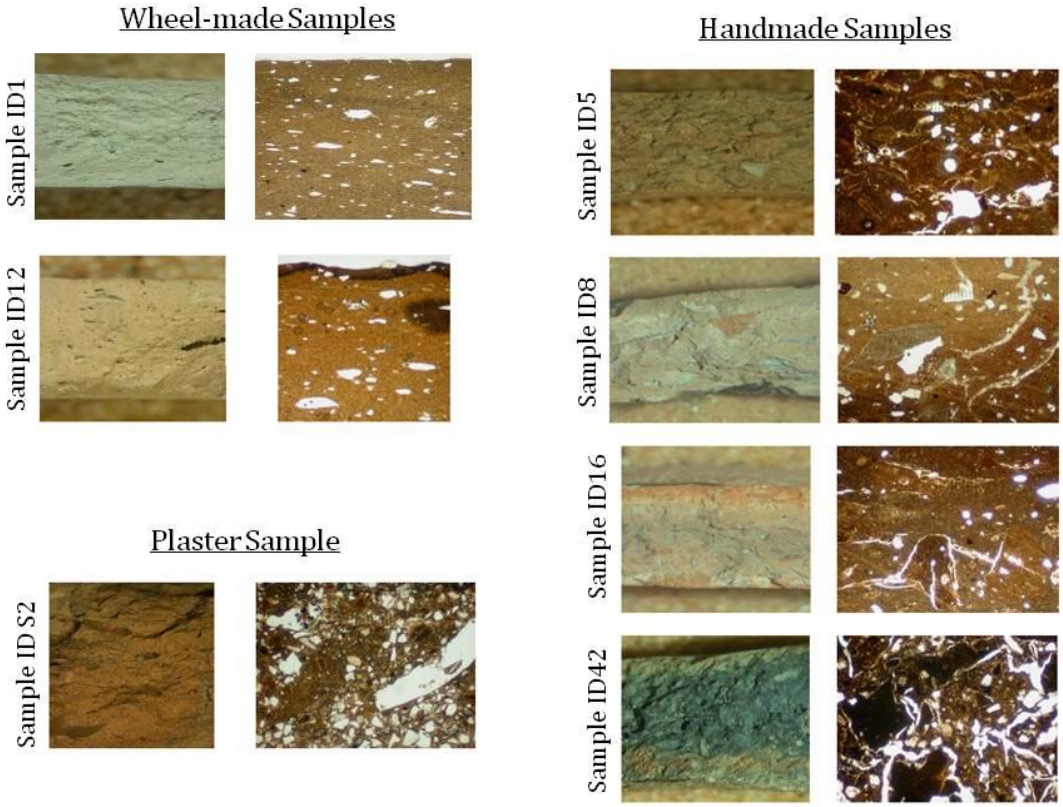


Figure 6.3: Examples of paste according to ware and manufacture; left image shows a photograph of a fresh-break cross-section taken with a stereoscopic microscope, right image shows cross-section in parallel polarized light. Both images courtesy of R. Piermartiri, taken during petrographic analysis (see Section 6.4.2 below).

Figure 6.4: Coil break patterns observed during this study.

Rim Sherds

Although every sherd belonged to one of the inclusion types identified, certain other recordable characteristics were only identifiable on specific subgroups of the sample assemblage (for example, rim, body, or base sherds, or decorated vs. non-decorated sherds) and were thus analyzed with respect to that subgroup. Rim sherds made up roughly 60% of the Ojakly samples (see again Table 6.4), and based on profile drawings of these 322 examples, six generalized rim forms were identified (Figure 6.5). Keeping aside a miscellaneous or 'other' rim form group, the remaining five forms can be further summarized as either 'rounded' or 'squared' rim categories, which as distinct groups reveal strikingly different patterns in terms of associated attributes (Table 6.5). Rounded rim sherds come from pots with a smaller average diameter (ca. 12-13 cm), while squared rims came from larger vessels (17 cm average diameter). In terms of matrix composition, rounded rims tended to be of a finer paste and more often have a sand temper than squared rims, which were more likely to be grog-tempered and exhibit a less well-levigated paste. The distinctions between rounded rims and squared rims can even be seen in the manufacturing process (all wheel-made rim sherds were rounded) and aesthetic composition (squared sherds had incised decorations more frequently than did rounded sherds).

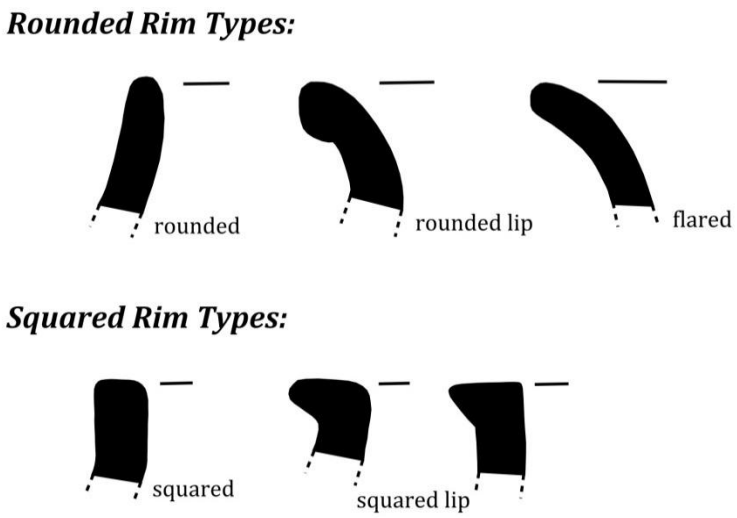


Figure 6.5: Examples of common rim types identified in the analyzed Ojakly ceramics, grouped into 'rounded' and 'squared' categories. 'Miscellaneous/other' rim types not shown.

Rim Type (n)	Avg Diam/ Thickness	Inclusions	Manufacture (W-M vs. HM)	Decoration	Sherd Paste
rounded lip (10)	12 cm/6.7 mm	20% sand	10% W-M	no examples	sometimes fine
rounded (63)	13 cm/6.5 mm	>10% sand	10% W-M	<10%	sometimes fine
flared (28)	14 cm/6.6 mm	>10% sand	>20% W-M	<10%	sometimes fine
flattened lip (88)	16 cm/7.2 mm	<5% sand	no W-M	>20%	angular paste only
squared (76)	17 cm/7.9 mm	<5% sand	no W-M	>10%	angular paste only

Table 6.5: A comparison of different macroscopic sherd attributes recorded on different rim types.

Body Sherds

Body sherds comprised roughly 30% of the Ojakly analyzed samples, and most of these (ca. 25%) were large enough to exhibit their vessel's upper shape, where the neck and shoulder meet. As with rims, the full set of profile drawings could be summarized by recognizing several distinct, reoccurring forms (Figure 6.6), but importantly, vessel forms were recorded

independently of rim forms and the two were not conflated attributes. In addition to the three common vessel forms – long curve necks, short angled necks, and straight/no-necks – a number of sherds (n = 203) were recorded as 'unidentified – closed', indicating their closed form (based on the angle of the rim) even if their exact shoulder/neck relationship could not be determined. Again, as was the case with rims, by generalizing the patterns observed into these vessel form groups, certain attributes stood out as distinctly related to each form. Long curve necks and straight/no-neck forms consistently revealed themselves at opposite ends of a continuum, with short angled necks often falling somewhere between the two (Table 6.6). Thus, long curve necks were the largest (in average diameter and thickness, when recordable), with substantially higher occurrences of rough paste, grog temper (in every sample), and incised decoration (40%). Straight/no-neck forms, by contrast, represented markedly smaller and thinner vessels, more often characterized by a fine paste and some component of sand temper, and, importantly, no examples of incised decoration.

Vessel form and rim form were recorded as separate independent attributes, and a number of sherds (n = 82) exhibited both features, allowing some general corresponding trends to be recognized between shoulder and rim. There is a clear association between long curve neck vessels and squared rims and an even stronger association between straight/no-neck vessels and rounded rims *without lips*. Flared rounded rims, on the other hand, are convincingly related to the vessels with short angled necks, which everywhere else sit consistently within a middle-ground between long curve necks and straight/no-necks.

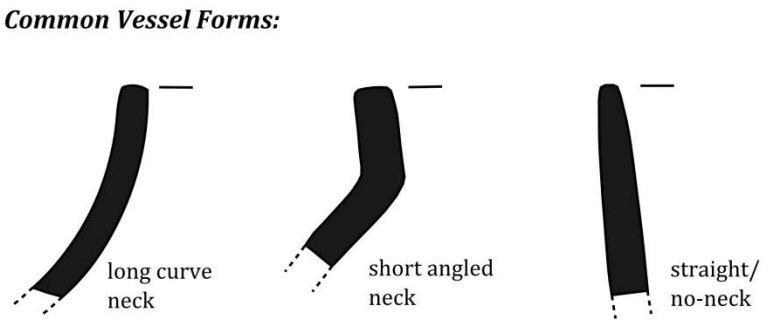


Figure 6.6: Examples of the three most commonly identified vessel forms from analyzed body sherds (varieties of 'unidentified' forms not shown). Note that vessel form and rim type were recorded independently.

Form Type	Avg Diam/ Thickness	Inclusions	Manufacture (W-M vs. HM)	Decoration	Matrix Angularity
straight/no-neck	11 cm/5.4 mm	33% mixed	>10% W-M	0%	often fine
short angled neck	16 cm/7.1 mm	85% grog	5% W-M	30%	sometimes fine
long curve neck	18 cm/8.3 mm	97% grog	all HM	40%	>80% angular paste

Table 6.6: A comparison of different attributes by identified vessel form type.

Base Sherds

Bases were not as numerous as either rim sherds or body sherds, and comprised only 10% of the Ojakly samples (n = 60). They were generalized as one of two types: flat (when the vessel wall curved inward to directly form the base), or raised (on a solid short pedestal, or with a small protruding foot), shown in Figure 6.7. Bearing in mind the smaller sample size, flat and raised bases can nonetheless be distinguished by their association with different attributes (Table 6.7). Raised bases as a group have a larger average diameter, and were exclusively handmade with a rougher paste (no examples were wheel-made or exhibited a fine paste). Temper differences between the two base types are rather pronounced: looking at bases tempered with sand only, roughly 70% are flat bases and 30% are raised; the reverse ratio appears looking at bases with

grog-only or mixed grog-sand temper, with 30% flat and 70% raised. No bases examined exhibited any decorations.

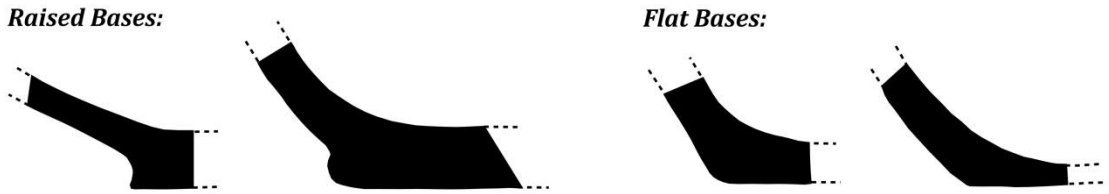


Figure 6.7: Bases in the Ojakly samples were characterized as either having a small raised foot or pedestal, or a flat form where the vessel wall formed a continuous smooth joint with the bottom of the pot.

Base Type (n)	Average Diameter	Inclusions	Manufacture (W-M vs. HM)	Decoration	Sherd Paste
flat (12)	6 cm	50% sand	25% W-M	n/a	50% fine
raised (36)	9.5 cm	10% sand	no W-M	n/a	angular paste only

Table 6.7: A comparison of attributes recorded by base type.

Incised Decorations

Incised decorations are commonly viewed as a defining characteristic of mobile pastoralist pottery in the Bronze Age Murghab, and these elements certainly appear within the Ojakly diagnostic sample analyzed. Both the designs used and the location of the decoration on the upper portion of the vessels put the Ojakly pottery in line with broad trends in aesthetics used throughout Central Eurasia at this time (see Cerasetti 1998; Kuz'mina 2007). However, although these decorations are not uncommon in the Ojakly assemblage, neither are they frequent, appearing on 142 of the total 513 sherds examined (most commonly on body sherds – 113, compared to 29 on rim sherds). Given the fragmented nature of Ojakly's ceramics, broader extrapolations are problematic, but these ratios might suggest that only a small percentage of handmade coarseware was decorated in this manner. Decorations appeared on roughly 30% of

grog-tempered vessels and slightly less often on mixed temper vessels, but on only 15% of sand-tempered vessels. Related to this (since temper and paste processing appear to correlate), decorations appear with more frequency the rougher the paste (Figure 6.8). Thus, based on this sample, decorations might be better understood not as a defining feature of handmade coarseware, but as an aesthetic choice made under certain conditions.

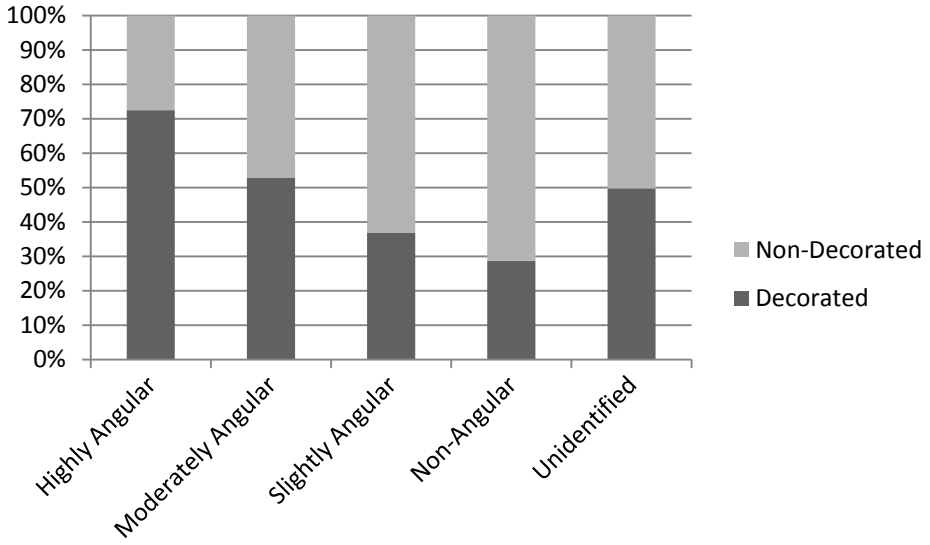


Figure 6.8: The proportion of decorated vs. non-decorated sherds by the attribute 'paste angularity' (reflecting the level of processing of the clay. 'Highly angular' clay was not well-levigated and therefore rougher).

Firing Conditions

Finally, the macroscopic analysis recorded characteristics related to firing conditions, noting the cross-section patterning identified by Rye (1981), but modified in this case to the more generalized categories of 'oxidized' and 'fully reduced' sherds, with the addition of categories for 'reduced – exterior only' and 'reduced – interior only'. Table 6.8 summarizes the attribute patterns found to associate with each firing category, which overall tend to hold even though the number of samples within each category varies considerably. There are only a handful of trends that should be highlighted as different and therefore possibly informative. Although three of the categories contained a majority of rim sherds and some wheel-made

sherds, reduced exterior sherds were more often from the body than the rim of the vessel, and none were wheel-made. Given the equally small sample size of the reduced interior category, which follows the trends of the larger-sized categories, these differences in the attributes of reduced exterior sherds are unlikely to be random or accidental. Also of note is the different spatial patterning, in that while the two largest categories contained sherds coming rather equally from all areas of the site, reduced exterior sherds predominantly came from one living area, and reduced interior sherds largely from the other living area. One possible explanation for this is that the vessels found in each area were largely made during different ceramic production events, which would fit within the presumed punctuated, episodic occupation of Ojakly.

	Oxidized Sherds (n = 365)	**Fully Reduced (n = 98)**	**Reduced Interior (n = 26)**	**Reduced Exterior (n = 20)**
Sherd Type	>60% rims	>60% rims	>60% rims	25% rims; 55% body
W-M vs. HM	90% HM	~90% HM	95% HM	100% HM
Sherd Paste	sometimes fine	sometimes fine	no fine paste	no fine paste
Inclusions	mostly grog	mostly grog	mostly grog; low abundance	90% grog; low abundance
Rim Type	similar mix	similar mix	>50% flat lip	40% rounded
Base Type	mostly raised	mostly raised	all flat	mostly raised
Form Type	long/straight/short	short/long/straight	all long curve	none identifiable
Decoration	25%	~35%	~40%	45%
Site Area	even split	even split	50% Area 1 few in Area 5	70% Area 4; few in Area 5

Table 6.8: The breakdown of sherds fired under different conditions by various other attribute classes.

Despite some apparent differences in firing atmosphere and attributes associated with these differences, the overall quality and friability of the coarseware indicates that it was low-fired, and the range of matrix colors and coloring in cross-sections are further suggestive of the variability in firing control typically seen in open-pit firing (cf. Michelaki 2006). This, combined

with the fact that 90% of Ojakly's pottery is handmade, suggest a household level of craft production, even taking into account the presence of the ceramic kiln at the site (an issue returned to in Chapter 7).

Overall, the handmade coarseware assemblage at Ojakly presents an internal variability in paste attributes, firing, and decoration use, aesthetic appearance, and distribution across the site. Since mobile pastoralist coarsewares are typically described in very limited terms and homogeneity is implicit if not stressed, the variability revealed here is noteworthy and should stand alongside that described for wheel-made ceramics, although standardizations in production are not comparable. The diversity in handmade coarseware presented here is indicative of a low level of ceramic specialization, where pots were likely produced on a household level, using open firing techniques. Despite differences in paste recipes and decoration that might be related to individual potters, the overall range of vessel sizes and shapes were probably part of a generalized institutional framework of pottery manufacture (cf. Doumani 2014), determined not by any organized direction but through their users' needs of multi-functional and transportable containers.

6.4.2 LaboratoryAnalysis Results

To complement the results of the in-field macroscopic analysis, which were oriented toward identifying variability within the coarseware assemblage and building a useful typology, laboratory analyses provide greater insight into production choice and practice. These analyses examined 51 samples drawn from the macroscopically analyzed group (refer to Table 6.3), and function on the premise that ceramics are a form of "manmade rock": composed of a non-uniform heterogenous mixture of several minerals with definite and distinguishable properties,

subject to characteristic transformation through the firing process (Herz and Garrison 1998:194). Thus, if we know the mineralogical composition of the pottery and can examine the microscopic properties of the paste, we are in a position to speak about clay preparation, vessel forming techniques, and firing conditions. Across an assemblage, we might then be able to translate these variables into ceramic production practices. Briefly, petrographic analysis describes the kind, size, shape, and percentage of inclusions in the ceramic body, as well as some attributes of the clay matrix (the shape and orientation of minerals and voids) (Herz and Garrison 1998; Michelaki 2006:12; Piermartiri 2012), while geochemical and mineralogical analyses examine the non-visual mineral composition of ceramic sherds (Herz and Garrison 1998; Rotondaro 2012). Both these laboratory analyses provide detailed information complementary to the macroscopic analysis, providing a more complete picture of the range of materials and technologies available to and employed by Ojakly's potters.

Both geochemical/mineralogical and petrographic analyses recognized different categories within the analyzed samples, and in each, a large group comprised of the majority of samples was found, along with three small groups that stood out against this majority backdrop: 1) the Ojakly kiln plasters, along with two low-fired ceramic samples and one piece of 'cookware', 2) a 4-sherd subset of the Murghab survey pottery, and 3) the so-called BMAC sherd from Tamgaly, Kazakhstan. The first group, containing plaster/low-fired/cookware samples, was distinguishable for the use of straw or grass (and not grog) as temper, recognized through the characteristic voids and impressions left behind in the sherd[21]. This group also exhibited a very poor clay matrix, where the raw clay had not been cleaned of its plentiful angular natural inclusions, leaving the actual clay minerals in proportionally low abundance.

[21] Interestingly, although they are chemically similar to other kiln plasters and the low-fired ceramic samples, the two samples from the deepest portion of the kiln wall, where an ashy fill was present, were not tempered with plant material. The remaining four samples from the kiln wall, taken above the level of the ash fill, were straw-tempered.

Four decorated sherds comprised the second group. These were collected during archaeological survey near the site of Egri Bogaz in the northern Murghab, and were made from a coarse, carbonate-poor clay, which contained less silt than other samples and had large natural clastic inclusions.

Only one of the analyzed samples was collected outside the Murghab: the so-called BMAC sample from Tamgaly, Kazakhstan. Perhaps tellingly, the trace element composition of this sherd is unique compared to other samples, and may indicate a similarly unique production locale. Although the sherd shares some compositional features of Murghab wares, in comparison to these it exhibits an odd mix of features: grog temper (as is found in handmade coarseware) in a smooth matrix with parallel elongated voids (similar to wheel-made samples). Therefore, although archaeologists familiar with Central Eurasia's Bronze Age material culture might be able to readily visualize a sherd described as BMAC, the particular designation of this Kazakh sherd as such – and possibly others encountered in regional literature – would seem to be misplaced in terms of both production and origin.

Beyond the three outlier groups, the majority of laboratory-analyzed samples demonstrate a general consistency in clay resources used for pottery found in the Murghab. For both handmade coarseware and wheel-made samples, the clays used were calcareous (marly) and contained natural inclusions of quartz, K-feldspar, plagioclase, and phyllosilicates in varying quantities. There was no noticeable difference between decorated and non-decorated samples. Even without comparable modern clay samples, the broad similarity across a range of wares types, aesthetic tendencies, and deposition locations strongly supports the hypothesis that most of the pottery found in the Murghab was indeed made there and not imported from outside the alluvial fan region.

Yet while the clay, or range of clays, used was largely indistinguishable across the bulk of analyzed samples, the preparation, processing, and firing of the clays into ceramic vessels was not. Petrographic analysis revealed different patterns in voids, fractures, inclusion types, and inclusion/matrix ratio between samples that are traditionally (and were macroscopically) identified as either handmade or wheel-made. The clay used in wheel-made samples was cleaned of impurities and larger natural rock inclusions, leaving a fine paste that did not shrink or fracture significantly during the drying phase. In contrast, the handmade coarseware exhibits severe latticed fracturing due to shrinkage during the drying process, a result of the high porosity of the matrix and the temper used. In addition to grog, which was noted using the hand lens during macroscopic analysis, the handmade coarseware temper in some samples included lithic and rock fragments, as well foraminifera shells (identified by the cavities they formed). Beyond clay processing (cleaning and tempering), different forming techniques for wheel-made and handmade samples were visible through laboratory analyses. Wheel-made samples have small, ellipsoidal voids in their paste that are elongated parallel to the sherd's surface, while coarseware samples have voids of irregular shape and size, a likely indication of the use of a potter's wheel in the first case, and not in the second case.

Geochemical, mineralogical, and petrographic analyses are also able in many cases to help determine the firing temperature used to produce ceramic vessels, based on levels of clay vitrification and the minerals present along with their known transformations at particular temperatures. In the samples analyzed here, the firing temperature for nearly all sherds (both wheel-made and handmade) was estimated at between 800° – 900° C, based on the absence of primary calcite and the presence of secondary clinopyroxenes, as well as the lack of any vitrification. In a handful of samples, however, the presence of primary calcite and lack of

clinopyroxenes, gehlenite, and hematite suggests the firing temperature was not sustained above 800° C. The composition of plaster samples from the interior kiln wall similarly indicate that although the temperature in the fuel chamber may have reached ca. 800° C, it was probably not sustained for any length of time (this is further support for the supposition that the kiln was never successfully operated, presented in Chapter 4).

6.4.3 Contextual Ceramic Analysis

Using the results of the macroscopic and laboratory analyses, a follow-up contextual analysis attempted to understand spatial patterning of ceramics across the site of Ojakly, and, to a much lesser extent given the very limited sample size, the northern Murghab region. Here a closer look at the ceramics found inside the kiln in production-oriented Area 5 are also examined in greater detail, drawing on both the macroscopic observations and laboratory analysis results.

Spatial Patterning

The first pattern of note regards the distribution of wheel-made versus handmade coarseware sherds across the site. As already noted, at Ojakly the overall ratio was 9:1 in favor of handmade coarseware ceramics, but by breaking this down into site areas differences can be teased out. The two living areas, for example (Area 1 and Area 4) contained 95% handmade coarseware, while the production area (Area 5) saw this percentage drop to 80% (with 20% wheel-made). Not surprisingly, given the clear disassociation of wheel-made sherds and decoration, there is a much smaller frequency of decorated sherds in the production area, but at just 13% (compared to 30% in the living areas), the numbers suggest a real disparity in the proportions here that is not simply the result of association/disassociation of attributes.

Other ceramic patterns at Ojakly are probably not the direct result of above-noted attribute associations or too-small sample sizes. The presence of rims and their types, for example, do legitimately appear unevenly distributed across the site. Rims make up proportionally fewer diagnostic sherds in living Area 4 than they do in either Area 1 (also a living area) and Area 5 (production area). And while the generalized 'rounded' and 'squared' rim forms appear similarly distributed across Ojakly, if instead the presence or absence of a *lipped* rim is examined, there is a clearly greater use of lipped vessels in the living areas than in the production area.

Wheel-made Ceramics from the Kiln

Certainly one of the most unexpected group of finds at Ojakly, and perhaps one of the most interesting, was a collection of unfired ceramics and terracotta crescent wedges found in the deepest fill of the kiln (Figure 6.9). Resting in about 20 cm of gray, ashy soil above the plastered kiln floor, these finds appear to comprise a single context or event, interpreted as corresponding to the unsuccessful first firing of the kiln (see Chapter 4).

The unfired greenware recovered were not fragments of containers or vessels, but rather represent a form traditionally identified as a "potstand" (Russian подставка – *podstavka*) in the relevant literature (Hiebert 1994a; P'yankova 1989, 1993). Potstands are well-known from Bronze Age sedentary sites in the Murghab, and specifically appear in a number of Namazga VI ceramic assemblages. In every published example potstands are wheel-made using well-levigated clay. Despite their name, the precise function of such potstands is unclear; they may have indeed been stands for large storage vessels with inward sloping or pointed bases, or they may have been molds upon which the bases of other vessels were formed (Hiebert 1994a:57).

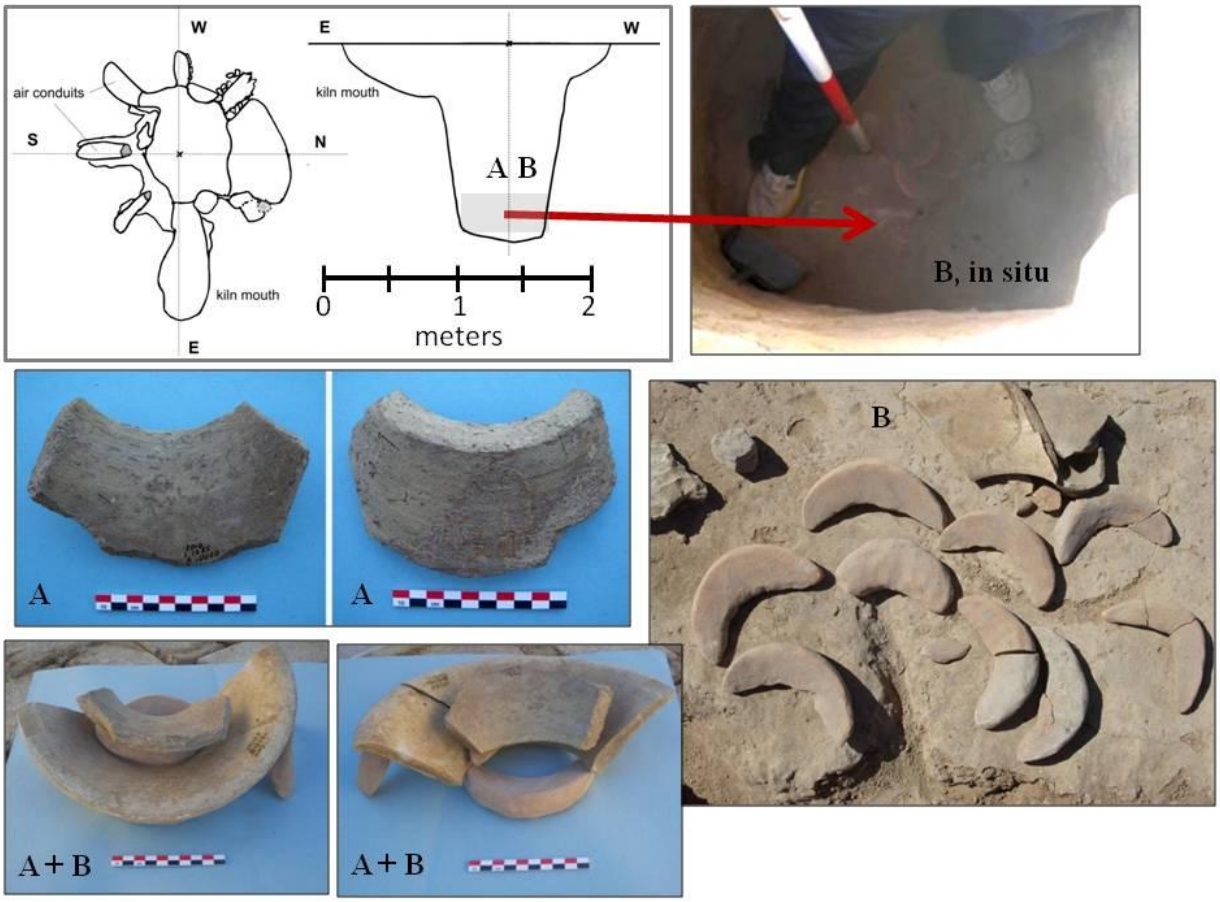


Figure 6.9: Ceramics recovered from the kiln. A = unfired potstands; B = terracotta wedges. The wedges could be used to stack potstands during firing.

The intended function of the Ojakly potstands is likewise uncertain, but like the Namazga VI examples, they were wheel-formed and included a chaff temper. Their paste, however, is noticeably rougher than that of Namazga VI or wheel-made ceramics more generally, and the fragments are thicker, so that once fired these potstands would have resembled but been quite distinguishable from typical Namazga VI potstands; Figure 6.10 shows the Ojakly potstands and a Namazga VI example side-by-side for comparison. On the other hand, the more levigated, less tempered paste would have readily distinguished these potstands from the handmade coarseware most typical of Ojakly as well, leaving them in some regard as an in-between or mixture of the two ware types. The potstands may furthermore represent a sort of ‘hybrid’ or ‘experimental’

form[22], imitating the vessels (and possibly functions) of wheel-made wares common at that time, and produced in a distinctly different manner than the coil-forming technique used for the handmade coarseware that otherwise characterizes the site. It is doubtful that wet or leather-hard unfired vessels would be transported any great distance to be fired, so although no potter's wheel was recovered at Ojakly the wheel-made potstands were most likely made on-site.

Figure 6.10: Side-by-side comparison of unfired Ojakly potstand fragments with a typical Namazga VI example.

The greenware potstands were found together with nine crescent-shaped terracotta wedges (see Figure 6.9, B). These sand-tempered wedges had been fired at some point prior to their use in the kiln, and they were likely used as spacers allowing several potsands to be stacked upside-down during firing. This arrangement would have improved airflow and heat distribution around the potstands during firing, and allowed multiple pieces to be fired in a single event, thus increasing both overall production efficiency and capacity.

[22] In discussion with local scholars, there is an understandable hesitation in supporting this claim of imitation ware without more definitive evidence, although P'yankova states explicitly that "livestock breeders" of Late Bronze Age southern Tajikistan "copied wheel-made specimens" in their handmade vessels (1982:41). As more mobile pastoralist ceramic assemblages are collected in the future, additional data may help to evaluate a similar claim for Ojakly.

6.5 A New, Working Typology for Handmade Coarseware in the Bronze Age Murghab

Drawing from the various results presented above, it is possible to reconstruct the ceramic assemblage of Ojakly from what is now known about the overlapping properties of its constituent sherds, even without any complete vessels having been recovered. Based on attributes recognized *within* the Ojakly samples themselves (as opposed to using a pre-defined trait list borrowed from other typologies), it has been possible to identify various but repeated patterns of paste preparation and tempering, vessel formation, size and shape characteristics, and employment of decoration. By correlating how often and how strongly these patterns co-occur, and when they do not, three types of commonly-occurring vessels can be identified at Ojakly:

1) large pots with distinct bases, long curved necks, and a rim with flattened outward lip or sharply squared off; these pots are never wheel-made, and tend to be rougher, with grog temper, and not unusually exhibit decoration on the upper part of the vessel
2) medium to large pots with flat, undistinguished bases, and short angled necks leading to flared rims
3) small pots with flat bases, straight upright bodies with no neck, and a rounded rim; these are sometimes wheel-made with a fine, sand-tempered paste, and rarely have any decoration

Two other classes of ceramics are also important, although their use at the site appears to be much more restricted to particular contexts:

a) ‘cookware’ – thick, rough-pasted, flat ceramics, found primarily in association with food preparation areas at living Area 4
b) potstands – apparently used only in the production area (Area 5)

The above classes are not meant to suggest that these were *the only* types of vessels used at Ojakly. On the contrary, these types are idealized summaries of commonly-shared attributes across the assemblage, not examples of specific sherds found, and there remain overlaps in attributes that leave no doubt about the wide range of existing vessels. These groups, however, stand out because their attributes repeatedly appear together, signaling a specific constellation of traits that together gives a fair idea of what certain more common vessels may have looked like. The recognition of these common vessels, as well as the overall variability of ceramics used at the site, should help dispel the notion of the ubiquitous, uniform "nomadic jar" (Kuz'mina 1994a, 2007), or at the very least render it part of a much more varied mobile pastoralist ceramic repertoire. That there *was* a conscious, productive repertoire should be evident in the recognition of the common vessels used by Ojakly's inhabitants; mobile pastoralists were keyed into some common, shared notions of what a pot should look like and how to make it, but were still individual producers and consumers relying on their own labor and skills.

6.6 A Brief Interpretation of Ojakly's Ceramics

The ceramic analyses presented here do several important things. First, they make clear that wheel-made ware and handmade coarseware are geographically co-occurring local ceramic traditions during the Late Bronze Age, which utilize the same range of Murghab clay resources. Second, in addition to showing that the differences between wheel-made and handmade wares are not related to geographic origin, these analyses emphasize that the differences are more than simply aesthetic, and revolve as much around the choices potters made in manipulating clays and

shaping and firing vessels. Finally, and perhaps most importantly, these comprehensive analyses reveal for the first time the range of variation to be found between two somewhat idealized ceramic poles, which has never before been properly recognized, described, or explored for what it might reveal about social relationships between farming and mobile pastoralist communities in the Late Bronze Age Murghab.

To return to the first point, nearly all of the samples analyzed from excavations at Ojakly and from Murghab survey work point to the same clay resource(s) being used, which given the unlikely chance that *all* the samples originated outside the region, would seem to confirm localized ceramic production in the Murghab. This is further corroborated by the fact that the analyzed sherd from Tamgaly, Kazakhstan, which was suspected of having a Murghab origin, in fact has a distinctly different chemical and mineralogical makeup than the other samples. The four sherds from Egri Bogaz in the northern Murghab, which do somewhat differ compositionally from other samples, may reflect some extra-local connections, but on the whole the analyses here indicate pottery was not regularly being brought into the Murghab from distant areas through trade or along regular migration routes. If pottery making was a seasonal activity restricted to the Murghab, then the vessels produced and used at Ojakly (and anywhere else the inhabitants traveled) were also geographically restricted, given their indistinguishable chemical and mineralogical composition from the undoubtedly local wheel-made ware.

If, as seems to be the case, the inhabitants of Ojakly were utilizing only locally-produced pottery, the implication is that they either did not make a habit of bringing pottery on extra-regional migrations, or, perhaps more likely given the overall evidence from Ojakly, handmade coarseware-bearing mobile pastoralists were rather more endemic to the Murghab during this period than has previously been thought (cf. Hiebert 1994a; Moore et al. 2004; see also Chapter

3). This conclusion has a host of social implications which will be expanded on in the next chapter (Chapter 7), but in regard to ceramic production it suggests that the differences in wheel-made ware and handmade coarseware were maintained by choice, rather than by differential access to material or technological resources.

Chapter 7: Discussion

In the preceding chapters I have presented the results of excavation and analyses undertaken for the site of Ojakly, in the northeastern Murghab alluvial fan. Here, I draw these multiple lines of evidence together to highlight the inhabitants of Ojakly as mobile pastoralists who lived near and interacted with sedentary farming communities, but who simultaneously maintained a socio-cultural distance from their neighbors. I contextualize the Ojakly results with additional data from Bronze Age farming communities in the Murghab as well as with material from mobile pastoralist sites in nearby regions.

7.1 Mobile Pastoralists at Ojakly – A Synthesis of Excavation and Analysis Results

Taken on their own, the site organization and layout, and the faunal, archaeobotanical, and ceramic assemblages from Ojakly cannot certify that the inhabitants of the site were mobile pastoralists. It is only by drawing together the multiple lines of evidence into one coherent argument that we can begin to assess the overall picture of subsistence strategy (Chang and Koster 1986; Mughal 1994; Young et al. 2008). Following the "criteria" for identifying mobile pastoralist sites presented in Cribb (1991:92-96) and Hole (1978, 1979), at Ojakly I have found all the various lines of evidence to be consistent with the practices of mobile pastoralists, and I address each dataset in turn below.

In terms of the physical layout and architecture of Ojakly, the punctuated but repeated occupation of the same space is consistent with the regular cycling of mobile pastoralist campsites, and the use of the same dumping area for refuse through the occupation phases in

Area 4 may indicate the same group(s) came back to the site on successive occasions. The reed-impressed daub found widespread on the site, but particularly in association with postholes, speaks to the type of architectural features and is further evidence of the temporary nature of the occupation. In Area 1, the raised area of hardened soil, complete with a ring of postholes encircling a possible sunken structure, and the distinction of this raised area from an adjacent zone containing fired pits and features accords well with the bank and sunken house features of prehistoric mobile pastoralists noted by Itina (1977) south of the Aral Sea, and more broadly, by Andronovo groups identified by Kuz'mina (2007). Such sunken features with postholes are not found anywhere as part of the developed Namazga cultural sequence, including its local BMAC expression in late Namazga V and VI. Namazga-sequence architecture is characterized by mudbrick structures with complexes of square rooms, which is not only found within the walled centers of large villages, but also in smaller residential locales best described as farming hamlets (i.e. the site of Gonur 20, in Sarianidi and Dubova 2012). Sunken dwellings with stick-and-daub upper walls, on the other hand, are recorded archaeologically, historically, and ethnographically throughout the foothill and upland areas of Central Asia and adjoining regions, and are often linked to temporary habitation and seasonal mobile populations. In the Murghab, this type of architecture is still used by seasonally-mobile groups of Baluchi Turkmen for dwellings and underground storage pits (see Figure 4.6).

Certainly, small, temporary campsites with lean-to structures could have been utilized by subsets of the sedentary community near more remote agricultural plots during particular times of the year (as planting or harvesting camps, for example). However, if this were the reason for Ojakly's existence, then the handmade coarseware ceramics that dominate the site need explanation. As Abdi (2002, 2003) suggests, the campsites of transhumant herdsmen (or, by

logical extension, farmers' temporary camps) should evidence a limited range of activities and not the full set of day-to-day practices that would characterize self-sufficient mobile pastoralists. Limited materials and types of objects, moreover, should also characterize the herdsmen campsite as a sub-unit of the village community to which it is tied economically, socially, and culturally (ibid). Ojakly is not terribly far from agricultural villages that were probably occupied at the same time, and the finer wheel-made ceramics could easily have been carried out to a temporary herders' or farmworkers' camp. Yet even if the occupants chose to make their own expedient, expendable pottery, something like the coarse handmade "kitchen ware" recovered in the village contexts (Cattani 2008b:143; Hiebert 1994a:61; Hiebert and Moore 2004:294), it is highly unlikely their learned, oft-practiced ceramic paste recipe would shift away from the ubiquity of Namazga-type chaff-tempering, and specifically toward the unique grog tempers of the "Andronovo" ware type. Thus, taken all together, the architectural, organizational, and ceramic distinctions of Ojakly from coeval sedentary farming villages and hamlets are strongly indicative of a distinct population, for whom institutional frameworks of mobility and ceramic production were well-established.

As illustrated by Cribb (1987), archaeological faunal remains should neither be universally nor straightforwardly interpreted in terms of the structure of a living herd nor the human logic behind its maintenance through time. In general, however, we can look to the Ojakly faunal assemblage for features consistent with mobile pastoralism as an independent subsistence economy. First, the fauna points to a particular emphasis on domesticated herd animals. Cattle may have been a small part of mixed herds with sheep and goat, or individual animals or butchered remains may have been brought to Ojakly (Chapter 5, Section 5.2). That herd animals were a basis for subsistence is reinforced by the heavy processing of bones, and the

numerous cut and hack marks and instances of burning, especially on sheep and goat remains. There are very few specimens of wild animals present in the sample, with wild boar possibly the only identifiable wild species. Since cattle were kept in sedentary villages at this time, and hunting also contributed a small amount to the diet in these contexts (Hiebert 1994a; Moore 1993a; Moore et al. 1994; Sataev and Sataeva 2012b), these strategies should also have been available to the inhabitants of Ojakly. That they are not more evident here suggests the herding and hunting strategies at Ojakly were a choice rather than a constraint due to environmental marginality. This observation is further underscored by the archaeobotanical remains, which indicate the local environs of Ojakly might have been better -watered than at present (Chapter 5, Section 5.3).

Traditional interpretations of the role of settled communities in interactions like those apparently represented by Ojakly would lead us to surmise that the mobile pastoral inhabitants of the site were drawn into the sphere of influence of settled farming communities, based on their need for grains and other foodstuffs that they could not otherwise grow themselves due to their mobile lifestyle (Barfield 1989; Khazanov 1994, 2001). In exchange, the nomads would have brought in the raw materials necessary to craft production centered in the settlements, but the terms of exchange were likely to be unequal, since the nomads needed grains and were thus at the mercy of trade terms set by the agricultural settlements.

Yet the evidence from Ojakly supports none of the above suppositions. In this instance, the mobile pastoralists appear not to be dependent on farming communities for their subsistence needs. Indeed, they seem to be invested in their herds, with no evidence for grain storage or processing as a significant economic investment (Rouse and Cerasetti 2014; Spengler et al. 2014a). By contrast, there is solid evidence for the involvement of mobile pastoralists in

agricultural activities from excavated campsites that post-date Ojakly, but are still part of later Bronze Age tradition in the Murghab (Cattani 2008b; Cerasetti et al. *forthcoming*; also see below Section 7.2). There is also no evidence that the people who lived at Ojakly seem to have been involved in trade of raw materials from resource zones outside the Murghab, since there is no evidence that they regularly left the alluvial fan (pottery was made locally) or were involved in any stone or metal working (cf. the mobile pastoral groups discussed by Alimov et al. 1998; Boroffka et al. 2002; Parzinger and Boroffka 2003). The only clear evidence for production practices at Ojakly relate to ceramics, and here there appears to be a real distinction between the mobile pastoral and settled farming communities, not the unilateral supplanting of one production strategy for another by an overarching authority, predatory trade terms, or cultural absorption.

7.2 Ojakly in Archaeological Context

The overall data coming from Ojakly is consistent with the site's inhabitants being mobile pastoralists, and by further contextualizing these data with archaeological research coming from other later Bronze Age sites of Central Asia they can be strengthened as well as brought into the discussion of what the term interaction specifically meant in the context of the later Bronze Age Murghab. Highlighting the similarities and differences of economy, technology, materials, and practices between Ojakly, farming settlements of the Murghab, and sites belonging to Andronovo mobile pastoralists in neighboring areas will help illustrate the various institutions of this prehistoric world, and the way Ojakly's inhabitants participated in and helped to shape them.

Figure 7.1: Regional map showing location of archaeological sites featured in discussion chapter.

Figure 7.1 maps the various sites that appear in the following discussion. Within the Murghab, a handful of excavated mobile pastoralist sites provide some of the most relevant comparative material: Gonur-N (Hiebert and Moore 2004), Sites 1211/1219 (Cattani 2008b; Spengler et al. 2014a), and trenches at Adji Kui 1 (Cerasetti et al. *forthcoming*). (The first two sites are introduced in Chapter 3, Section 3.3.6.) A further three farming settlements sites provide good comparative faunal and archaeobotanical data from the Murghab: Gonur-depe (Moore 1993a, 1993b; Moore et al. 1994; Sataev 2008a, 2008b; Sataev and Sataeva 2012a, 2012b), Takhirbai-depe (Cattani and Genito 1998; Joglekar 1998), and Yaz-depe (Masson 1959). Based on published materials and/or radiocarbon dates from these sites, only Gonur-N and perhaps an initial phase of Site 1211/1219 overlap chronologically with Ojakly's occupation, while the other

Mughab sites date slightly earlier (Gonur) or later (Takhirbai, Yaz, Adji Kui 1 trenches, and probably Sites 1211/1219). Faunal and archaeobotanical datasets are also available from even earlier village occupations outside the Murghab, at sites in the Geoksyur oasis (Khlopin 1964) and at Geokchik-depe in the Dehistan Plain east of the Caspian Sea (southwest Turkmenistan, northern Iran) (Mashkour 1998), though these present regional rather than temporal comparisons and are not discussed in detail here.

Agriculturally-based settlements are known from the territory of Turkmenistan from at least the 5th millennium BC, where villages along the Kopet Dagh piedmont farmed rain- and runoff-watered fields with several species of domesticated wheats (*Triticum monococcum* – einkorn, *T. dicoccum* – emmer, *T. aestivum* – bread wheat) and barley (*Hordeum vulgare* – six-row, hulled and naked varieties) (Harris 2010; Harris et al. 1996; Lisitsina 1981; Miller 1999). At the Aeneolithic (Chalcolithic, or locally the Anau period) sites of Ilgynly-depe (Kasparov 1994b), Monjukli-depe (Pollock and Bernbeck 2011), and Anau (Hiebert 2003), agriculture appears to have been supplemented with sheep/goat pastoralism affiliated with village-based herdsmen, as well as some hunting and opportunistic use of wild animals. This is a pattern also observed in the Aeneolithic Geoksyur oasis settlements, located in the Tedjen alluvial fan between the Kopet Dagh and the Murghab alluvial fan (Khlopin 1964; Lisitsina 1969).

By the apogee of the Bactria-Margiana Archaeological Complex (BMAC) in the later part of the Middle Bronze Age (ca. 2200-1900 BCE) in the Murghab alluvial fan, the triad of agriculture-pastoralism-hunting was well-established as the economic base for even the largest communities, as evidenced at the site of Gonur-depe 1[23] (Moore et al. 1994; Sataev and Sataeva 2012b). In this region, canal-based irrigation was essential for agriculture (Lisitsina 1981), and

[23] Also known as Gonur 1 and often simply as Gonur, this settlment consists of two distinct occupations: Gonur-depe North appears to have been inhabited primarily during the Middle Bronze Age (NMG V), while occupation at Gonur-depe South was restricted to the Late Bronze Age (NMG VI).

farmers grew a variety of domestic crops. In Middle Bronze Age layers at Gonur (Phase I, 2400–1950 BCE) naked and hulled forms of six-row barley (*Hordeum vulgare*), several species of wheat (*Triticum*), pulses such as lentil (*Lens culinaris*), grass pea (cf. *Lathyrus* sp.), pea (*Pisum* sp.), and chickpea (*Cicer arietinum*), and fruits and nuts including cultivated grapes (*Vitis vinifera*), possible apple (cf. *Malus*) and cherry (cf. *Prunus*), and *Pistacia vera* (from shell fragments) were recorded in macrobotanical samples (Hiebert 1994a; Miller 1999; Moore et al. 1994). From two samples taken at Takhirbai, in levels dated to the Final Bronze/Early Iron Age transition, hulled barley, broomcorn millet, and weed seeds were recovered (Nesbitt 1994).

Recall that at Ojakly, compared to the spectrum of crops found at the village sites, only naked and hulled six-row barley (*Hordeum vulgare*), and one highly compact wheat species (*Triticum aestivum/turgidum*) were recovered (along with broomcorn millet – *Panicum miliaceum* – see below). Destructive taphonomy and windblown deposits may have been partially responsible for the different assemblages, although agricultural sites certainly were affected by these as well[24], and yet consistently produced more diverse crop remains. Other mobile pastoralist sites from the Murghab, which date to the Final Bronze Age and were occupied perhaps 300 years after Ojakly, provide evidence for a more comprehensive engagement with agriculture or farmers than does Ojakly (Cerasetti et al. *forthcoming*; Spengler et al. 2014a). At Site 1211/1219, hulled and naked six-row barley, free-threshing bread wheat, broomcorn millet, peas, lentils, and grass peas were recovered (Spengler et al. 2014a). From Adji Kui trenches excavated in late 2013, flotation produced the same crop varieties, and an additional two legumes previously unidentified in this part of the world (bitter vetch [*Vicia ervilia*] and fava bean [*Vicia faba*]) as well as nut shell fragments of wild pistachio (*Pistacia vera*) and a seed of

[24] Miller (1999:13) notes that "At Gonur, high winds prevented archaeologists from floating the [soil] samples", an obvious indication the negative effects of strong winds in the Murghab are neither restricted to Ojakly nor the Bronze Age.

wild hawthorne (*Crataegus* spp.) (R. Spengler, personal communication). Compared to the macrobotanical remains known from all other sites in the Murghab during the Bronze Age, Ojakly appears to have the smallest range of domesticated plant species.

Interestingly, broomcorn millet (*Panicum miliaceum*) was present at all three of the Murghab mobile pastoralist sites for which we have archaeobotanical samples, and at none of the Bronze Age farming sites. In fact, the millet grains from Ojakly mark the earliest clear presence of this crop in the region[25], and based on current evidence this grain does not appear to have become part of the repertoire of agriculturalists in the Murghab until the subsequent Iron Age period, where it was recovered in samples from Takhirbai-depe (Nesbitt 1994:73; see discussions in Hunt et al. 2008; Spengler and Willcox 2013; Spengler et al. 2014a, 2014b). On the other hand, based on archaeobotanical research across Central and Eastern Eurasia, broomcorn millet is found in the archaeological deposits of Bronze Age mobile pastoral groups (Frachetti et al. 2010; Spengler et al. 2014c). Broomcorn millet has also been reported for a small Late Bronze Age settlement in the Vakhsh Valley of southern Tajikistan (Vinogradova 2008:304), which is identified as an agricultural farmstead but is part of a series of sites in the region which show a strong mix of Namazga and Andronovo archaeological features and thus represent a regular contact zone for farmers and pastoralists (P'yankova 1994, 2002; Vinogradova 1993, 1994; Vinogradova and Kuz'mina 1996). Based in part on these findings, Spengler et al. (2014a, 2014b) have proposed that mobile pastoralists, including those living at Ojakly, helped spread domesticated millet west from its origins in present-day China, introducing the crop to the

[25] Impressions on the inner surface of pottery recovered at the Gonur Temenos, dated stylistically to late NMG V, have been identified by Bakels (2003) as those of broomcorn millet. Although several specialists express agreement with Bakels' assessment, to date millet grains themselves have not been recovered in Bronze Age levels at Gonur, and combined with the lack of a calibrated radiocarbon date that can be clearly associated with the pottery in question, it might yet be premature to cite these impressions as the earliest evidence for millet in the Murghab.

farming communities of Central and southwestern Eurasia (see Lightfoot et al. 2013 for more on the movement of millet in prehistoric Eurasia).

In terms of animal exploitation, samples from all published sites that can be used for comparison with Ojakly are very small. Domesticated sheep, goat, and cattle seem to make up the majority of species utilized at all Bronze Age sites in Central Asia, even if their ratios vary among reported assemblages. Nevertheless, scholars argue based on relatively equal numbers of younger and adult animals that culling of males and meat production from caprine herds could have been a focus at some of the early village sites (Ilgynly-depe and Geokchik-depe) in the Kopet Dagh and the Dehistan plain (Kasparov 1994b; Mashkour 1998). Interpretations of the economic contribution of herds have been based in these reports on tooth eruption and wear and age-at-death profiles for sheep/goat (Kasparov 1994a; Joglekar 1998; Moore 1993a; Pollock and Bernbeck 2011). The age-at-death profile from Ojakly is consistent with those from other reports, with 14 of 22 aged specimens being adult (Table 7.1). The lack of an obvious emphasis on any particular age set for herd culling at Ojakly, combined with the absence of tools or materials associated with secondary production (i.e. spindle whorls) is most consistent with a mixed meat/milk economic strategy. In the Murghab villages of Gonur-depe (Middle and Late Bronze Age) and Takhirbai-depe (early Iron Age) scholars have drawn attention to older animals and suggest they were valued for secondary products (for Gonur: Moore 1993a:165; Sataev 2008b; for Takhirbai: Joglekar 1998:117)[26]. However, in all cases, samples are very small. More adult than younger animals are only present in the mixed-period assemblage at Gonur. Numbers are almost equal at Monjukli. As a result, it is clear that larger faunal assemblages are needed to establish the management of animals for wool and dairy. Nevertheless, artifactual data does

[26] Sataev (2008b:139) even suggests two different types of sheep were bred at Gonur for different purposes – one type for wool and one for dairy – although he admits this is a very tentative conclusion based on a small sample size of fragmentary remains.

support the importance of spinning in the Bronze Age economy in Margiana. Spindle whorls are a common find at Gonur (Moore 1993a; Sarianidi 1990), as well as being widespread in the Murghab and Bactria in Late Bronze Age contexts (Masimov et al. 1998:38; Vinogradova 2008).

Sheep/Goat Ageing at Sites in Southern Turkmenistan

	Gonur North Mound (shurf sample)			*Ojakly*	*Takhirbai 1*	*Ilgynly-depe*	*Monjukli-depe*
	Period 1 (NMG V)	Mixed Periods	Period 2 (NMG VI)	LBA (NMG VI)	Yaz I	Early Aeneolithic	Aeneolithic Levels
Adult (2+ yrs)	0	14	9	14	4	42	23
Young and Juvenile (0 - 2 yrs)	8	11	14	22	6	58	24
Not Ageable	473	612	140	377	180	not given	1737
Total Aged Specimens	*8*	*25*	*23*	*36*	*10*	*100*	*47*
Total Percent Aged	*1.7%*	*4.1%*	*16.4%*	*9.5%*	*5.6%*	*unknown*	*2.7%*

Table 7.1: Comparison of aged and not ageable sheep/goat specimens reported for archaeological sites in southern Turkmenistan. Data from Moore 1993a (Gonur), Joglekar 1998 (Takhirbai), Kasparov 1994b (Ilgynly), and Pollock and Bernbeck 2011 (Monjukli).

Moving to address the relative importance of cattle to sheep/goat in the prehistoric Murghab, most authors suggest that both cattle and sheep/goat were kept. At Gonur, cattle bones make up a smaller percentage of the faunal remains than sheep and goat (15-40% less, depending on the report) (Moore 1993a; Sataev 2008b; Sataev and Sataeva 2012a, 2012b). Sataev and Sataeva point out, however, that these animals accounted for a larger proportion of the meat consumed at the site (2012a:57; 2012b:155). At all settled village sites large domestic stock animals appear to have formed a consistent dietary contribution, and cattle were common animals throughout the region and period (Kasparov 1994b; Joglekar 1998; Mashkour 1998). Hiebert (1994a:134) even suggests cattle were housed within walled living compounds at Gonur. The *Bos* remains from Ojakly, when the special context of the kiln deposit is removed from the assemblage, are relatively few overall and present a limited range and generally less-meaty body

parts. This suggests cattle were not kept on site as part of the regular herd, and that these animals probably did not make up a major portion of the diet at the site.

While sheep/goat were the most frequent animals found in grave deposits at Gonur (Sataev 2008a:150), *Bos* remains also appeared in special contexts such as burials and in deposits near altars (Moore 1993a:166; Sataev 2008a:148), suggesting the conceptual significance of what would have been a valuable – even if commonplace – animal. At the Late Bronze Age agricultural settlement of Kangurttut in south Tajikistan (northern Bactria), Vinogradova (2008:303) reports bones of cattle and young sheep/goat as the remains of a funerary meal in association with human burial in a re-purposed subterranean kiln. These behaviors in a region thought to be a zone of intense farmer-pastoralist interaction indicate the special status of these animals for both sedentary and mobile groups. In this light, the kiln fauna from Ojakly is rather interesting, since the same two animals appear prominently in the deposits and likely included complete pelvises and crania. The special context of the kiln is also indicated in this case by the interment of nine *Sus* teeth (mandibular incisors and canines), probably female wild boar, and certainly from more than one animal. The fauna in the Ojakly kiln, interred as an intentional deposit or deposits, thus fits within broader traditions found in sedentary and contact-zone communities.

However, even if some behaviors probably related to the conceptual position of certain animals were similar between Ojakly and later Bronze Age farming communities, the positions of such animals in the practical economies were different. As already noted, the Ojakly inhabitants seem to have utilized sheep/goat more preferentially than cattle in terms of regular meat consumption, even though cattle were not unfamiliar stock animals, widely utilized in sedentary contexts and perhaps kept in limited numbers at Ojakly. Another example of divergent

practices is the differential use of wild animals between Ojakly and farming sites. From the Neolithic (local Djeitun) period onward hunting contributed to the diet of village settlements (Harris 1996; Kasparov 1994a, 1994b), and wild animals are recorded in small but consistent proportion (5 – 10%) even during the highly-invested agriculture practices of the Bronze Age Murghab. Wild animals that would have provided significant meat, including the Persian goitered gazelle (*Gazella subgutturoza*), wild boar (*Sus scrofa*), and the occasional onager or kulan (*Equus hemionus*) all appear in the faunal assemblages of farming villages (Hiebert 1994a:133; Joglekar 1998; Moore 1993b; Moore et al. 1994). Smaller wild species, ranging from canids (jackals and foxes) to hare (*Lepus europeus*) to hedgehog, as well as birds, fish, and reptiles (snake and tortoise) are also reported in small numbers and seem to have been opportunistically exploited. In contrast, there were no wild animals recovered in the refuse deposits at Ojakly, and the only probable wild specimens were nine *Sus* teeth and an Equid phalanx found as intentional deposits in the kiln. The range of body parts for domestic sheep/goat and the heavy processing of the bones at Ojakly point to the high value placed on the herd. In contexts outside this region, this is an exploitation pattern most consistent with specialized pastoralists (Marshall 1990b Marshall and Pilgram 1991; Speth and Spielmann 1983).

Even given some overlaps in the types of domestic animals or plant foods utilized at Ojakly and farming sites in the Murghab and beyond, there is a clear contrast in terms of the subsistence focus and practices, beyond what would be expected if these groups were specialized economic sub-sets of a single socio-cultural tradition. The faunal patterns at Ojakly are consistent with a pastoral population that exclusively managed mixed herds as a full-time subsistence strategy. Both bread wheat and the naked variety of barley in evidence at the site are

water-demanding and time consuming crops, and not likely to be tended by casual farmers. These facts, combined with the lack of any crop processing tools or other indications of farming on-site, are good indications that the inhabitants of Ojakly were *not* practicing farmers. The wild flora recovered in the archaeobotanical samples suggests Ojakly was close enough to irrigated fields or some other water source, where herd animals could graze on agricultural stubble and wild vegetation growing along artificial or natural watercourses. Grains for human consumption, evidenced in limited amounts from pit and hearth features at Ojakly, were probably received through exchange from neighboring agricultural groups as needed or desired. These may have been secondary to meat in the diet, since there is no evidence at Ojakly that substantial quantities of grain were stored or processed on-site, as there were, by contrast, at Site 1211/1219 (Cattani 2008b; Cerasetti et al. *forthcoming*)[27]. If not obtained from farming communities in the Murghab, the presence of broomcorn millet at Ojakly might be explained by way of contact with other mobile pastoral groups to the north and east where this grain was more common (Spengler et al. 2014b, 2014c). The subsistence parallels of Ojakly's inhabitants to a wider world of Andronovo mobile pastoralists add to the framework of general connection built around similarities in ceramic decoration and architecture across the region (Cerasetti 1998; Itina 1977; Kutimov 1999; Kuz'mina 1994a, 2007).

Within the Murghab alluvial fan, the Takhirbai group of sites seems to document a more pronounced interaction between sedentary farming communities and mobile pastoralists than other areas (Cattani 2008b; Salvatori 2003). In addition to the broomcorn millet grains from Final Bronze/Early Iron Age transition levels at Takhirbai-depe, the site of Takhirbai 3 contains built-up layers from the Late and Final Bronze Ages and coarseware ceramics similar to those

[27] Unlike Ojakly, Site 1211/1219 had clearly-delineated storage areas, where caches of processed agricultural grains were kept in at least one instance in a wheel-made pot (Cattani 2008a, Spengler et al. 2014a). A grinding stone was also recovered inside the storage area.

from Ojakly, as well as one of the only known burials of a "steppe" individual (Cattani 2008b). Thus, Ojakly and the Takhirbai sites may both represent a broader but still poorly-documented Late Bronze Age phenomenon of more sustained interaction even in the face of clearly-maintained material and behavioral boundaries. In this regard, the evidence from Site 1211/1219 and even later from the Adji Kui 1 trenches – the apparently increased dependence of mobile pastoralists on agricultural crops and their involvement in farming activities themselves – may represent changing farmer-pastoralist relationships through time (Cerasetti et al. *forthcoming*). Certainly the comparison of these sites indicates multipe dynamics of interaction between sedentary farmers and mobile pastoralists were occurring in the later Bronze Age Murghab.

7.3 Ojakly in Theoretical Context – Participation

Generally speaking, the distributions of similar and/or distinct archaeological materials reveal social interactions on broad temporal or geographical scales, but they do not in and of themselves speak to the why or how of the social encounter (Brughmans 2012; Jervis 2011; Kohl 2008; MacEachern 1998). To get at these more granular aspects, we need to marshal data from the archaeological site as the lived experience of past people, both in their singular and mundane practices, and to employ a conceptual framework for understanding and interpreting what we find. The concept of Participation outlined in Chapter 2 provides this framework, and the Ojakly example is a particular realization of that abstraction. Given the unique positioning of Ojakly at the intersection of mobile-sedentary cultural spheres and localized temporal shifts in socio-political structures of legitimacy and authority, we are able to see the mechanisms by which groups choose to participate in or disengage from the social institutions they encounter.

The ceramic assemblage and related features at Ojakly are perhaps the most tangible inroads into the concept of Participation, since they index the various overlapping institutional networks in which the inhabitants of the site participated. On the one hand, the mobile pastoralists at Ojakly were invested in their coarseware production practices as materialized tie-ins to the broader cultural world of Andronovo steppe pastoralism, even if the inhabitants should not necessarily be characterized as "Andronovo" themselves. The fact that such ceramic affiliations were maintained across the approximately 400 years of the Late and Final Bronze Age in the Murghab (ca. 1800–1400 BCE) speaks to the relevance even seemingly quotidian ceramics had on signifying inter-group distinctions (Cattani 2008a; Kutimov 2014; Salvatori 2008b). On the other hand, the potstands and the carefully-constructed ceramic kiln they were found in demonstrate not only that the technology necessary to produce high-quality wheel-made ceramics was available (that is, knowledge was not restricted to sedentary farming communities), but that this knowledge was actually transferred through engagement between the two communities. Somewhere along the line, the Ojakly inhabitants learned the basics of kiln firing and the use of production tools like the potter's wheel, and incorporated these locally-encountered practices into their own ceramic production repoirtoire. Even if we envision a scenario of inter-marriage, where someone from the farming community came to live at Ojakly and introduced or directed these practices, at a fundamental level the inhabitants of Ojakly expanded their notions of what constituted acceptable ceramic forms and methods of production. Without abandoning the Andronovo or mobile pastoralist 'ceramic institution,' they incorporated materials and behaviors that linked them to the local community of sedentary farmers.

The use of wheel-made drinking cups at Ojakly, almost certainly imports from the sedentary communities of the late Namazga tradition, similarly enfolds materials and behaviors

into a participatory realm of social institutions. By choosing to import these cups when they certainly had other means of consuming liquids, and by importing these with a regularity not seen for other Namazga-ware vessels, the Ojakly inhabitants were buying in to either the aesthetics of Namazga drinking cups or the particular behaviors associated with them. Building on the hypothesis put forward for the negotiation camp of Gonur-N (Section 3.3.6), that members of the farming and Andronovo pastoral communities negotiated the use of land over a shared meal, we can imagine a context for the use of these drinking cups at Ojakly. In this scenario, employing the cups themselves, as well as participating in the behaviors associated with them, could have granted the Ojakly inhabitants legitimacy as relevant social partners in the eyes of the sedentary farmers with whom they sat down to negotiate.

The argument being made here supports the long-standing archaeological distinction between wheel-made ware and handmade coarseware and the social groups (farmers and mobile pastoralists) they represent, but it enlivens the continuum of their engagement with one another and renders the farmer-pastoralist dynamic much more complex than has thus far been documented in this place and time. If the behaviors of potters at Ojakly are not the result of restricted technical knowledge or geographical limitations in production, and instead represent real social choices, then it is reasonable to infer that enough regular contact between different social groups existed to precipitate a material demonstration of group affiliation. As Di Cosmo (2002:1-2) notes, however a community might define itself, the sense of belonging or not belonging will be heightened by an external "threat", and no more potent existential threat exists than in cross-cultural interaction. At the same time as this research acknowledges the reality of the wheel-made wares and handmade coarsewares and other material culture as representative of

distinct social groups, it colors the spectrum of variation to be found between a too-often employed polarization of idealized material and social forms.

In addition to ceramics, basic subsistence and the involvement (or not) in farming activities mark a realm in which behavior and practice can speak to the participation of groups in different institutional domains. The inhabitants of Ojakly were not farmers, as far as the evidence suggests, and their subsistence base seems to have centered on herd animals, perhaps particularly on small stock like sheep and goat. While we might presume plant-based foods such as domestic grains and wild edibles contributed to the diet at Ojakly, there is no clear evidence for this in the form of processing tools, dedicated storage areas, or the macrobotanical contents of pits and fireplaces. Yet such evidence is present at the slightly later mobile pastoralist occupation of Site 1211/1219, 30 km to the south of Ojakly, and at the Bronze-Iron Age transition period campsites outside Adji Kui 1, 25 km west of Ojakly (Cattani 2008x; Joint Mission 2006; Cerasetti et al. *forthcoming*). The conclusion to be drawn is that although farming *can* be associated with Murghab mobile pastoralists during the later Bronze Age periods, it cannot be associated with the occupation at Ojakly in particular. I suggest this is in part a strategy of social positioning. The Ojakly inhabitants may have participated in local institutions by incorporating new ceramics and modes of production into their world, but they did not participate in agriculture or farming-related activities. At least at this early stage of mobile-sedentary interaction in the Murghab, different subsistence practices may have been conceptually linked to distinct social domains.

Participation, then, can be seen in the Ojakly case as the means by which groups of farmers and mobile pastoralists identified as such. It is the conceptual fiber linking practice to institution, and explains how materials take on rhetorical meaning that can alternately re-inforce, re-shape, or undermine social-ideological constructs. The mobile pastoralists occupying Ojakly

could have behaved in any number of ways, including setting up camp next to farming villages, taking up agricultural pursuits, or trading secondary animal products from their herds for grains or other goods including ceramics. The fact that these practices are not apparent in the archaeological record for Ojakly does not prove their absence, but it does require some explanation. I suggest the inhabitants of Ojakly were consciously negotiating their social position in the Murghab, productively engaging with their sedentary farming neighbors as co-habitants in a distinct geographic space, but maintaining their social distance through distinct material and behavioral markers (i.e., ceramics, herding). If mobile pastoralists are neither inferior nor antagonistic to other forms of complex society, then the choices individuals made to participate in the institutions they encountered can be viewed in the broader light of calculated social negotiation.

From the household scale to the pan-regional culture, social units are held together as such by a shared understanding of normative behaviors, modes of thinking, and forms of legitimacy. These institutions are no doubt communicated along a number of avenues not always visible in the archaeological record (speech patterns, ceremonies, food and drink, clothing), but certainly the durable goods archaeologists regularly encounter represent one mode of intra- and inter-group communication. Pottery is an often-used index for social affiliation, (Blake 2013; Byrne 2004; Jervis 2011), and the production *chaîne opératoire* of this and other goods are sometimes used to identify "communities of practice" wherein technologies and techniques are learned and sometimes restricted in socio-political power plays (Mizoguchi 2013; Roux and Courty 2005; Vaughn 2006). Archaeological materials are thus not just a reflection of the social world, but part of its construction. Objects and the practices behind them are also manipulatives with which institutions are re-coded and re-shaped across space and time (Canepa 2010). If

social affiliations, or "identity communities" (to use a borrowed term from Murray and Mills 2013:136; also Yaeger 2000) are overlapping, fluid, and multifaceted, then the meaning imbued to any particular object as manifestation of that identity community is also changeable. Meaning, then, is a patchwork based on changing engagements – formed and dissolved, fleeting and prolonged – and lasts only as long as the relationship between particular human and material actors lasts (Jervis 2011:240).

By virtue of Ojakly's geographical and temporal situation, its inhabitants were positioned to maintain and recode relationships at multiple scales. Several lines of evidence point to the inhabitants of Ojakly participating in the wider world of Eurasian steppe pastoralists: the style and construction of temporary architecture, their subsistence emphasis on herding and not farming, and the abundant handmade coarseware that constituted their everyday use pottery. Each of these ties them into a set of broadly-shared norms about the value placed on certain things. For ceramics, for example, there were clear ideas about what a pot should look like and how it should be made, reflected in the identification of the handmade coarseware as "Andronovo." But at the same time, there were small shifts in behavior happening at Ojakly that signal the site's inhabitants were participating in the local world of the Murghab. The import of wheelmade cups, for example, shows they were "buying in" to either the aesthetic of Namazga ware or whatever particular behaviors were associated with this type of vessel. Likewise, the kiln and the unfired potstands demonstrate an attempt to expand the modes and types of ceramic production at Ojakly beyond the typical practices of mobile pastoralists. Although it was unsuccessful in this particular instance, the Ojakly kiln demonstrates the types of material transfers and behavioral shifts that are enabled by cross-cultural encounters. And yet, changes

went in the other direction as well, so that the broomcorn millet introduced by mobile pastoralists became part of the regular domestic crop package at later farming sites.

In the Ojakly case, there is no need to explain these transfers and shifts in behavior in terms of the classic trade-or-raid models of mobile-sedentary interaction, such that Andronovo mobile pastoralists needed to move into the Murghab to interact with farming communities there. Studies in archaeology, history, and ethnography reveal that mobile pastoralists lived across the breadth of Eurasia without direct contact with farmers or urban centers. When contacts between mobile and sedentary groups do occur, then, we can view such encounters as calculated participation in each other's worlds. By virtue of the overlapping networks of interaction in which the Ojakly inhabitants participated, there was an inherent option to participate in both the broader steppe world and the local sown world via different materials and practices. The mediation of material and social worlds is something scholars have been wrestling with in diverse research contexts. Rather than seeing a particular group who dictates the terms of trade and exchange, by viewing encounters themselves as the drivers for change in both the material and social worlds, we gain a more realistic understanding of the activities and materials that constitute the site of Ojakly. This allows us to see the choices mobile pastoralists made in prehistory as careful social negotiations, as complex and dynamic as those of their farming neighbors. Ojakly should not be seen as the representation of a static, polarized relationship between farmer and mobile pastoralists in the Late Bronze Age Murghab, but as pieces of a social puzzle we are only just beginning to realize had profound effect on historical trajectories of the region.

Chapter 8: Conclusion

In Chapter 2 I introduced the shifting common knowledge of (pre)historic Eurasian social formations based on mobile pastoralism, which scholars are re-sketching not as primitive forms or dysfunctional examples of social complexity, but as alternate mappings of the way we conceptualize power, legitimacy, and even civilization. In particular, an emphasis has been placed on flexibility, wherein mobile pastoralist social units (re)combine at different scales and social-political authority is often linked to the ability to navigate these social encounters. However, I do not wish to perpetuate the sedentary farmer/mobile pastoralist dichotomy by suggesting an exclusivity to their forms of power, based either in territorial or social authority. Indeed, it is the interplay of social and geographical factors that gives texture to the complexity of the real world (Coward 2013), and a number of archaeological and ethnographic examples from Eurasia highlight the way landscapes, spaces, and objects participate on par with humans in social encounters (Empson 2007; Frachetti 2008b, 2012; Honeychurch and Amartuvshin 2007; Rogers 2012). The goals of stability and amassing social credit were the same in agricultural and pastoral societies in Eurasian history, notes Rogers (2012:242), even if the foundations for complexity and the implementation of strategies were locally variable across or even within each society. It is this variability – seen as an aberration from the perspective of sedentary agriculture and as a necessary flexibility from the standpoint of mobile pastoralism – that has caused such continuous trouble for fitting prehistoric Eurasia into the paradigms for social complexity drawn up for other contexts (Drennan et al. 2011; Honeychurch 2015).

In the Bronze Age Murghab, the engagement of settled farmers and mobile pastoralists imbued certain objects and practices with meaning relative to overlapping institutional networks in a process rather than a static map of connections or patterns held constant through time. The inhabitants of Ojakly participated in a subsistence economy that valued herd animals above agricultural products, and thus required a particular perspective of the landscape and economic resources and investments – a 'mobile pastoral institution'. By participating in this institution, Ojakly's inhabitants were differentiated from their farmer neighbors in the Murghab and were linked to mobile pastoral groups further afield. The institutional affiliation was reinforced through everyday ceramic use, and we might see this reflected in the ties of motif and forming technique shared between Ojakly and other Bronze Age nomads (Cerasetti 1998; Hiebert and Moore 2004; Kutimov 1999, 2014; Kuz'mina 2007). The basic process of ceramic production at Ojakly, restricted as it was to the household sphere, likewise speaks to a particular institutional notion about the aesthetics and value of pottery, which differs markedly from that of the farming settlements and is probably tied in part to the demands of a mobile lifestyle.

At the same time as they were participating in broad institutional networks shared with mobile pastoralist communities beyond the Murghab, the group(s) inhabiting Ojakly also participated in local institutions. Their specific use of Namazga cups, along with the attempted production of potstands in a kiln, suggests the mobile pastoralists were adding another layer to the network of institutions they participated in: certain vessels, and certain production practices, had become valid embodiments of their concept of 'pottery'. By consciously choosing to participate in specific aspects of the 'pottery institution' of their sedentary neighbors, and at the same time rejecting participation in other aspects of it, Ojakly's inhabitants were not the passive recipients of civilizational forces, but were actively negotiating their engagements through

material culture. In so doing, they helped shape patterns of interaction and interplay between social groups that would resonate for centuries to come.

As archaeologists, we are not required to know the meaning of an object to recognize that it was meaning*ful* to those who made, used, or discarded it. We can contribute to social history by recognizing that meaning – whatever it may be – is made durable only through engagement. Participation defines that engagement, and is what colors the world with meaning and builds the social context. Enacted through practice and interpreted through mutually comprehensible institutions, participation drives the spread, consolidation, and dissolution of the archaeological cultures we recognize in prehistory. When multiple institutions align across great swaths of territory or time, we recognize these as a civilization. Yet the mechanisms that allow people to buy in, or not buy in, to those institutions in the encounters and practices of their daily lives are the same in the wild and variable realms 'outside' of civilization. Mobile pastoralists in Eurasian prehistory were inherently flexible participants who bridged – and influenced – distinct social-cultural worlds without necessarily submitting to or assimilating within them. The encounters of sedentary and mobile groups in places like the Late Bronze Age Murghab are therefore significant not only in the abstract sense of studying interactions, but for the tangible evidence they provide about how communities participate in multiple, overlapping, and often incongruent social contexts. The day-to-day materials and behaviors evidenced at Ojakly were made meaningful because the inhabitants found themselves in a liminal position both geographically – between the world of the "stepee" and the world of the "sown" – and within the local socio-political trajectory – during the waning of the Bactria-Margiana Archaeological Complex. Their engagement across these contexts is the foundation for the unique contours of Central Asian society, shaped by cross-cultural encounters and participation in multiple worlds.

References Cited

Abdi, Kamyar

2003 The Early Development of Pastoralism in the Central Zagros Mountains. *Journal of World Prehistory* 17(4):395-448.

Abdi, Kamyar, Gabriel Nokandeh, Ali Azadi, Fereydoun Biglari, Saman Heydari, Dariush Farmani, Akbar Rezaii and Marjan Mashkour

2002 Tuwah Khoshkeh: A Middle Chalcolithic Mobile Pastoralist Camp-Site in the Islamabad Plain, West Central Zagros Mountains, Iran. *Journal of Persian Studies* 40:43-74.

Adams, Robert McCormick

1974 The Mesopotamian Social Landscape: A View from the Frontier. In *Reconstructing Complex Societies: An Archaeological Colloquium*, Supplement to the Bulletin of the American Schools of Oriental Research No. 20, edited by C. B. Moore, pp. 1-20. American Schools of Oriental Research, Cambridge.

Alimov, Kamildžan, Nikolaus Boroffka, Mira Bubnova, Jurij F. Burjakov, Jan Cierny, Jusuf Jakubov, Joachim Lutz, Hermann Parzinger, Ernst Pernicka, V. Radililovksiy, V. Ruzanov, Timur Sirinov and Gerd Weisgerber

1998 Prähistorischer Zinnbergbau in Mittelasien. Vorbericht der ersten Kampagne 1997. *Eurasia Antiqua* 4:137-199.

Alizadeh, Abbas

2009 Prehistoric Mobile Pastoralists in South-central and Southwestern Iran. In *Nomads, Tribes, and the State in the Ancient Near East: Cross-disciplinary Perspectives*, Oriental Institute Seminars 5, edited by J. Szuchman, pp. 129-145. The Oriental Institute of The University of Chicago, Chicago.

Alyekshin, V. A.

1980 К проблеме генетической связи южно туркменских комплексов эпохи бронзы [On the problem of the genetic relationship between South Turkmen complexes of the Bronze Age]. *Kratkie Soobshcheniya* 161:24-31.

Amiet, Pierre

1986 *L'âge des échanges inter-iraniens: 3500-1700 avant J.-C.* Notes et Documents Des Musées De France 11. Éditions de la Réunion des musées nationaux, Paris.

1988 Elam and Bactria. In *Bactria: An Ancient Oasis Civilization from the Sands of Afghanistan*, edited by G. Ligabue and S. Salvatori, pp. 126-140. Erizzo, Venice.

Anthony, David W.

2007 *The Horse, the Wheel, and Language: How Bronze-Age Riders from the Eurasian Steppes Shaped the Modern World*. Princeton University Press, Princeton.

2009 The Sintashta Genesis: The Roles of Climate Change, Warfare, and Long-Distance Trade. In *Social Complexity in Prehistoric Eurasia: Monuments, Metals and Mobility*, edited by B. K. Hanks and K. Linduff, pp. 47-73. Cambridge University Press, Cambridge.

Appadurai, Arjun (editor)

1986 *The Social Life of Things: Commodities in Cultural Perspective* Cambridge University Press, Cambridge.

Askarov, A. A.

1981 Southern Uzbekistan in the Second Millennium B.C. . *Journal of Anthropology & Archeology of Eurasia* 19(3-4):256-272.

Atagarryev, E. and O. Berdyev

1970 The Archæological Exploration of Turkmenistan in the Years of Soviet Power. *East and West* 20(3):285-306.

Atamuradov, Khabibulla Ishchanovich

1994 Paleogeography of Turkmenistan. In *Biogeography and Ecology of Turkmenistan*, Monographiae Biologicae 72, edited by V. Fet and K. I. Atamuradov, pp. 49-64. Kluwer Academic Publishers.

Avanessova, N.A.

1996 Pasteurs et agricultueurs de la vallée du Zeravshan (Ouzbékistan) au début de l'age du Bronze: relations et influences mutuelles [Pastoralists and farmers of the Zeravshan Valley (Uzbekistan) at the beginning of the Bronze Age: mutual relations and influences]. In *Sarazm (Tadjikistan) ce'ramiques: chalcolithique et bronze ancien*, edited by B. Lyonnet, pp. 117-131. De Boccard, Paris.

Babaev, Agadzhan Gel'dyevich

1994 Landscapes of Turkmenistan. In *Biogeography and Ecology of Turkmenistan*, Monographiae Biologicae 72, edited by V. Fet and K. I. Atamuradov, pp. 5-22. Kluwer Academic Publishers, Dordrecht.

1999 *Desert problems and desertification in Central Asia: the researches of the Desert Institute*. Springer, Berlin; New York.

Bacon, Elizabeth E.

1954 Types of Pastoral Nomadism in Central and Southwest Asia. *Southwestern Journal of Anthropology* 10(1):44-68.

Bakels, C.C.

2003 Report concerning the contents of ceramic vessels found in the "white room" of Gonur Temenos, Merv Oasis, Turkmenistan. *Electronic Journal of Vedic Studies* 9(1c).

Barfield, Thomas J.

1989 *The Perilous Frontier: Nomadic Empires and China, 221 BC to AD 1757*. Blackwell, Cambridge, Massachusetts.

2001a Steppe Empires, China and the Silk Route: Nomads as a Force in International Trade and Politics. In *Nomads in the Sedentary World*, Curzon-IIAS Asian Studies Series, edited by A. M. Khazanov and A. Wink, pp. 234-250. Curzon, Richmond.

2001b The shadow empires: Imperial state formation along the Chinese-nomad frontier. In *Empires: Perspectives from Archaeology and History*, Wenner-Gren Foundation for Anthropological Research International Symposium 122, edited by S. E. Alcock, T. N. D'Altroy, K. D. Morrison and C. M. Sinopoli, pp. 10-41. Cambridge University Press, Cambridge.

2003 Conclusion. In *Nomadic Pathways in Social Evolution*, Civilizational Dimension 5, edited by N. N. Kradin, D. M. Bondarenko and T. J. Barfield, pp. 172-179. Russian Academy of Sciences Center for Civilizational and Regional Studies, Moscow.

Barnard, Hans and Willeke Wendrich (editors)

2008 *The Archaeology of Mobility: Old World and New World Nomadism*. 4. Cotsen Advanced Seminar Series. Regents of the University of California, Los Angeles.

Barth, Fredrik

1956 Ecologic relationships of ethnic groups in Swat, North Pakistan. *American Anthropologist* 58(6):1079-1089.

1959 The land use pattern of migratory tribes of South Persia. *Norsk geografisk tidsskrift – Norwegian Journal of Geography* 17(1-4):1–11.

Bar-Yosef, Ofer and Anatoly Khazanov (editors)

1992 *Pastoralism in the Levant: Archaeological Mateials in Anthropological Perspectives*. Monographs in World Archaeology No. 10. Prehistory Press, Madison.

Bates, Daniel G. and Susan H. Lees

1977 The Role of Exchange in Productive Specialization. *American Anthropologist* 79:824-841.

Beckwith, Christopher I.

2009 *Empires of the Silk Road: A History of Central Eurasia from the Bronze Age to the Present*. Princeton University Press, Princeton.

Behrensmeyer, Anna K.

1978 Taphonomic and Ecologic Information from Bone Weathering. *Paleobiology* 4(2):150-162.

Bell, Gertrude L.

1907 *Syria: The Desert and the Sown*. William Heinemann, London.

Bell-Fialkoff, Andrew (editor)

2000 *The Role of Migration in the History of the Eurasian Steppe: Sedentary Civilization vs. "Barbarian" and Nomad*. St. Martin's Press, New York.

Bendezu-Sarmiento, Julio and Johanna Lhuillier

2011 Iron Age in Turkmenistan: Ulug-Depe in the Kopetdagh Piedmont. In *Monuments of History and Culture of Turkmenistan (Discoveries, Researches, and Restoration for 20 years of Independence)*, pp. 238-249. Turkmen State Publishing Service, Ashgabat.

Bendrey, Robin

2011 Some like it hot: environmental determinism and the pastoral economies of the later prehistoric Eurasian steppe. *Pastoralism: Research, Policy and Practice* 1(8):1-16.

Berberian, Manuel and Robert S. Yeats

2001 Contribution of archaeological data to studies of earthquake history in the Iranian Plateau. *Journal of Structural Geology* 23:563-584.

Biscione, Raffaele

1985 The So-Called 'Nestorian Seals': Connection Between Ordos and Middle Asia in Middle-Late Bronze Age. In *Orientalia Iosephi Tucci Memoriae Dicata*, edited by G. Gnoli and L. Lanciotti, pp. 95-109. Istituto Italiano per il Medio ed Estremo Oriente (IsMEO), Rome.

Blake, Emma

2013 Social networks, path dependence, and the rise of ethnic groups in pre-Roman Italy. In *Network Analysis in Archaeology: New Approaches to Regional Interaction*, edited by C. Knappett, pp. 203-221. Oxford University Press, Oxford.

Bodin, Jean

1955 [1576] *Les Six Livres de la République [Six Books of the Commonwealth]*. Translated by M. J. Tooley. Basil Blackwell, Oxford.

Boessneck, Joachim

1969 Osteological differences between sheep (*Ovis aries* Linné) and goat (*Capra hircus* Linné). In *Science in Archaeology (2nd edition)*, edited by D. Brothwell and E. S. Higgs, pp. 331–358. Thames and Hudson, London.

Bold, Bat-Ochir

1996 Socio-economic segmentation Khot-Ail in nomadic livestock keeping of Mongolia. *Nomadic Peoples* 39:69-86.

Bondarenko, Dmitri M., Andrey V. Korotayev and Nikolay N. Kradin

2003 Introduction: Social Evolution, Alternatives, and Nomadism. In *Nomadic Pathways in Social Evolution*, Civilizational Dimension 5, edited by N. N. Kradin, D. M. Bondarenko and T. J. Barfield, pp. 1-24. Russian Academy of Sciences Center for Civilizational and Regional Studies, Moscow.

Bonora, Gian Luca and Massimo Vidale

2008 An Aspect of the Early Iron Age (Yaz I) Period in Margiana: Ceramic Production at Site No. 999. In *The Bronze Age and Early Iron Age in the Margiana Lowlands: Facts and methodological proposals for a redefinition of the research strategies*, The Archaeological Map of the Murghab Delta Studies and Reports II, edited by S. Salvatori, M. Tosi and B. Cerasetti, pp. 153-193. Archaeopress, Oxford.

Boroffka, Nikolaus, Jan Cierny, Joachim Lutz, Hermann Parzinger, Ernst Pernicka and Gerd Weisgerber

2002 Bronze Age Tin from Central Asia: Preliminary Notes. In *Ancient Interactions: East and west in Eurasia*, edited by K. Boyle, C. Renfrew and M. Levine, pp. 135-159. McDonald Institute for Archaeological Research, Cambridge.

Boucharlat, Rémy, Henri-Paul Francfort and Olivier Lecomte

2005 The Citadel of Ulug Depe and the Iron Age Archaeological Sequence in Southern Central Asia. *Iranica Antiqua* XL:479-514.

Bourdieu, Pierre

1977 *Outline of a Theory of Practice*. Translated by R. Nice. Cambridge University Press, Cambridge.

Bradburd, Daniel

1989 Producing Their Fates: Why Poor Basseri Settled but Poor Komachi and Yomut Did Not. *American Ethnologist* 16(3):502-517.

1997 Nomads and Their Trade Partners: Historical Context and Trade Relations in Southwest Iran, 1840-1975. *American Ethnologist* 24(4):895-909.

Braekmans, D., P. Degryse, J. Poblome, B. Neyt, K. Vyncke and M. Waelkens

2011 Understanding ceramic variability: an archaeometrical interpretation of the Classical and Hellenistic ceramics at Düzen Tepe and Sagalassos (Southwest Turkey). *Journal of Archaeological Science* 38:2101-2115.

Brain, C. K.

1981 *The Hunters or the Hunted? An Introduction to African Cave Taphonomy*. University of Chicago Press, Chicago.

Bregel, Yuri

1996 *Notes on the Study of Central Asia*. Papers on Inner Asia 28. Indiana University Research Institute for Inner Asian Studies, Bloomington.

Brewer, Marilynn B.

1979 In-Group Bias in the Minimal Intergroup Situation: A Cognitive-Motivational Analysis. *Psychological Bulletin* 86(2):307-324.

Bronk Ramsey, Christopher

2009 Dealing with outliers and offsets in radiocarbon dating. *Radiocarbon* 51(3):1023-1045.

Browman, David L.

1989 Origins and development of Andean pastoralism: an overview of the past 6000 years. In *The Walking Larder: Patterns of domestication, pastoralism, and predation*, edited by J. Clutton-Brock, pp. 256-268. Unwin Hyman, London.

Brughmans, Tom

2012 Thinking Through Networks: A Review of Formal Network Methods in Archaeology. *Journal of Archaeological Method and Theory*.

Bunn, Henry T. and Ellen M. Kroll

1986 Systematic Butchery by Plio/Pleistocene Hominids at Olduvai Gorge, Tanzania. *Current Anthropology* 27(5):431-452.

Byrne, Ryan

2004 Lie Back and Think of Judah: The Reproductive Politics of Pillar Figurines. *Near Eastern Archaeology* 67(3):137-151.

Cacciatore, Monica

ca. 2010 I Siti N. 1211 e 1219: la cultura Andronovo nell'area di Takhirbai (Turkmenistan) [Sites No. 1211 and 1219: the Andronovo culture in the area of Takhirbai (Turkmenistan)]. BA (Hon.) Thesis, Facoltà di Lettere e Filosofia, Università di Bologna, Bologna.

Callahan, Ted

2007 The Kyrgyz of the Afghan Pamir Ride On. *Nomadic Peoples* 11(1):39-49.

Campbell, Mary B.

1991 *The Witness and the Other World: Exotic European travel writing, 400-1600*. Cornell University Press, Ithaca.

Canepa, Matthew P.

2010 Preface: Theorizing Cross-Cultural Interaction Among Ancient and Early Medieval Visual Cultures. *Ars Orientalis* 38 (Theorizing Cross-Cultural Interaction Among the Ancient and Early Medieval Mediterranean, Near East and Asia):7-29.

Cappers, René T. J.

2006 *Roman Footprints at Berenike: Archaeobotanical Evidence of Subsistence and Trade in the Eastern Desert of Egypt*. Cotsen Institute of Archaeology, Los Angeles.

Castellani, Vittorio

2001 *Ricognizione in Turkmenistan*. University of Pisa. Field Report Submitted to Italian Ministry for Foreign Affairs, Rome, Italy.

Castells, Manuel

2000 *The Rise of the Network Society*, Vol. I. The Information Age: Economy, Society and Culture. 3 vols. Blackwell, Cambridge, MA.

Cattani, Maurizio

2004 Margiana at the end of Bronze Age and beginning of Iron Age. In *U istokov tsivilizatsii: Sbornik statej k 75-letiyu Viktora Ivanovicha Sarianidi [Near the Sources of Civilizations: the issue in honor of the 75th anniversary of Victor Sarianidi]*, edited by M. F. Kosarev, P. M. Kozhin and N. A. Dubova, pp. 303-315. Staryj sad, Moscow.

2008a The Final Phase of the Bronze Age and the "Andronovo Question" in Margiana. In *The Bronze Age and Early Iron Age in the Margiana Lowlands: Facts and methodological proposals for a redefinition of the research strategies*, The Archaeological Map of the Murghab Delta Studies and Reports II, edited by S. Salvatori, M. Tosi and B. Cerasetti, pp. 133-151. Archaeopress, Oxford.

2008b Excavations at Sites No. 1211 and No. 1219 (Final Bronze Age). In *The Bronze Age and Early Iron Age in the Margiana Lowlands: Facts and methodological proposals for a redefinition of the research strategies*, The Archaeological Map of the Murghab Delta Studies and Reports II, edited by S. Salvatori, M. Tosi and B. Cerasetti, pp. 119-132. Archaeopress, Oxford.

Cattani, Maurizio, Barbara Cerasetti, Sandro Salvatori and Maurizio Tosi

2008 The Murghab Delta in Central Asia 1990-2001: The GIS from Research Resource to a Reasoning Tool for the Study of Settlement Change in Long-Term Fluctuations. In *The Bronze Age and Early Iron Age in the Margiana Lowlands: Facts and methodological proposals for a redefinition of the research strategies*, The Archaeological Map of the Murghab Delta Studies and Reports II, edited by S. Salvatori, M. Tosi and B. Cerasetti, pp. 39-45. Archaeopress, Oxford.

Cattani, Maurizio and B. Genito

1998 The Pottery Chronological Seriation of the Murghab Delta from the End of the Bronze Age to the Achaemenid Period: a preliminary note. In *The Archaeological Map of the Murghab Delta, Preliminary Reports 1990-95*, Reports and Memoirs III, edited by A. Gubaev, G. Koshelenko and M. Tosi, pp. 75-87. Istituto Italiano per L'Africa e L'Oriente: Centro Scavi e Richerche Archeologiche, Rome.

Cattani, Maurizio and Sandro Salvatori

2008 Transects and Other Techniques for Systematic Sampling. In *The Bronze Age and Early Iron Age in the Margiana Lowlands: Facts and methodological proposals for a redefinition of the research strategies*, The Archaeological Map of the Murghab Delta Studies and Reports II, edited by S. Salvatori, M. Tosi and B. Cerasetti, pp. 1-27. Archaeopress, Oxford.

Cerasetti, Barbara

1998 Preliminary Report on Ornamental Elements of "Incised Coarse Ware". In *The Archaeological Map of the Murghab Delta, Preliminary Reports 1990-95*, Reports and Memoirs III, edited by A. Gubaev, G. A. Koshelenko and M. Tosi, pp. 67-74. Istituto Italiano per L'Africa e L'Oriente: Centro Scavi e Richerche Archeologiche, Rome.

2008 A GIS for the Archaeology of the Murghab Delta. In *The Bronze Age and Early Iron Age in the Margiana Lowlands: Facts and methodological proposals for a redefinition of the research strategies*, The Archaeological Map of the Murghab Delta

Studies and Reports II, edited by S. Salvatori, M. Tosi and B. Cerasetti, pp. 29-37. Archaeopress, Oxford.

2012 Remote Sensing and Survey of the Murghab Alluvial Fan, Southern Turkmenistan: The Coexistence of Nomadic Herders and Sedentary Farmers in the Late Bronze Age and Early Iron Age. In *Proceedings of the 7th International Congress on the Archaeology of the Ancient Near East 12 April – 16 April 2010, the British Museum and UCL, London Volume 1*, edited by R. Matthews, J. Curtis and with the collaboration of Michael Seymour, Alexandra Fletcher, Alison Gascoigne, Claudia Glatz, St John Simpson, Helen Taylor, Jonathan Tubb and Rupert Chapman, pp. 539-558. Harrassowitz Verlag, Wiesbaden.

Cerasetti, Barbara, Giorgia Benedetta Codini and Lynne M. Rouse

2014 Walking In The Murghab Alluvial Fan (Southern Turkmenistan): An integrated approach between old and new interpretations about the interaction between settled and nomadic people. In *'My Life is like the Summer Rose', Maurizio Tosi e l'Archeologia come modo di vivere: Papers in honour of Maurizio Tosi for his 70th birthday*, BAR International Series S2690, edited by C. C. Lamberg-Karlovsky, B. Genito and B. Cerasetti, pp. 105-114. Archaeopress, Oxford.

Cerasetti, Barbara and Massimo Mauri

2002 The Murghab Delta Palaeochannel Reconstruction on the Basis of Remote Sensing from Space. In *Proceedings of The Conference "Space Application for Heritage Conservation", Strasbourg (France), November 5-8 2002*, edited by B. Warmbein, pp. 1-9, Strasbourg.

Cerasetti, Barbara, Lynne M. Rouse and Ilaria de Nigris

forthcoming The Influence of Late Bronze Age Sedentary-Mobile Interactions on the Iron Age: Mobile Pastoral Occupation Sites in the Murghab Alluvial Fan, Turkmenistan. In *Proceedings of the International Conference, "A millennium of history: The Iron Age*

in Central Asia (2nd and 1st millennia BC)", Eurasien-Abteilung, DAI, Berlin, 23rd–24th June 2014, edited by J. Lhuillier, *in review*.

Chang, Claudia and Harold A. Koster

1986 Beyond Bones: Toward an Archaeology of Pastoralism. *Advances in Archaeological Method and Theory* 9:97-148.

Chase-Dunn, Christopher, Thomas D. Hall, Richard Niemeyer, Alexis Alvarez, Hiroko Inoue, Kirk Lawrence and Anders Carlson

2010 Middlemen and Marcher States in Central Asia and East/West Empire Synchrony. *Social Evolution & History* 9(1):52-79.

Chemonics International, Inc.

2001 *Biodiversity Assessment for Turkmenistan.* Report Submitted to USAID Central Asian Republics Mission, Almaty, Kazakhstan.

Chernykh, E. N.

1964 О Металле Абашевекой Культуры [On Metals of the Abashevo Culture]. In *Памятники Каменного и Бронзового Веков Евразии [Sites of the Stone and Bronze Ages of Eurasia]*, pp. 97-109. Nauka, Moscow.

Chernykh, E. N., S. V. Kuz'minykh, E. Yu. Lebedeva, S. A. Agapov, V. Yu. Lunkov, L. B. Orlovskaya, T. O. Teneyshvili and D. V. Valkov

1999 Археологические Памятники Эпохи Бронзы на Каргалах (поселение Горный и другие) [Bronze Age Archaeological Sites at Kargaly (Gorny settlement and others)]. *Russian Archaeology* 1991(1):77-102.

Childe, Vere Gordon

1928 *The Most Ancient East: The Oriental Prelude to European Prehistory*. Kegan Paul, London.

Christian, David

2000 Silk Roads or Steppe Roads? The Silk Roads in World History. *Journal of World History* 11(1):1-26.

Cleuziou, Serge, V. Gaibov and A. Annaev

1998 Off-Site Archaeological Transects in Northern Margiana. In *The Archaeological Map of the Murghab Delta, Preliminary Reports 1990-95*, Reports and Memoirs III, edited by A. Gubaev, G. Koshelenko and M. Tosi, pp. 27-33. Istituto Italiano per L'Africa e L'Oriente: Centro Scavi e Richerche Archeologiche, Rome.

Coolidge, Jennifer

2005 *Southern Turkmenistan in the Neolithic: A petrographic case study*, BAR International Series 1423. Archaeopress, Oxford.

Coward, Fiona

2013 Grounding the net: social networks, material culture, and geography in the Epipalaeolithic and early Neolithic of the Near East (~21-6,000 cal BCE). In *Network Analysis in Archaeology: New Approaches to Regional Interaction*, edited by C. Knappett, pp. 247-280. Oxford University Press, Oxford.

Crawford, Harriet and Khalid Al Sindi

1995 A seal in the collections of the National Museum, Bahrain. *Arabian Archaeology & Epigraphy* 6:1-4.

Cremaschi, M.

1998 Palaeohydrography and Middle Holocene Desertification in the Northern Fringe of the Murghab Delta. In *The Archaeological Map of the Murghab Delta, Preliminary Reports 1990-95*, Reports and Memoirs III, edited by A. Gubaev, G. A. Koshelenko and M. Tosi, pp. 15-25. Istituto Italiano per L'Africa e L'Oriente: Centro Scavi e Richerche Archeologiche, Rome.

Cretaux, Jean-François, René Letolle and Muriel Bergé-Nguyen

2013 History of Aral Sea level variability and current scientific debates. *Global and Planetary Change* 110:99-113.

Cribb, Roger L. D.

1987 The Logic of the Herd: A Computer Simulation of Archaeological Herd Structure *Journal of Anthropological Archaeology* 6:376-415.

1991 *Nomads in Archaeology*. Cambridge University Press, Cambridge.

Cywa, Katarzyna

2011 Use of wood in the ancient cult of fire temple at Mele Hairam (south-western Turkmenistan), based on preliminary charcoal analysis. *SAGVNTVM Extra* 11(5th International Meeting of Charcoal Analysis: The charcoal as cultural and biological heritage):151-152.

Dahl, Gudrun

1981 Production in Pastoral Societies. In *The Future of Pastoral Peoples: Proceedings of a Conference held in Nairobi, Kenya, 4-8 August 1980* edited by J. G. Galaty, D. Aronson, P. C. Salzman and A. Chouinard, pp. 200-209. International Development Research Centre, Ottawa.

de Weijer, Frauke

2007 Afghanistan's Kuchi Pastoralists: Change and Adaptation. *Nomadic Peoples* 11(1):9-37.

Di Castro, Angelo Andrea

2005 The barbarisation of Bactria. In *Cultural Interaction in Afghanistan c 300 BCE to 300 CE*, edited by A. A. Di Castro and C. A. Hope, pp. 1-18. Monash Asia Institute, Clayton, Australia.

Di Cosmo, Nicola

2002 *Ancient China and Its Enemies: The Rise of Nomadic Power in East Asian History*. Cambridge University Press, Cambridge.

Djamali, Morteza, Simon Brewer, Siegmar W. Breckle and Stephen T. Jackson

2012 Climatic determinism in phytogeographic regionalization: A test from the Irano-Turanian region, SW and Central Asia. *Flora* 207:237– 249.

Dobres, Marcia-Anne and John E. Robb (editors)

2000 *Agency in Archaeology*. Routledge, New York.

2005 "Doing" Agency: Introductory Remarks on Methodology. *Journal of Archaeological Method and Theory* 12:159-166.

Doise, W., G. Csepeli, H. D. Dann, C. Gouge, K. Larsen and A. Ostell

1972 An experimental investigation into the formation of intergroup representations. *European Journal of Social Psychology* 2(2):202-204.

Dolukhanov, Pavel M.

1981 The Ecological Prerequisites for Early Farming in Southern Turkmenia. In *The Bronze Age Civilization of Central Asia: Recent Soviet Discoveries*, edited by P. L. Khol, pp. 350-358. M. E. Sharpe, Inc, New York.

Doumani, Paula N.

2014 Bronze Age Potters in Regional Context: Long-term development of ceramic technology in the eastern Eurasian steppe zone. PhD Thesis, Department of Anthropology, Washington University in St. Louis.

Drennan, Robert D., Bryan K. Hanks and Christian E. Peterson

2011 The Comparative Study of Chiefly Communities in the Eurasian Steppe Region. *Social Evolution & History* 10(1):149-186.

Drenova, A. N.

2006 Activation of fixed dune massifs: Cause and probability of renewal. *Quaternary International* 152–153:175-180.

Dunham, Yarrow, Andrew Scott Baron and Mahzarin R. Banaji

2008 The development of implicit intergroup cognition. *Trends in Cognitive Sciences* 12(7):248-253.

Dunham, Yarrow, Andrew Scott Baron and Susan Carey

2011 Consequences of ‘‘Minimal’’ Group Affiliations in Children. *Child Development* 82(3):793–811.

During Caspers, Elisabeth C. L.

1994 Further Evidence for 'Central Asian' Materials from the Arabian Gulf. *Journal of the Economic and Social History of the Orient* 37(1):33-53.

2008 The Murghabo-Bactrian Archaeological Complex and the Indus Script. In *Intercultural Relations Between South and Southwest Asia: Studies in Commemoration of E.C.L. During Caspers (1934-1996)* BAR International Series, edited by E. Olijdam and R. H. Spoor, pp. 260-267. Archaeopress, Oxford.

Dyson-Hudson, Rada and Neville Dyson-Hudson

1980 Nomadic Pastoralism. *Annual Review of Anthropology* 9:15-61.

Empson, Rebecca

2007 Separating and Containing People and Things in Mongolia. In *Thinking Through Things: Theorising artefacts ethnographically*, edited by A. Henare, M. Holbraad and S. Wastell, pp. 113-140. Routledge, London.

Epimakhov, Andrei V.

2009 Settlements and Cemeteries of the Bronze Age of the Urals: The Potential for Reconstructing Early Social Dynamics. In *Social Complexity in Prehistoric Eurasia: Monuments, Metals and Mobility*, edited by B. K. Hanks and K. Linduff, pp. 74-90. Cambridge University Press, Cambridge.

Esenov, Paltamet E.

2014 Groundwaters and Salinization of Soils in Turkmenistan. In *The Turkmen Lake Altyn Asyr and Water Resources in Turkmenistan*, The Handbook of Environmental Chemistry 28, edited by I. S. Zonn and A. G. Kostianoy, pp. 141–150. Springer-Verlag, Berlin.

Fedorovich, B. A. and A. S. Kes

1934 [Subaerial delta of the Murghab]. In *Trudy Geomorfol. Inst. AN SSSR [Transactions of the Geomorphological Institute of the Academy of Sciences of the USSR]*, pp. 5-20. Nauka.

Ferdinand, Claus

2003 Material Culture of Pastoral Nomads: Reflections based on Arab and Afghan Materials. In *Technology, Tradition, and Survival: Aspects of Material Culture in the Middle East and Central Asia*, edited by R. L. Tapper and K. McLachlan, pp. 172-204. Frank Cass Publishers, London.

Fet, Galena

ca. 2014 *Central Asia: Southern Turkmenistan and northern Iran*. World Wildlife Fund, Inc. http://www.worldwildlife.org/ecoregions/pa1008 (Accessed 4 March 2015).

Fet, Victor

ca. 2014 *Central Asia: Northern Afghanistan, southern Turkmenistan, southern Uzbekistan, extending into Iran and Tajikistan*. World Wildlife Fund, Inc. http://www.worldwildlife.org/ecoregions/pa1306 (Accessed 4 March 2015).

Fet, Victor and Khabibulla I. Atamuradov (editors)

1994 *Biogeography and Ecology of Turkmenistan*. Monographiae Biologicae 72. Kluwer Academic Publishers, Dordrecht.

Finkelstein, Israel and Avi Perevolotsky

1990 Processes of Sedentarization and Nomadization in the History of Sinai and the Negev. *Bulletin of the American Schools of Oriental Research* 279:67-88.

Fleskens, L., A. Ataev, B. Mamedov and W. P. Spaan

2007 Desert Water Harvesting from Takyr Surfaces: Assessing the Potential of Traditional and Experimental Technologies in the Karakum. *Land Degradation & Development* 18:17-39.

Fleure, Herbert J. and Harold J. E. Peake

1928 *The Steppe and the Sown*. The Corridors of Time V. Yale University Press, New Haven.

Fouache, Eric, Roland Besenval, Claude Cosandey, Céline Coussot, Matthieu Ghilardi, Sébastien Huot and Michel Lamothe

2012 Palaeochannels of the Balkh river (northern Afghanistan) and human occupation since the Bronze Age period. *Journal of Archaeological Science* 39(11):3415-3427.

Frachetti, Michael D.

2008a *Pastoralist Landscapes and Social Interaction in Bronze Age Eurasia*. University of California Press, Berkeley.

2008b Variability and Dynamic Landscape of Mobile Pastoralism in Ethnography and Prehistory. In *The Archaeology of Mobility: Old World and New World Nomadism*, Cotsen Advanced Seminar Series, edited by H. Barnard and W. Wendrich, pp. 366-396. Regents of the University of California, Los Angeles.

2009 Differentiated Landscapes and Non-Uniform Complexity Among Bronze Age Societies of the Eurasian Steppe. In *Social Complexity in Prehistoric Eurasia: Monuments, Metals and Mobility*, edited by B. K. Hanks and K. Linduff, pp. 19-46. Cambridge University Press, Cambridge.

2012 Multiregional Emergence of Mobile Pastoralism and Nonuniform Institutional Complexity across Eurasia. *Current Anthropology* 53(1):2-38.

Frachetti, Michael D. and Elissa Bullion

forthcoming Bronze Age Participation in a 'global' ecumene: Mortuary practice and ideology across Inner Asia. In *Ancient Globalization and the People Without History*, edited by M. D. Frachetti and N. Boivin. Cambridge University Press, Cambridge.

Frachetti, Michael D. and Lynne M. Rouse

2012 Central Asia, the Steppe, and the Near East, 2500 – 1500 BC. In *A Companion to the Archaeology of the Ancient Near East*, edited by D. T. Potts, pp. 687-705. Blackwell Publishing Ltd., London.

Frachetti, Michael D., Lynne M. Rouse and Paula N. Doumani Dupuy

forthcoming On Participation. In preparation for *American Anthropologist*.

Frachetti, Michael D., Robert N. Spengler III, Gayle J. Fritz and Alexei N. Mar'yashev

2010 Earliest direct evidence for broomcorn millet and wheat in the central Eurasian steppe region. *Antiquity* 84:993–1010.

Francfort, Henri-Paul

1994 The Central Asian dimension of the symbolic system in Bactria and Margiana. *Antiquity* 68(259):406-418.

Francfort, Henri-Paul and Elena E. Kuz'mina

1999 Du nouveau dans la chronologie de l'Asie Centrale du Chalcolithique à l'Âge du Fer. In *14C et archeològie: 3éme Congrés International, Lyon 6-10 avril 1998*, edited by J. Evin, C. Oberlin, J.-P. Daugas and J.-F. Salles, pp. 467-469. Presses de l'Université de Rennes, Rennes.

Fratkin, Elliott M. and Kevin Smith

1994 Labor, livestock and land: the organization of pastoral production. In *African Pastoralists Systems: New Frontiers in Method and Theory*, edited by E. M. Fratkin, K. A. Galvin and E. A. Roth, pp. 99-112. Lynne Rienner, Boulder, Colorado.

Fritz, Gayle

2005 Palaeoethnobotanical Methodology and Applications. In *Handbook of Archaeological Methods*, edited by H. D. G. Maschner and C. Chippindale, pp. 773-834. AltaMira Press, Lanham, Maryland.

Frumkin, Grégoire

1970 *Archaeology in Soviet Central Asia* 6. E. J. Brill, Leiden.

Gellner, Ernest

1988 *State and society in Soviet thought*. Basil Blackwell, Oxford.

Genito, Bruno and Maria D'Angelo

2009 Pottery Fragments from the Topographic Survey in the Murghab Alluvial Fan (1990-2009): a State of Art and a Proposal for a Future Research Strategy. *Report of the Joint Turkmen-Italian Archaelogical Mission in the Murghab Alluvial Fan (Turkmenistan), October 13th to November 9th 2009*:15-29.

Gessner, Ursula, Vahid Naeimi, Igor Klein, Claudia Kuenzer, Doris Klein and Stefan Dech
2013 The relationship between precipitation anomalies and satellite-derived vegetation activity in Central Asia. *Global and Planetary Change* 110:74–87.

Gifford, Diane P. and Diana C. Crader
1977 A Computer Coding System for Archaeological Faunal Remains. *American Antiquity* 42(2):225-238.

Gilbert, Allan S.
1983 On the Origins of Specialized Nomadic Pastoralism in Western Iran. *World Archaeology* 15(1):105-119.

Glatzer, Bernt
1996 Dynamics of camp formation among Pashtun nomads in west Afghanistan. *Nomadic Peoples* 39:29-52.

Golden, Peter B.
2003 *Nomads and Sedentary Societies in Medieval Eurasia*. American Historical Association, Washington, DC.

Goldschmidt, Walter
1979 A General Model for Pastoral Social Systems. In *Pastoral production and society / Production pastorale et société*, edited by L'Equipe écologie et anthropologie des sociétés pastorales, pp. 15-27. Cambridge University Press, Cambridge.

Gorshenina, Svetlana
2014 *L'invention de l'Asie centrale: Histoire du concept de la Tartarie à l'Eurasie*. Rayon Histoire de la Librairie Droz n°4. Droz, Geneva.

Greenfield, Haskel J. and Elizabeth R. Arnold

2008 Absolute age and tooth eruption and wear sequences in sheep and goat: determining age-at-death in zooarchaeology using a modern control sample. *Journal of Archaeological Science* 35(4):836-849.

Grousset, René

1970 *The empire of the steppes: a history of Central Asia*. Translated by N. Walford. Rutgers University Press, Newark.

Gubaev, A., G. Koshelenko and Maurizio Tosi (editors)

1998 *The Archaeological Map of the Murghab Delta, Preliminary Reports 1990-95*. Reports and Memoirs III. Istituto Italiano per L'Africa e L'Oriente: Centro Scavi e Richerche Archeologiche, Rome.

Hall, Thomas D.

1991 Civilizational Change: The Role of Nomads. *Comparative Civilizations Review* 24:34-57.

Hanks, Bryan K. and Katheryn M. Linduff (editors)

2009 *Social Complexity in Prehistoric Eurasia: Monuments, Metals, and Mobility*. Cambridge University Press, Cambridge.

Harris, David R. (editor)

1996 *The Origins and Spread of Agriculture and Pastoralism in Eurasia.* UCL Press, London.

2010 *Origins of Agriculture in Western Central Asia: An Environmental-Archaeological Study*. University of Pennsylvania Museum of Archaeology and Anthropology, Philadelphia.

Harris, David R. and Chris Gosden

1996 The Beginnings of Agriculture in Western Central Asia. In *The Origins and Spread of Agriculture and Pastoralism in Eurasia*, edited by D. R. Harris, pp. 370-389. Smithsonian Institution Press, Washington D.C.

Herz, Norman and Ervan G. Garrison

1998 Ceramics. In *Geological Methods for Archaeology*, pp. 248-270. Oxford University Press, New York.

Hiebert, Fredrik T.

1994a *Origins of the Bronze Age Oasis Civilization in Central Asia*, American School of Prehistoric Research Bulletin 42. Peabody Museum of Archaeology and Ethnology, Cambridge (Massachusetts).

1994b Production evidence for the origins of the Oxus Civilization. *Antiquity* 68(259):372-387.

1998 Central Asians on the Iranian Plateau: A Model for Indo-Iranian Expansionism. In *The Bronze Age and Early Iron Age Peoples of Eastern Central Asia*, edited by V. H. Mair, pp. 148-161. The Institute for the Sudy of Man, Washington D.C.

2003 *A Central Asian Village at the Dawn of Civilization, Excavations at Anau, Turkmenistan*. University Museum Monograph 116. University of Pennsylvania Museum of Archaeology and Anthropology, Philadelphia.

Hiebert, Fredrik T. and C.C. Lamberg-Karlovsky

1992 Central Asia and the Indo-Iranian Borderlands. *Iran: Journal of the British Institute of Persian Studies* 30:1-15.

Hiebert, Fredrik T. and Katherine M. Moore

2004 A small steppe site near Gonur. In *U istokov tsivilizatsii: Sbornik statej k 75-letiyu Viktora Ivanovicha Sarianidi [Near the Sources of Civilizations: the issue in honor of the 75th anniversary of Victor Sarianidi]*, edited by M. F. Kosarev, P. M. Kozhin and N. A. Dubova, pp. 294-302. Staryj sad, Moscow.

Hole, Frank

1978 Pastoral nomadism in western Iran. In *Explorations in Ethnoarchaeology*, School of American Research Advanced Seminar Series, edited by R. A. Gould, pp. 127-167. University of New Mexico Press, Albuquerque.

1979 Rediscovering the past in the present : ethnoarchaeology in Luristan, Iran. In *Ethnoarchaeology: implications of ethnography for archaeology*, edited by C. Kramer, pp. 192-208. Columbia University Press, New York.

Hollingsworth, James, Hamid Nazari, Jean-François Ritz, Reza Salamati, Morteza Talebian, Abbas Bahroudi, Richard T. Walker, Magali Rizza and James Jackson

2010 Active tectonics of the east Alborz mountains, NE Iran: Rupture of the left-lateral Astaneh fault system during the great 856 A.D. Qumis earthquake. *Journal of Geophysical Research* 115(B12313).

Holt, Frank L.

1988 *Alexander the Great and Bactria: The Formation of a Greek Frontier in Central Asia*. E.J. Brill, Leiden.

2005 *Into the Land of Bones: Alexander the Great in Afghanistan*. University of California Press, Berkeley.

Honeychurch, William

2010 Pastoral nomadic voices: a Mongolian archaeology for the future. *World Archaeology* 42(3):405-417.

2015 *Inner Asia and the Spatial Politics of Empire: Archeology, Mobility, and Culture Contact*. Springer, New York.

Honeychurch, William and Chunag Amartuvshin

2007 Hinterlands, Urban Centers, and Mobile Settings: The "New" Old World Archaeology from the Eurasian Steppe. *Asian Perspectives* 46(1):36-64.

Houle, Jean-Luc

2006 'Gateways' into Societal Complexity: Issues of mobility and territoriality in the development of early small-scale steppe polities of central Mongolia. Paper presented at the Eurasian Steppe Symposium, University of Pittsburgh (Pittsburgh, Pennsylvania, USA).

2009 Socially Integrative Facilities and the Emergence of Societal Complexity on the Mongolian Steppe. In *Social Complexity in Prehistoric Eurasia: Monuments, Metals, and Mobility*, edited by B. K. Hanks and K. M. Linduff, pp. 338-377. Cambridge University Press, Cambridge.

Humphrey, Caroline and David Sneath

1999 *The End of Nomadism? Society, the State and the Environment in Inner Asia*. Duke University Press, Durham.

Hunt, Harriet V., Marc Vander Linden, Xinyi Liu, Giedre Motuzaite-Matuzeviciute, Sue Colledge and Martin K. Jones

2008 Millets across Eurasia: chronology and context of early records of the genera *Panicum* and *Setaria* from archaeological sites in the Old World. *Vegetation History and Archaeobotany* 17(Supplement 1):S5–S18.

Huntington, Samuel P.

1993 The Clash of Civilizations? *Foreign Affairs* 72(3):22-49.

Ibn Khaldûn

2004 [1377] The Muqaddimah: An Introduction to History (abridged edition), edited by N. J. Dawood. Translated by F. Rosenthal. Princeton University Press, Princeton.

Ilkhamov, Alisher

2006 Archaeology of Uzbek Identity. *Anthropology & Archeology of Eurasia* 44(4):10-36.

Irons, William

1974 Nomadism as a Political Adaptation: The Case of the Yomut Turkmen. *American Ethnologist* 1(4):635-658.

1979 Political stratification among pastoral nomads. In *Pastoral production and society / Production pastorale et société*, edited by L'Equipe écologie et anthropologie des sociétés pastorales, pp. 361-374. Cambridge University Press, Cambridge.

Itina, Marianna Aleksandrovna

1977 *Istoriia Stepnykh Plemen Yuzhnogo Priaralia (II-nachalo I tysiacheletiia do n. e.) [History of the Steppe Tribes of the southern Pre-Aral (2nd - beginning 1st millennium B.C.)]*, 10. Trudy Khorezmskoi Arkheologo-Etnograficheskoi Ekspeditsii. Akademia Nauk SSSR, Moscow.

Jervis, Ben

2011 A patchwork of people, pots and places: Material engagements and the construction of ‘the social’ in Hamwic (Anglo-Saxon Southampton), UK. *Journal of Social Archaeology* 11(3):239–265.

Joglekar, P. P.

1998 A Preliminary Report on the Faunal Remains at Takhirbai-depe. In *The Archaeological Map of the Murghab Delta, Preliminary Reports 1990-95*, Reports and

Memoirs III, edited by A. Gubaev, G. Koshelenko and M. Tosi, pp. 115-118. Istituto Italiano per L'Africa e L'Oriente: Centro Scavi e Richerche Archeologiche, Rome.

Johnson, Matthew

1999 *Archaeological Theory: An Introduction*. Blackwell Publishers, Oxford.

Joint Italian-Turkmen Archaeological Mission to the Murghab Alluvial Fan

2006 *Preliminary Report: Site 1211*. University of Bologna. Fieldwork Report Submitted to Ministry of Culture and Transport, Ashgabat, Turkmenistan.

Jungner, H.

2004 A collaboration for developing archaeological research in Turkmenistan. In *U istokov tsivilizatsii: Sbornik statej k 75-letiyu Viktora Ivanovicha Sarianidi [Near the Sources of Civilizations: the issue in honor of the 75th anniversary of Victor Sarianidi]*, edited by M. F. Kosarev, P. M. Kozhin and N. A. Dubova, pp. 290-293. Staryj sad, Moscow.

Kakroodi, A. A., S. B. Kroonenberg, R.M. Hoogendoorn, H. Mohammd Khani, M. Yamani, M. R. Ghassemi and H. A. K. Lahijani

2012 Rapid Holocene sea-level changes along the Iranian Caspian coast. *Quaternary International* 263:93-103.

Kasparov, A. K.

1994a Environmental Conditions and Farming Strategy of Protohistoric Inhabitants of South-Central Asia. *Paléorient* 20(2):143-149.

1994b Patterns in Caprine Exploitation at Ilgynly-depe, Turkmenistan. In *New Archaeological Discoveries in Asiatic Russia and Central Asia*, Archaeological Studies 16, edited by V. M. Masson, A. G. Kozintsev, N. F. Solovyova and V. Y. Zuyev, pp. 36-38. Institute of History of Material Culture, Russian Academy of Sciences, St. Petersburg.

Kenoyer, Jonathan Mark

2006 Cultures and societies of the Indus tradition. In *Historical Roots in the Making of 'the Aryan'*, edited by R. Thapar, pp. 21-49. National Book Trust, New Delhi.

Kharin, Nikolai G.

2002 *Vegetation Degradation in Central Asia under the Impact of Human Activities*. Springer Science+Business Media, New York.

Khazanov, Anatoly M.

1994 *Nomads and the Outside World*. Second ed. Translated by J. Crookenden. The University of Wisconsin Press, Madison.

2001 Nomads in the History of the Sedentary World. In *Nomads in the Sedentary World,* Routledge-IIAS Asian Studies Series, edited by A. M. Khazanov and A. Wink, pp. 1-23. Routledge, London.

2005 Nomads and Cities in the Eurasian Steppe Region and Adjacent Countries: A Historical Overview. In *Shifts and Drifts in Nomad-Sedentary Relations*, edited by S. Leder and B. Streck, pp. 163-178. Dr. Ludwig Reichert Verlag, Wiesbaden.

2009 Specific Characteristics of Chalcolithic and Bronze Age Pastoralism in the Near East. In *Nomads, Tribes, and the State in the Ancient Near East: Cross-disciplinary Perspectives*, Oriental Institute Seminars 5, edited by J. Szuchman, pp. 119-127. The Oriental Institute of The University of Chicago, Chicago.

Khlopin, Igor Nikolaievich

1964 *Geoksyurskaya Gruppa Poselenii Epohi Eneolita [Geoksyur Group of the Late Eneolithic Epoch]*. Akademia Nauk SSSR, Moscow.

1969 *Eneolit Yujnih Oblastei Srednei Azii*, Part 3. Akademia Nauk SSSR, Leningrad.

1983 *Юго-Западная Туркмения в Эпоху Поздней Бронзы: По материалам Сумбарских Могильников [Southwest Turkmenia in the Bronze Age: From materials of the Sumbar cemeteries]*. Nauka, Leningrad.

Kibaroğlu, Mustafa, Antonio Sagona and Muharrem Satir

2011 Petrographic and geochemical investigations of the late prehistoric ceramics from Sos Höyük, Erzurum (Eastern Anatolia). *Journal of Archaeological Science* 38:3072-3084.

Kinzler, Katherine D., Emmanuel Dupoux and Elizabeth S. Spelke

2007 The native language of social cognition. *Proceedings of the National Academy of Sciences* 104(30):12577-12580.

Kinzler, Katherine D. and Elizabeth S. Spelke

2011 Do infants show social preferences for people differing in race? *Cognition* 119(1):1-9.

Kircho, Lubov B. and S. G. Popov

1999 K voprosu o radiouglerodnoj khronologii drevnejshikh tsivilizatsij Srednej Azii. *Stratum Plus. Ot Balkan do Gimalaev. Vremja tsivilizatsij, 2*:350-361.

Klejn, Leo S.

1993 To separate a centaur: on the relationship of archaeology and history in Soviet tradition. *Antiquity* 67:339-348.

Knappett, Carl and Lambros Malafouris (editors)

2008 *Material Agency: Toward a Non-Anthropocentric Approach*. Springer, New York.

Kohl, Philip L. (editor)

1981 *The Bronze Age Civilization of Central Asia: Recent Soviet Discoveries*. M. E. Sharpe, Inc., Armonk.

Kohl, Philip L.

1984 *Central Asia: Palaeolithic Beginnings to the Iron Age*. Éditions Recherche sur les Civilisations, Paris.

1989 The Use and Abuse of World-Systems Theory: The Case of the "Pristine" West Asian State. In *Archaeological Thought in America*, edited by C. C. Lamberg-Karlovsky, pp. 218-240. Cambridge University Press, Cambridge.

2002 Archaeological Transformations: Crossing the Pastoral/Agricultural Bridge. *Iranica Antiqua* 37:151-190.

2005 Трансформация культуры от мобильных скотоводов к оседлым змледельцев (Бактрийско-Маргианский Археологический Комплекс) [Transformation of culture from mobile pastoralists to sedentary farmers (Bactria-Margiana Archaeological Complex)]. *Russian Archaeology* 2005(1):64-71.

2007 *The Making of Bronze Age Eurasia*. Cambridge University Press, Cambridge.

2008 Shared Social Fields: Evolutionary Convergence in Prehistory and Contemporary Practice. *American Anthropologist* 110(4):495–506.

Koryakova, Ludmila and Andrej Vladimirovich Epimakhov

2007 *The Urals and Western Siberia in the Bronze and Iron Ages*. Cambridge World Archaeology. Cambridge University Press, Cambridge.

Krader, Lawrence

1955 Ecology of Central Asian Pastoralism. *Southwestern Journal of Anthropology* 11(4):301-326.

Kradin, Nikolay N.

2003 Ernest Gellner and Debates on Nomadic Feudalism *Social Evolution & History* 2(2):162-176.

Kramer, Carol

1977 Pots and People. In *Mountains and Lowlands: Essays in the Archaeology of Greater Mesopotamia*, Bibliotheca Mesopotamica 7, edited by L. D. Levine and T. C. Young, pp. 91-112. Undena Publications, Malibu, California.

Kroeber, A. L.

1947 Culture Groupings in Asia. *Southwestern Journal of Anthropology* 3(4):322-330.

Kryzhanovsky, Oleg L. and Khabibulla I. Atamuradov

1994 Zoogeography of Coleoptera in Turkmenistan. In *Biogeography and Ecology of Turkmenistan*, Monographiae Biologicae 72, edited by V. Fet and K. I. Atamuradov, pp. 403-418. Kluwer Academic Publishers, Dordrecht.

Kutimov, Yu. G.

1999 Культурная Атрибуция Керамики Степного Облика Эпохи Поздней Бронзы Южных Районов Средней Азии (Туркменистана) [Cultural Attributes of Late Bronze Age Steppe Pottery of the Southern Regions of Middle Asia (Turkmenistan)]. *Stratum Plus* 2:314-322.

2014 К вопросу о культурных контактах степного и земледельческого населения в позднем бронзовом веке на территории Туркменистана [On the question of cultural contacts between herders and farmers in the Late Bronze Age of Turkmenistan]. In *Археология древних обществ Евразии: хронология, культурогенез, религиозные*

воззрения - Памяти Вадима Михайловича Массона (03.05.1929-19.02.2010) [Archaeology of the Ancient Societies of Eurasia: chronology, cultural genesis, religious views - Dedicated to the memory of Vadim Mikhailovich Masson (03.05.1929–19.02.2010)], Russian Academy of Sciences Institute for the History of Material Culture, Proceedings XLII, pp. 86-96. IHMC RAS; "Art-Xpress", St. Petersburg.

Kuz'mina, Elena E.

1964 О южных пределах распространения степных культур эпохи бронзы в Средней Азии [On the southern extent of the spread of steppe cultures of the Bronze Age in Central Asia]. In *Памятники Каменного и Бронзового Веков Евразии [Sites of the Stone and Bronze Ages of Eurasia]*, pp. 141-158. Nauka, Moscow.

1994a *Откуда пришли индоарии? Материальная культура племен андроновской общности и происхождение индоиранцев [Whence came the Indo-Aryans? Material culture of the Andronovo community tribes and origins of the Indo-Iranians]*. MGP "Kalina", Moscow.

1994b Stages of Development of Stock-Breeding Husbandry and Ecology of the Steppes in the Light of the Archaeological and Palaeoecological Data (4th Millennium BC - 8th Century BC). In *The Archaeology of the Steppes: Methods and Strategies. Papers from the International Symposium held in Naples 9-12 November 1992*, edited by B. Genito, pp. 31-71. Instituto Italiano per il Medio ed Estremo Oriente (IsMEO), Naples.

2007 *The Origin of the Indo-Iranians*. Leiden Indo-European Etymological Dictionary Series 3. Brill, Leiden.

Kuz'mina, Elena E. and A. A. Lyapin

1984 Novie Nahodki Stepnoi Keramiki na Murgabe [New Finds of Steppe Ceramics in the Murghab]. In *Problemy Arkheologii Turkmenistana*, edited by V. M. Masson, pp. 6-22. Ylym (Akademia Nauk Turkmen SSR), Ashkhabad.

Lamberg-Karlovsky, C. C.

1989 Mesopotamia, Central Asia and the Indus Valley: so the kings were killed. In *Archaeological Thought in America*, edited by C. C. Lamberg-Karlovsky, pp. 241-267. Cambridge University Press, Cambridge.

1994 The Bronze Age *khanates* of Central Asia. *Antiquity* 68(259):398-405.

2002 Archaeology and Language: The Indo-Iranians. *Current Anthropology* 43(1):63-88.

2003 Civilization, State, or Tribes? Bactria and Margiana in the Bronze Age. *The Review of Archaeology* 24(1):11-19.

Latour, Bruno

2005 *Reassembling the Social: An Introduction to Actor-Network Theory*. Oxford University Press, Oxford.

Lattimore, Owen

1979 Herdsmen, Farmers, Urban Culture. In *Pastoral production and society / Production pastorale et société*, edited by L'Equipe écologie et anthropologie des sociétés pastorales, pp. 479-490. Cambridge University Press, Cambridge.

1992 [1940] *Inner Asian Frontiers of China*. Oxford University Press, Oxford.

Law, Randall

2008 Inter-Regional Interaction and Urbanism in the Ancient Indus Valley: A Geologic Provenience Study of Harappa's Rock and Mineral Assemblage. PhD Thesis, Department of Anthropology, University of Wisconsin - Madison.

Lecomte, Olivier, Henri-Paul Francfort, Rémy Boucharlat and Mukhammed Mamedov
2002 Rechcrches archéologiques récentes à Ulug Dépé (Turkménistan). *Paléorient* 28(2):123-132.

Lees, Susan H. and Daniel G. Bates
1974 The Origins of Specialized Nomadic Pastoralism: A Systemic Model. *American Antiquity* 39(2):187-193.

Lerman, Zvi, Dmitry Prikhodko, Inna Punda, David Sedik, Eugenia Serova and Johan Swinnen
2012 *Turkmenistan: Agricultural sector review,* Country Highlights No. 7. Food and Agriculture Organization of the United Nations (FAO) and European Bank for Reconstruction and Development (EBRD). Report Submitted to Investment Centre Division of the United Nations Food and Agriculture Organization (FAO), Rome, Italy.

Leung, Irene S.
2003 'Felt yurts neatly arrayed, large tents huddle close': visualizing the frontier in the Northern Song dynasty. In *Political Frontiers, Ethnic Boundaries, and Human Geographies in Chinese History*, edited by N. Di Cosmo and D. J. Wyatt, pp. 192-219. Routledge Curzon, London.

Levy, Thomas Evan
1983 The Emergence of Specialized Pastoralism in the Southern Levant. *World Archaeology* 15(1):15-36.

Lhuillier, Johanna, Armance Dupont-Delaleuf, Olivier Lecomte and Julio Bendezu-Sarmiento
2013 The Middle Iron Age in Ulug depe: a preliminary typo-chronological and technological study of the Yaz II ceramic complex. In *Pottery and Chronology of the Early Iron Age in Central Asia*, edited by M. Wagner, pp. 9-27. The Kazimierz Michałowski Foundation, Warsaw.

Lightfoot, Emma, Xinyi Liu and Martin K. Jones

2013 Why move starchy cereals? A review of the isotopic evidence for prehistoric millet consumption across Eurasia. *World Archaeology* 45(4):574-623.

Lindsay, Ian and Alan Greene

2013 Sovereignty, mobility, and political cartographies in Late Bronze Age southern Caucasia. *Journal of Anthropological Archaeology* in press.

Lindsey, Rebecca

2014 *Shrinking Aral Sea*. NASA Earth Observatory http://earthobservatory.nasa.gov/Features/WorldOfChange/aral_sea.php (Accessed November 6, 2014).

Lioubimtseva, Elena, Roy Cole, J. M. Adams and G. Kapustin

2005 Impacts of climate and land-cover changes in arid lands of Central Asia. *Journal of Arid Environments* 62(2):285-308.

Lioubimtseva, Elena and Geoffrey M. Henebry

2009 Climate and environmental change in arid Central Asia: Impacts, vulnerability, and adaptations. *Journal of Arid Environments* 73:963-977.

Lioubimtseva, Elena , Jahan Kariyeva and Geoffrey M. Henebry

2014 Climate Change in Turkmenistan. In *The Turkmen Lake Altyn Asyr and Water Resources in Turkmenistan*, The Handbook of Environmental Chemistry 28, edited by I. S. Zonn and A. G. Kostianoy, pp. 39–58. Springer-Verlag, Berlin.

Lisitsina, G. N.

1969 The Earliest Irrigation in Turkmenia. *Antiquity* 43:279-288.

1981 The History of Irrigation Agriculture in Southern Turkmenia. In *The Bronze Age Civilization of Central Asia: Recent Soviet Discoveries*, edited by P. L. Kohl, pp. 350-358. Translated by P. L. Kohl and W. Mandel. M. E. Sharpe, Inc., Armonk.

Lisitsina, G. N. and K. P. Popov

1988 About Tree Vegetation on Southern Turkmenistan Plains in the Neolithic, Eneolithic, the Bronze and the Early Iron Ages. *Izvestiia Academii Nauk, Turkmenskoi SSR* 1:68-70.

Llobera, Marcos

1996 Exploring the topography of mind: GIS, social space and archaeology. *Antiquity* 70:612-622.

Luneau, Élise

2010 L'Âge du Bronze Final en Asie Centrale Méridionale (1750-1500/1450 avant n.e.): La fin de la civilisation de l'Oxus [The Final Bronze Age in Southern Central Asia (1750-1500/1450 BC): The end of the Oxus Civilization]. PhD Thesis, UMR 7041 - ARSCAN, Université Paris 1 - Panthéon-Sorbonne, Paris.

Lyapin, A. A.

1996 Early Murgap Dams. *Problems of Desert Development* 1:13-21.

MacEachern, Scott

1998 Scale, style and cultural variation: technological traditions in the northern Mandara Mountains. In *The Archaeology of Social Boundaries*, edited by M. T. Stark, pp. 107-131. Smithsonian Institution Press, Washington, D.C.

Mahajan, Neha and Karen Wynn

2012 Origins of ‘‘Us’’ versus ‘‘Them’’: Prelinguistic infants prefer similar others. *Cognition* 124:227–233.

Makarewicz, Cheryl A.

2013 A pastoralist manifesto: breaking stereotypes and re-conceptualizing pastoralism in the Near Eastern Neolithic. *Levant* 45(2):159-174.

Maman, Shimrit, Dan G. Blumberg, Haim Tsoar, Batyr Mamedov and Naomi Porat

2011 The Central Asian ergs: A study by remote sensing and geographic information systems. *Aeolian Research* 3:353–366.

Mann, Michael

1986 *A History of Power from the Beginning to A.D. 1760*, The Sources of Social Power - Volume 1. Cambridge University Press, Cambridge.

Marcolongo, Bruno and P. Mozzi

1998 Outline of Recent Geological History of the Kopet-Dagh Mountains and the southern Kara-kum. In *The Archaeological Map of the Murghab Delta, Preliminary Reports 1990-95*, Reports and Memoirs III, edited by A. Gubaev, G. A. Koshelenko and M. Tosi, pp. 1-13. Istituto Italiano per L'Africa e L'Oriente: Centro Scavi e Richerche Archeologiche, Rome.

Markofsky, Steven Brett

2010 Illuminating the Black Sands: Survey and Settlement in the Bronze Age Murghab Delta, Turkmenistan. PhD Thesis, Institute of Archaeology, University College London.

2014 When Survey Goes East: Field Survey Methodologies and Analytical Frameworks in a Central Asian Context. *Journal of Archaeological Method and Theory* 21:697–723.

Marshall, Fiona

1990a Origins of Specialized Pastoral Production in East Africa. *American Anthropologist* New Series 92(4):873-894.

1990b Cattle Herds and Caprine Flocks. In *Early Pastoralists of South-Western Kenya*, edited by P. Robertshaw, pp. 205-206. British Institute in Eastern Africa, Nairobi.

Marshall, Fiona and Elisabeth Hildebrand

2002 Cattle Before Crops: The Beginnings of Food Production in Africa. *Journal of World Prehistory* 16(2):99-143.

Marshall, Fiona and Tom Pilgram

1991 Meat versus within-bone nutrients: Another look at the meaning of body part representation in archaeological sites. *Journal of Archaeological Science* 18(2):149-163.

Marushchenko, A. A.

1956 Итоги полевых археологических работ 1953 [Results of archeological field work in 1953]. In *Материалы по археологии Туркменистана [Archaeological Material of Turkmenistan]*, Труды Института истории, археологии и этнографии (ТИИАЭ) [Transactions of the Institute of History, Archaeology, and Ethnography] 2, pp. 5-10.

Mashkour, Marjan

1998 The Subsistence Economy in the Rural Community of Geoktchik Depe in Southern Turkmenistan: Preliminary Results of the Faunal Analysis. In *Archaeozoology of the Near East III: Proceedings of the third international symposium on the archaeozoology of southwestern Asia and adjacent areas*, ARC 18, edited by H. Buitenhuis, L. Bartoseiwicz and A. M. Choyke, pp. 200-220. Centre for Archeological Research and Consultancy, Groningen.

Masimov, Iminjan Suleymanovich

1980 The Study of Bronze Age Sites in the Lower Murghab *Anthropology & Archeology of Eurasia* 19(3-4):194-220.

1981 The Study of Bronze Age Sites in the Lower Murghab. In *The Bronze Age Civilization of Central Asia: Recent Soviet Discoveries*, edited by P. L. Kohl, pp. 194-220. Translated by P. L. Kohl and W. Mandel. M. E. Sharpe, Inc., Armonk.

Masimov, Iminjan Suleymanovich, Sandro Salvatori and Berdy N. Udeumuradov

1998 Preliminary Analysis of the Bronze Age Material Collected by the Margiana Archaeological Project and a First Chronological Assessment. In *The Archaeological Map of the Murghab Delta, Preliminary Reports 1990-95*, Reports and Memoirs III, edited by A. Gubaev, G. A. Koshelenko and M. Tosi, pp. 35-46. Istituto Italiano per L'Africa e L'Oriente: Centro Scavi e Richerche Archeologiche, Rome.

Masson, Vadim Mikhailovich

1959 *Drevnezemledel'cheskaya Kul'tura Margiany [Ancient Farming Culture of Margiana]*, 73. Materialy i Issledovaniya po Arkheologii SSSR. Akademia Nauk SSSR, Moscow.

1980 Altyn-depe During the Aeneolithic Period. *Anthropology and Archaeology of Eurasia* 19:63-95.

1981 Altyn-depe during the Aeneolithic Period. In *The Bronze Age Civilization of Central Asia: Recent Soviet Discoveries*, edited by P. L. Kohl, pp. 63-95. Translated by P. L. Kohl and W. Mandel. M. E. Sharpe, Inc., Armonk.

2002 Cultures of the Steppe Bronze Age and Urban Civilizations in the South of Central Asia. In *Complex Societies of Central Eurasia from the 3rd to the 1st Millennium BC: Regional Specifics in Light of Global Models*, Journal of Indo-European Studies Monograph Series 46, edited by K. Jones-Bley and D. G. Zdanovich, pp. 547-557. Institute for the Study of Man, Washington, D.C.

Masson, Vadim Mikhailovich and David R. Harris

1994 New Excavations at Jeitun, Turkmenistan: the first five years. In *New Archaeological Discoveries in Asiatic Russia and Central Asia*, Archaeological Studies 16, edited by V. M. Masson, A. G. Kozintsev, N. F. Solovyova and V. Y. Zuyev, pp. 14-16. Institute of History of Material Culture, Russian Academy of Sciences, St. Petersburg.

Masson, Vadim Mikhailovich and Viktor Ivanovich Sarianidi

1972 *Central Asia: Turkmenia Before the Achaemenids*. Translated by R. Tringham. Ancient People and Places 79. Praeger Publishers, New York.

1973 *Среднеазиатская терракота эпохи бронзы: опыт классификации и интерпретации [Central Asian terracotta of the Bronze Age: classification and interpretation]*. Культура народов востока: материалы и исследования [Culture of the East: Materials and Research]. Nauka, Moscow.

Mbae, N. Bernard

1990 The ethnoarchaeology of Maasai settlements and refuse disposal patterns in the Lemek area. In *Early Pastoralists of South-Western Kenya*, edited by P. Robertshaw, pp. 279-292. British Institute in Eastern Africa, Nairobi.

Meadow, Richard H.

2002 The Chronological and Cultural Significance of a Steatite Wig From Harappa. *Iranica Antiqua* 37:191-202.

Michalowski, Piotr

1986 Mental maps and ideology: Reflections on Subartu. In *The Origins of Cities in Dry-farming Syria and Mesopotamia in the Third Millennium BC*, edited by H. Weiss, pp. 129-156. Four Quarters Publishing Co., Guilford, Connecticut.

1999 Sumer dreams of Subartu: Politics and the geographical imagination. In *Languages and Cultures in Contact: At the Crossroads of Civilizations in the Syro-Mesopotamian Realm*, edited by K. Van Lerberghe and G. Voet, pp. 305-315. Peeters Press, Leuven.

Michelaki, Kostalena

2006 *Household Ceramic Economies: Production and consumption of household ceramics among the Maros villagers of Bronze Age Hungary*, BAR International Series 1503. Archaeopress, Oxford.

Micklin, Philip P.

2007 The Aral Sea Disaster. *Annual Review of Earth and Planetary Sciences* 35:47-72.

Miller, Naomi F.

1984 The Use of Dung as Fuel: An Ethnographic Example and an Archaeological Application. *Paléorient* 10(2):71-79.

1996 Seed Eaters of the Ancient Near East: Human or Herbivore? *Current Anthropology* 37(3):521-528.

1999 Agricultural development in western Central Asia in the Chalcolithic and Bronze Ages. *Vegetation History and Archaeobotany* 8:13-19.

2003 The Use of Plants at Anau North. In *A Central Asian Village at the Dawn of Civilization, Excavations at Anau, Turkmenistan*, edited by F. T. Hiebert and K. Kurdansakhatov. University of Pennsylvania Museum, Philadelphia.

Mizoguchi, Koji

2013 Evolution of prestige good systems: an application of network analysis to the transformation of communication systems and their media. In *Network Analysis in*

Archaeology: New Approaches to Regional Interaction, edited by C. Knappett, pp. 151-178. Oxford University Press, Oxford.

Moore, Katherine M.

1993a Animal Use at Bronze Age Gonur Depe. *Information Bulletin of the International Association for the Study of the Cultures of Central Asia* 19:164-176.

1993b Bone Tool Technology at Gonur Depe. *Information Bulletin of the International Association for the Study of the Cultures of Central Asia* 19:218-227.

Moore, Katherine M., Naomi F. Miller, Fredrik Talmage Hiebert and Richard H. Meadow

1994 Agriculture and herding in the early oasis settlements of the Oxus Civilization. *Antiquity* 68(259):418-427.

Mughal, Mohammad Rafique

1994 The Harappan Nomads of Cholistan. In *Living Traditions: Studies in the Ethnoarchaeology of South Asia*, edited by B. Allchin, pp. 53-68. Oxford and IBH, New Delhi.

Murray, Wendi Field and Barbara J. Mills

2013 Identity Communities and Memory Practices: Relational Logics in the US Southwest. In *Relational Archaeologies: Humans, animals, things*, edited by C. Watts, pp. 135-153. Routledge, New York.

Nechaeva, N. A., I. A. Mordvinov and I. A. Mosolov

1943 *Past'ishcha Kara-Kymov i ik ispol'zovanie.* Izdatel'stvo TurkmenFAN, Ashkhabad.

Nelson, Cynthia (editor)

1973 *The Desert and the Sown: Nomads in the Wider Society*. Regents of the University of California, Berkeley.

Nesbitt, Mark

1994 Archaeobotanical Research in the Merv Oasis (section in The International Merv Project Preliminary Report on the Second Season (1993), Georgina Herrmann and K. Kurbansakhatov). *Iran: Journal of the British Institute of Persian Studies* 32:71-73.

Nesbitt, Mark and Sarah O'Hara

2000 Irrigation agriculture in Central Asia: a long-term perspective from Turkmenistan. In *The Archaeology of Drylands: Living at the margin*, edited by G. Barker and D. Gilbertson, pp. 103-122. Routledge, London.

Neumann, Iver B. and Einar Wigen

2013 The importance of the Eurasian steppe to the study of international relations. *Journal of International Relations and Development* 16:311-330.

Nikolaev, V.N.

1982 Experience of Development and Rational Management of Desert Rangelands. In *Combating desertification in the USSR: problems and experience*, edited by A. G. Babaev, pp. 55-74. Centre of International Projects GHNT, Moscow.

Ninfo, Andrea and Alessandro Perego

2006 *Evoluzione geomorfologica del delta interno del Murghab: relazione missione Turkmenistan 2006* University of Pisa. Field Report Submitted to Italian Ministry of Foreign Affairs, Rome, Italy.

Niyazklychev, K.

1973 Zemledelcheskii Kalandar i Skotovodstvo u Turkmen-Chovdurov v Kontse XIX - Nachalye XX Vek [Farming Calendar and Herding Among Turkmen Nomads at the end of the 19th - beginning of the 20th century]. In *Ocherki po istorii khozyaistva i kulturi Turkmen*, pp. 87-98. Ylym, Ashkabad.

Noddle, Barbara

1974 Ages of epiphyseal closure in feral and domestic goats and ages of dental eruption. *Journal of Archaeological Science* 1(2):195-204.

Noe-Nygaard, Nanna

1977 Butchering and Marrow Fracturing as a Taphonomic Factor in Archaeological Deposits. *Paleobiology* 3(2):218-237.

Olijdam, Eric

2008 A Possible Central Asian Origin for the Seal-Impressed Jar from the 'Temple Tower' at Failaka In *Intercultural Relations Between South and Southwest Asia: Studies in Commemoration of E.C.L. During Caspers (1934-1996)* BAR International Series, edited by E. Olijdam and R. H. Spoor, pp. 268-287. Archaeopress, Oxford.

Orlovsky, Nikolai S.

1994 Climate of Turkmenistan. In *Biogeography and Ecology of Turkmenistan*, Monographiae Biologicae 72, edited by V. Fet and K. I. Atamuradov, pp. 23-48. Kluwer Academic Publishers, Dordrecht.

Parzinger, Hermann and Nikolaus Boroffka (editors)

2003 *Das Zinn der Bonzezeit in Mittelasien I: Die siedlungsarchäologischen Forschungen im Umfeld der Zinnlagerstätten*. Vol. 1. Archäologie In Iran Und Turan Band 5. Philipp von Zabern, Mainz am Rhein.

Paul, Jürgen

2006 Terms for nomads in medieval Persian historiography. *Asiatische Studien: Zeitschrift der Schweizerischen Asiengesellschaft = Études asiatiques: revue de la Société Suisse - Asie* LX(2):437-457.

Payne, Sebastian

1985 Morphological distinctions between the mandibular teeth of young sheep, Ovis, and goats, Capra. *Journal of Archaeological Science* 12(2):139-147.

Peake, Harold J. E. and Herbert J. Fleure

1927 *Peasants and Potters*. The Corridors of Time III. Oxford University Press, Oxford.

Piermartiri, Roberta

2012 Ceramiche di cultura Andronovo e Namazga VI provenienti dal conoide alluvionale del fiume Murghab (Turkmenistan): Caratterizzazione mineralogico-petrografica [Ceramics of the Andronovo culture and Namazga VI from the Murghab alluvial fan (Turkmenistan): Mineralogical-petrographic characterization]. MSc (Conservation and Restoration Science for Cultural Heritage) Thesis, Scuola di Scienze, University of Bologna.

Pines, Yuri

2005 Beasts or Humans: Pre-Imperial Origins of the "Sino-Barbarian" Dichotomy. In *Mongols, Turks, and Others: Eurasian Nomads and the Sedentary World*, Brill's Inner Asian Library 2, edited by R. Amitai and M. Biran, pp. 59-101. Brill, Leiden.

Pollock, Susan and Reinhard Bernbeck

2011 Excavations at Monjukli Depe, Meana Čaača Region, Turkmenistan, 2010. *Archäologische Mitteilungen aus Iran und Turan* 43:169-237.

Porter, Anne

2009 Beyond Dimorphism: Ideologies and Materialities of Kinship as Time-Space Distanciation. In *Nomads, Tribes, and the State in the Ancient Near East: Cross-disciplinary Perspectives*, Oriental Institute Seminars 5, edited by J. Szuchman, pp. 201-225. The Oriental Institute of The University of Chicago, Chicago.

2012 *Mobile Pastoralism and the Forming of Near Eastern Civilizations: Weaving Together Society*. Cambridge University Press, Cambridge.

Possehl, Gregory L.

1979 Pastoral Nomadism in the Indus Civilization: An hypothesis. In *South Asian Archaeology, 1977*, edited by M. Taddei, pp. 537-551. Istituto Universitario Orientale, Naples.

2003 *The Indus Civilization: A Contemporary Perspective*. Vistaar Publications, New Delhi.

2005 The Middle Asian Interaction Sphere. *Expedition* 49(1):40-42.

Possehl, Gregory L., Vasant Shinde and Marta Ameri

2004 The Ahar-Banas Complex and the BMAC. *Man and Environment* XXIX(2):18-29.

Potts, Daniel T.

1993 A new Bactrian find from southeastern Arabia. *Antiquity* 67:591-596.

2014 *Nomadism in Iran: From Antiquity to the Modern Era*. Oxford University Press, Oxford.

Pratt, Mary Louise

2008 *Imperial Eyes: Travel Writing and Transculturation*. Second ed. Routledge, London.

Prendergast, Mary E., Jiarong Yuan and Ofer Bar-Yosef

2009 Resource intensification in the Late Upper Paleolithic: a view from southern China. *Journal of Archaeological Science* 36:1027–1037.

Pulleybank, E. G.

1974 Prehistoric East-West Contacts Across Eurasia: Notes and Comment. *Pacific Affairs* 47(4):500-508.

Pumpelly, Raphael (editor)

1905 *Explorations in Turkestan, Expedition of 1903: With an Account of the Basin of Eastern Persia and Sistan*. Carnegie Institution of Washington, Washington, D.C.

1908 *Explorations in Turkestan, Expedition of 1904: Prehistoric civilizations of Anau; origins, growth, and influence of environment*. Carnegie Institution of Washington, Washington, D.C.

P'yankova, L. T.

1982 South-western Tajikistan in the Bronze Age. *Information Bulletin of the International Association for the Study of the Cultures of Central Asia* 1:35-46.

1989 Pottery Complexes of Bronze Age Margiana (Gonur and Togolok 21). *Information Bulletin of the International Association for the Study of the Cultures of Central Asia* 16:27-54.

1993 Pottery of Margiana and Bactria in the Bronze Age. *Information Bulletin of the International Association for the Study of the Cultures of Central Asia* 19:109-127.

1994 Central Asia in the Bronze Age: sedentary and nomadic cultures. *Antiquity* 68(259):355-372.

1996 The Settlement of Karymberdy (IX - VII CC. B.C.) in the South of Tadjikistan. *Information Bulletin of the International Association for the Study of the Cultures of Central Asia* 20:195-210.

2002 South Tajikistan: Synthesis of Settled and Steppe Cultures at the End of the Bronze Age. In *Complex Societies of Central Eurasia from the 3rd to the 1st Millennium BC: Regional Specifics in Light of Global Models*, Journal of Indo-European Studies Monograph Series 46, edited by K. Jones-Bley and D. G. Zdanovich, pp. 558-573. Institute for the Study of Man, Washington, D.C.

Rachkovskaja, K. and O. B. Pereladova

ca. 2014 *Central Asia: Central Turkmenistan stretching into Uzbekistan and Kazakhstan*. World Wildlife Fund, Inc. http://www.worldwildlife.org/ecoregions/pa1312 (Accessed 4 March 2015).

Rancier, Megan

2009 Resurrecting the Nomads: Historical Nostalgia and Modern Nationalism in Contemporary Kazakh Popular Music Videos. *Popular Music and Society* 32(3):387–405.

Rice, Jenna

2014 "Just Rage": Causes of the Rise in Violence in the Eastern Campaigns of Alexander the Great. Masters Thesis, Department of History, University of Missouri-Columbia.

Rogers, J. Daniel

2012 Inner Asian States and Empires: Theories and Synthesis. *Journal of Archaeological Research* 20:205-256.

Rotondaro, Eleonora

2012 Ceramics of Andronovo Culture and Namazga VI from alluvial fun of the Murghab River (Turkmenistan): mineralogical and geochemical characterization. MSc (Conservation and Restoration Science for Cultural Heritage) Thesis, Scuola di Scienze, University of Bologna.

Rouse, Lynne M. and Barbara Cerasetti

2014 Ojakly: A Late Bronze Age mobile pastoralist site in the Murghab Region, Turkmenistan. *Journal of Field Archaeology* 39(1):32-50.

Roux, Valentine and Marie-Agnès Courty

2005 Identifying Social Entities at a Macro-Regional Level: Chalcolithic ceramics of south Levant as a case study. In *Pottery Manufacturing Processes: Reconstitution and Interpretation*, edited by L.-S. A. D. Bosquet and R. Martineau, pp. 201-214. Archaeopress, Oxford.

Rowton, Michael B.

1974 Enclosed Nomadism. *Journal of the Economic and Social History of the Orient* 17(1):1-30.

Rustamov, Anver K. and Ovez Sopyev

1994 Vertebrates in the Red Data Book of Turkmenistan. In *Biogeography and Ecology of Turkmenistan*, Monographiae Biologicae 72, edited by V. Fet and K. I. Atamuradov, pp. 205-230. Kluwer Academic Publishers, Dordrecht.

Rustamov, Eldar A.

1994 Ecological Structure of the Bird Population in the Transcaspian Region: Cartographic Analysis and Problems of Conservation. In *Biogeography and Ecology of Turkmenistan*, Monographiae Biologicae 72, edited by V. Fet and K. I. Atamuradov, pp. 265-280. Kluwer Academic Publishers, Dordrecht.

2014 Turkmenistan: Landscape–Geographical Features, Biodiversity, and Ecosystems. In *The Turkmen Lake Altyn Asyr and Water Resources in Turkmenistan*, The Handbook of Environmental Chemistry 28, edited by I. S. Zonn and A. G. Kostianoy, pp. 9–22. Springer-Verlag, Berlin.

Rustamov, Igor G.

1994 Vegetation of the Deserts of Turkmenistan. In *Biogeography and Ecology of Turkmenistan*, Monographiae Biologicae 72, edited by V. Fet and K. I. Atamuradov, pp. 77-104. Kluwer Academic Publishers, Dordrecht.

Rye, Owen S.

1981 *Pottery Technology: Principles and Reconstruction*. Manuals on Archaeology 4. Taraxacum, Washington, D.C.

Sahedo, Jeff and Russell Zanca (editors)

2007 *Everyday Life in Central Asia: Past and Present*. Indiana University Press, Bloomington, Indiana.

Sahlins, Marshall D.

1968 *Tribesmen*. Prentice-Hall, Englewood Cliffs, New Jersey.

1972 *Stone Age Economies*. Aldine-Atherton, Chicago.

Said, Edward

1978 *Orientalism: Western Representations of the Orient*. Routledge, London.

Saiko, Edie Viktorovna

1982 *Техника и технология керамического производства Средней Азии в историческом развитии [Technique and technology of ceramic production in Central Asia in historical development]*. Nauka, Moscow.

Salnikov, Vladimir B.

1994 Formation of the Fish Population in the Artificial Hydrographic Network of Turkmenistan (the Amudarya River Basin). In *Biogeography and Ecology of Turkmenistan*, Monographiae Biologicae 72, edited by V. Fet and K. I. Atamuradov, pp. 365-387. Kluwer Academic Publishers, Dordrecht.

Salvatori, Sandro

1998 The Bronze Age in Margiana. In *The Archaeological Map of the Murghab Delta, Preliminary Reports 1990-95,* Reports and Memoirs III, edited by A. Gubaev, G. Koshelenko and M. Tosi, pp. 47-55. Istituto Italiano per L'Africa e L'Oriente: Centro Scavi e Richerche Archeologiche, Rome.

2000 Bactria and Margiana Seals: A New Assessment of Their Chronological Position and a Typological Survey. *East and West* 50(1-4):97-145.

2003 Pots and Peoples: The 'Pandora's Jar' of Central Asian Archaeological Research. On Two Recent Books on Gonur Graveyard Excavations. *Rivista di Archeologia* 27:5-20.

2007 About recent excavations at a Bronze Age site in Margiana (Turkmenistan). *Rivista di Archeologia* 31:11-28.

2008a The Margiana Settlement Pattern from the Middle Bronze Age to the Parthian-Sasanian: a Contribution to the Study of Complexity. In *The Bronze Age and Early Iron Age in the Margiana Lowlands: Facts and methodological proposals for a redefinition of the research strategies*, The Archaeological Map of the Murghab Delta Studies and Reports II, edited by S. Salvatori, M. Tosi and B. Cerasetti, pp. 57-74. Archaeopress, Oxford.

2008b Cultural Variability in the Bronze Age Oxus Civilisation and its Relations with the Surrounding Regions of Central Asia and Iran. In *The Bronze Age and Early Iron Age in the Margiana Lowlands: Facts and methodological proposals for a redefinition of the research strategies*, The Archaeological Map of the Murghab Delta Studies and Reports II, edited by S. Salvatori, M. Tosi and B. Cerasetti, pp. 75-98. Archaeopress, Oxford.

2008c A New Cylinder Seal from Ancient Margiana: Cultural exchange and syncretism in a “world wide trade system” at the end of the 3rd millennium BC. In *The Bronze Age*

and Early Iron Age in the Margiana Lowlands: Facts and methodological proposals for a redefinition of the research strategies II, edited by S. Salvatori, M. Tosi and B. Cerasetti, pp. 111-118. Archaeopress, Oxford.

Salvatori, Sandro, Maurizio Tosi and Barbara Cerasetti (editors)

2008 *The Bronze Age and Early Iron Age in the Margiana Lowlands: Facts and methodological proposals for a redefinition of the research strategies*. BAR International Series 1806. The Archaeological Map of the Murghab Delta Studies and Reports II. Archaeopress, Oxford.

Salzman, Philip Carl

1971 Movement and Resource Extraction among Pastoral Nomads: The Case of the Shah NawaziBaluch. *Anthropological Quarterly* 44(3):185-197.

2000 *Black tents of Baluchistan*. Smithsonian Institution Press, Washington, D.C.

2002 Pastoral Nomads: Some General Observations Based on Research in Iran. *Journal of Anthropological Research* 58(2):245-264.

2004 *Pastoralists: equality, hierarchy, and the state*. Westview Press, Boulder.

Sarianidi, Viktor Ivanovich

1965 *Pamyatniki Pozdnevo Eneolita Yujo-vostochnoi Turkmenii*, Part 4. Academia Nauk SSSR, Moscow.

1975 Stepnye plemena epokhi bronzy v Margiane [Steppe Tribes of the Bronze Age in Margiana]. *Sovietskaya Arkheologia* 2:20-29.

1981 Margiana in the Bronze Age. In *The Bronze Age Civilization of Central Asia: Recent Soviet Discoveries*, edited by P. L. Kohl, pp. 165-193. Translated by P. L. Kohl and W. Mandel. M. E. Sharpe, Inc., Armonk.

1984 Southern Turkmenia and Margiane in the Bronze Age. *Information Bulletin of the International Association for the Study of the Cultures of Central Asia* 7:5-16.

1988 Soviet Excavations in Bactria: The Bronze Age. In *Bactria: An Ancient Oasis Civilization from the Sands of Afghanistan*, edited by G. Ligabue and S. Salvatori, pp. 109-123. Erizzo, Venice.

1990 *Древности Страны Маргуш [Antiquities of Margush]*. Ylym, Ashgabad.

1993 Excavations at Southern Gonur. *Iran: Journal of the British Institute of Persian Studies* 31:25-37.

2002 *Margush: Ancient Oriental Kingdom in the Old Delta of the Murghab river*. Türkmendöwlethabarlary, Ashgabat.

2005 Les tombes royales de Gonur-Dépé. *Arcologia* 420:52-59.

2006 *Goňurdepe : şalaryň we hudaýlaryň şäheri = Gonur-Depe: gorod t͡sareĭ i bogov = Gonur-Depe: city of kings and gods*. Miras, Ashgabat.

2007 *Necropolis of Gonur*. Translated by I. Sarianidi. Kapon Editions, Athens.

2008 The Palace–Temple Complex of North Gonur. *Anthropology & Archeology of Eurasia* 47(1):8–35.

Sarianidi, Viktor Ivanovich and Nadezhda. A. Dubova

2012 Археологические работы Маргианской археологической экспедиции в 2008-2011 гг. [Archaeological Excavations of the Margiana Archaeological Expedition during 2008–2011]. In *Труды Маргианской Археологической Экспедиции: Том 4 - Исследования Гонур Депе в 2008 -2011 гг. [Transactions of the Margiana*

Archaeological Expedition: Volume 4 - Gonur Depe Studies in 2008-2011], Труды Маргианской Археологической Экспедиции 4, edited by V. I. Sarianidi, P. M. Kozhin, M. F. Kosarev and N. A. Dubova, pp. 29-55. Staryi Sad, Moscow.

Sarianidi, Viktor Ivanovich and Gabriele Puschnigg

2002 The Fortification and Palace of Northern Gonur. *Iran: Journal of the British Institute of Persian Studies* 40:75-87.

Sataev, R. M.

2008a Животные из раскопок городища Гонур-Депе [Animals from the excavations of the settlement of Gonur Depe]. In *Труды Маргианской Археологической Экспедиции: Том 2 [Transactions of the Margiana Archaeological Expedition: Volume 2]*, Труды Маргианской Археологической Экспедиции 2, edited by V. I. Sarianidi, P. M. Kozhin, M. F. Kosarev and N. A. Dubova, pp. 138-142. Staryi Sad, Moscow.

2008b Животные в хозяйстве и духовной жизни древнего населения Гонур Депе [Animals in the economy and the spiritual life of the ancient population of Gonur Depe]. In *Труды Маргианской Археологической Экспедиции: Том 2 [Transactions of the Margiana Archaeological Expedition: Volume 2]*, Труды Маргианской Археологической Экспедиции 2, edited by V. I. Sarianidi, P. M. Kozhin, M. F. Kosarev and N. A. Dubova, pp. 143-160. Staryi Sad, Moscow.

Sataev, R.M. and L.V. Sataeva

2012a Крупный рогатый скот в хозяйстве древней Маргианы [Cattle in the economy of ancient Margiana]. In *Труды Маргианской Археологической Экспедиции: Том 4 - Исследования Гонур Депе в 2008 -2011 гг. [Transactions of the Margiana Archaeological Expedition: Volume 4 - Gonur Depe Studies in 2008-2011]*, Труды Маргианской Археологической Экспедиции 4, edited by V. I. Sarianidi, P. M. Kozhin, M. F. Kosarev and N. A. Dubova, pp. 154-158. Staryi Sad, Moscow.

2012b Археозоологические и археоботанические исследования на Гонур-Депе в 2010 г. [Archaeozoological and archaeobotanical studies at Gonur Depe in 2010]. In *Труды Маргианской Археологической Экспедиции: Том 4 - Исследования Гонур Депе в 2008 -2011 гг. [Transactions of the Margiana Archaeological Expedition: Volume 4 - Gonur Depe Studies in 2008-2011]*, Труды Маргианской Археологической Экспедиции 4, edited by V. I. Sarianidi, P. M. Kozhin, M. F. Kosarev and N. A. Dubova, pp. 57-62. Staryi Sad, Moscow.

Sawer, Marian

1975 Plekhanov on Russian History: A Marxist Approach to Historical Pluralism. *Science & Society* 39(3):292-317.

Service, Elman R.

1975 *Origins of the State and Civilization: The Process of Cultural Evolution*. W. W. Norton & Company, Inc., New York.

Shcherbak, Nikolai N.

1994 Zoogeographic Analysis of the Reptiles of Turkmenistan. In *Biogeography and Ecology of Turkmenistan*, Monographiae Biologicae 72, edited by V. Fet and K. I. Atamuradov, pp. 307-328. Kluwer Academic Publishers, Dordrecht.

Shelach-Lavi, Gideon

2015 Steppe Land Interactions and their Effects on Chinese Cultures during the Second and Early First Millennia BCE. In *Nomads as Agents of Cultural Change: The Mongols and Their Eurasian Predecessors*, edited by R. Amitai and M. Biran, pp. 10-31. University of Hawai'i Press, Honolulu.

Shirinov, Timur

2000 Contacts Between Central Asia and the Indian Subcontinent in the Second Millennium B.C. In *India and Central Asia (pre-Islamic Period)*, edited by E. V. Rtveladze, pp. 11-12. Embassy of India in Uzbekistan, Tashkent.

Shishlina, Natalia M.

2001 The Seasonal Cycle of Grassland Use in the Caspian Sea Steppe During the Bronze Age: A New Approach to an Old Problem. *European Journal of Archaeology* 4(3):346-366.

Shishlina, Natalia M. and Fredrik T. Hiebert

1998 The Steppe and the Sown: Interactions Between Bronze Age Eurasian Nomads and Agriculturalists. In *The Bronze Age and Early Iron Age Peoples of Eastern Central Asia*, Journal of Indo-European Studies Monographs 26, edited by V. H. Mair, pp. 222-237. Institute for the Study of Man Inc. and The University of Pennsylvania Museum Publications, Washington D.C.

Shul'zhenko, I. F.

1954 *Zhivotnovodstvo Mongol'skoi Narodnoi Respubliki [Pastoralism in the Mongolian People's Republic]*. Trudy Mongol'skoi Komissii 11. Nauka, Moscow.

Singh, Ramadhar and Soo Yan Ho

2000 Attitudes and attraction: A new test of the attraction, repulsion and similarity-dissimilarity asymmetry hypotheses. *British Journal of Social Psychology* 39(2):197-211.

Smith, Jr., John Masson

1978 Turanian Nomadism and Iranian Politics. *Iranian Studies* 11(1/4):57-81.

Smith, Monica L.

2005 Networks, Territories, and the Cartography of Ancient States. *Annals of the Association of American Geographers* 95(4):832–849.

Soucek, Svat

2000 *A History of Inner Asia*. Cambridge University Press, Cambridge.

Spengler III, Robert N.

2014 Niche Dwelling vs. Niche Construction: Landscape Modification in the Bronze and Iron Ages of Central Asia. *Human Ecology*.

Spengler III, Robert N. and George Willcox

2013 Archaeobotanical results from Sarazm, Tajikistan, an Early Bronze Age Settlement on the edge: Agriculture and exchange. *Journal of Environmental Archaeology* 18(3):211-221.

Spengler III, Robert N., Barbara Cerasetti, Margareta Tengberg, Maurizio Cattani and Lynne M. Rouse

2014a Agriculturalists and pastoralists: Bronze Age economy of the Murghab alluvial fan, southern Central Asia. *Journal of Vegetation History and Archaeobotany* 23(6):805-820.

Spengler, R., M. Frachetti, P. Doumani, L. Rouse, B Cerasetti, E. Bullion and A. Mar'yashev

2014b Early agriculture and crop transmission among Bronze Age mobile pastoralists of Central Eurasia. *Proceedings of the Royal Society B* 281(20133382).

Spengler III, Robert N., Michael D. Frachetti and Paula N. Doumani

2014c Late Bronze Age agriculture at Tasbas in the Dzhungar Mountains of eastern Kazakhstan. *Quaternary International* 348:147-157.

Speth, John D. and Katherine A. Spielmann

1983 Energy source, protein metabolism, and hunter-gatherer subsistence strategies. *Journal of Anthropological Archaeology* 2(1):1-31.

Spooner, Brian

1973 *The cultural ecology of pastoral nomads*. Addison Wesley Modules in Anthropology 45. Addison Wesley Publishing Company, Reading, Massachusetts.

Standen, Naomi

1999 (Re)Constructing the Frontiers of Tenth-Century North China. In *Frontiers in Question: Eurasian Borderlands, 700-1700*, Themes in Focus, edited by D. Power and N. Standen, pp. 55-79. St. Martin's Press, Inc., New York.

Stride, Sebastian, Bernardo Rondelli and Simone Mantellini

2009 Canals versus horses: political power in the oasis of Samarkand. *World Archaeology* 41(1):73-87.

Suslov, S. P.

1961 *Physical Geography of Asiatic Russia*. W.H. Freeman, San Francisco.

Szuchman, Jeffrey (editor)

2009 *Nomads, Tribes, and the State in the Ancient Near East: Cross-disciplinary Perspectives*. Oriental Institute Seminars 5. The Oriental Institute of The University of Chicago, Chicago.

Tajfel, Henri

1970 Experiments in Intergroup Discrimination. *Scientific American* 223:96-102.

1982 Social Psychology of Intergroup Relations. *Annual Review of Psychology* 33:1-39.

Tang, Zihua, Dongmei Chen, Xinhua Wu and Guijin Mu

2013 Redistribution of prehistoric Tarim people in response to climate change. *Quaternary International* 308-309:36-41.

Tapper, Richard L.

1991 Golden tent-pegs: settlement and change among nomads in Afghan Turkistan. In *Cultural change and continuity in Central Asia*, edited by S. Akiner, pp. 198-217. Kegan Paul International, London.

Tashbaeva, Kadicha and A. Gritsina (editors)

2005 *Civilizations of Nomadic and Sedentary Peoples of Central Asia*. International Institute of Central Asian Studies, Samarkand.

Teggart, F.

1939 *Rome and China: A study of correlation in historical events*. University of California Press, Berkeley.

Thomas, Jean-Charles , Jean-Robert Grasso, Rémy Bossu, Joseph Martinod and Bakhthiar Nurtaev

2009 Recent deformation in the Turan and South Kazakh platforms, western central Asia, and its relation to Arabia-Asia and India-Asia collisions. *Tectonics* 18(2):201-214.

Tokgaev, Tangiriberdy

1994 Fauna, Zoogeography, and Ecology of Orthoptera in Turkmenistan. In *Biogeography and Ecology of Turkmenistan*, Monographiae Biologicae 72, edited by V. Fet and K. I. Atamuradov, pp. 451-466. Kluwer Academic Publishers, Dordrecht.

Tosi, Maurizio and Barbara Cerasetti

2010 Once upon a time... A Brief Reflection on the History of "The Archaeological Map of the Murghab Delta" (AMMD) Project in Relation to the Fundamental Role of V. I. Sarianidi. In *На пути открытия цивилизации. Сборник статей к 80-летию В.И. Сарианиди. Труды Маргианской Археологической Экспедиции: Том 3 [On the track of uncovering a civilization. A volume in honor of the 80th-anniversary of Victor Sarianidi. Transactions of the Margiana Archaeological Expedition: Vol. 3]*, Труды Маргианской Археологической Экспедици 3, edited by P. M. Kozhin, M. F. Kosarev and N. A. Dubova, pp. 86-103. Aleteia, St. Petersburg.

Trigger, Bruce G.

2006 [1989] *A History of Archaeological Thought*. Cambridge University Press, Cambridge.

Tringham, Ruth

1974 The Concept of "Civilization" in European Archaeology. In *The Rise and Fall of Civlizations: Modern Archaeological Approaches to Ancient Cultures - Selected Readings*, edited by C. C. Lamberg-Karlovsky and J. A. Sabloff, pp. 470-485. Cummings Publishing Company, Menlo Park, California.

Udeumuradov, Berdy N. and Vadim M. Masson

1993 *Алтын-депе и Маргиана: связи, хронология, происхождение [Altyn-Depe and Margiana: connection, chronology, origins]*. Ylym, Ashgabat.

Ur, Jason and Emily Hammer

2009 Pastoral Nomads of the 2nd and 3rd Millennia A.D. on the Upper Tigris River, Turkey: The Hirbemerdon Tepe Survey. *Journal of Field Archaeology* 34(1):37-56.

Vambéry, Arminius

1880 The Turcomans Between the Caspian and Merv. *The Journal of the Anthropological Institute of Great Britain and Ireland* 9:337-344.

Vaughn, Kevin J.

2006 Craft Production, Exchange, and Political Power in the Pre-Incaic Andes. *Journal of Archaeological Research* 14:313-344.

Vincze, Lajos

1980 Peasant Animal Husbandry: A Dialectic Model of Techno-Environmental Integration in Agro-Pastoral Societies. *Ethnology* 19(4):387-403.

Vinogradova, Natalia M.

1993 Interrelation between farming and "steppe" tribes in the Bronze Age south Tadjikistan. In *South Asian Archaeology 1991: Proceedings of the Eleventh International Conference of the Association of South Asian Archaeologists in Western Europe held in Berlin 1-5 July 1991*, edited by A. J. Gail, G. J. R. Mevissen and B. Zehmke, pp. 289-301. Franz Steiner Verlag, Stuttgart.

1994 The Farming Settlement of Kangurttut (South Tadjikistan) in the Late Bronze Age. In *Archaeologische Mitteilungen Aus Iran*, edited by P. Calmeyer, pp. 29-47. Dietrich Reimer, Berlin.

2004 *Yugo-Zapadnyi Tadzhikistan v epokhu pozdnei bronzy [Southwestern Tajikistan in the Late Bronze Age]*. Institut Vostokovedeniya RAN, Moscow.

2008 Late Bronze Age Farming Communities in North-Eastern Bactria (South Tajikistan). In *Intercultural Relations Between South and Southwest Asia: Studies in Commemoration of E.C.L. During Caspers (1934-1996)* BAR International Series, edited by E. Olijdam and R. H. Spoor, pp. 298-315. Archaeopress, Oxford.

Vinogradova, Natalia M. and Elena E. Kuz'mina

1996 Contacts Between the Steppe and Agricultural Tribes of Central Asia in the Bronze Age. *Anthropology & Archeology of Eurasia* 34(4):29-54.

Vinogradova, Natalia M. and Giovanna Lombardo

2002 Farming Sites of the Late Bronze and Early Iron Ages in Southern Tajikistan. *East and West* 52(1-4):71-125.

von den Driesch, Angela

1976 *A Guide to the Measurement of Animal Bones from Archaeological Sites*. Peabody Museum Bulletin 1. Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, Massachusetts.

Walker, Richard Thomas and Morteza Fattahi

2011 A framework of Holocene and Late Pleistocene environmental change in eastern Iran inferred from the dating of periods of alluvial fan abandonment, river terracing, and lake deposition. *Quaternary Science Reviews* 30:1256-1271.

Willcox, George

2002 Evidence for ancient forest cover and deforestation from charcoal analysis of ten archaeological sites on the Euphrates. In *Charcoal Analysis. Methodological Approaches, Palaeoecological Results and Wood Uses*, edited by S. Thiébault, pp. 141-145. BAR Int. Series 1063.

Wink, André

2001 Conclusion. In *Nomads in the Sedentary World*, Routledge-IIAS Asian Studies Series, edited by A. M. Khazanov and A. Wink, pp. 285-295. Routledge, London.

Winkelmann, Sylvia

2005 Deciphering the Intercultural Style? In *South Asian Archaeology 2003: Proceedings of the Seventeenth International Conference of the European Association of South Asian Archaeologists (7-11 July 2003, Bonn)*, edited by U. Franke-Vogt and H.-J. Weisshaar, pp. 185-197. Linden Soft, Aachen.

Woodfin, Warren T., Yuriy Rassamakin and Renata Holod

2010 Foreign Vesture and Nomadic Identity on the Black Sea Littoral in the Early Thirteenth Century: Costume from the Chungul Kurgan. *Ars Orientalis* 38 (Theorizing Cross-Cultural Interaction Among the Ancient and Early Medieval Mediterranean, Near East and Asia):155-186.

Wright, Joshua

2008 Non-graphic Information Systems and Diachronic Transformations in Margiana. In *The Bronze Age and Early Iron Age in the Margiana Lowlands: Facts and*

methodological proposals for a redefinition of the research strategies, The Archaeological Map of the Murghab Delta Studies and Reports II, edited by S. Salvatori, M. Tosi and B. Cerasetti, pp. 47-56. Archaeopress, Oxford.

Yaeger, Jason

2000 The social construction of communities in the Classic Maya countryside: Strategies of affiliation in western Belize. In *The archaeology of communities: A New World perspective*, edited by M. A. Canuto and J. Yaeger, pp. 123-142. Routledge, London.

Young, Ruth, Robin Coningham, Ihsan Ali and Taj Ali

2008 The Archaeological Visibility of Transhumance Tested Using Faunal Material from NWFP, Pakistan. In *South Asian Archaeology 1999: Proceedings of the Fifteenth Inernational Conference of the European Association of South Asian Archaeologists*, J. Gonda Indological Studies, edited by E. M. Raven, pp. 203-210. Egbert Forsten, Groningen.

Zagarell, Allen

1989 Pastoralism and the early state in Greater Mesopotamia. In *Archaeological Thought in America*, edited by C. C. Lamberg-Karlovsky, pp. 280-301. Cambridge University Press, Cambridge.

Zauderer, Jeffrey

1985 The Florescence of Arid Lands in Mesopotamia, Elam, and Central Asia: An Historical Perspective. Paper presented at the Riparian Ecosystems and their Management, University of Arizona, Tucson.

Zeder, Melinda A.

1991 *Feeding Cities: Specialized Animal Economy in the Ancient Near East*. Smithsonian Institution Press, Washington, D.C.

Zhukovsky, Valentin Alekseevich

1894 *Razvalinii starogo Merva [The Ruins of Ancient Merv]* St. Petersburg.

Zonn, Igor S.

2014a Water Resources of Turkmenistan. In *The Turkmen Lake Altyn Asyr and Water Resources in Turkmenistan*, The Handbook of Environmental Chemistry 28, edited by I. S. Zonn and A. G. Kostianoy, pp. 59-68. Springer-Verlag, Berlin.

2014b Karakum Canal: Artificial River in a Desert. In *The Turkmen Lake Altyn Asyr and Water Resources in Turkmenistan*, The Handbook of Environmental Chemistry 28, edited by I. S. Zonn and A. G. Kostianoy, pp. 95-106. Springer-Verlag, Berlin.

Zonn, Igor S. and Paltamet E. Esenov

2014 The Karakum Desert. In *The Turkmen Lake Altyn Asyr and Water Resources in Turkmenistan*, The Handbook of Environmental Chemistry 28, edited by I. S. Zonn and A. G. Kostianoy, pp. 28-37. Springer-Verlag, Berlin.