NEW FRONTIERS IN EAST ASIAN ARCHAEOLOGY: MONGOLIA AND NORTHEAST CHINA

January 10-11, 2025

Catalyst Centre, University of Toronto Scarborough, 1265 Military Trail, Scarborough, Ontario, M1C 1A4, Canada.





SCHEDULE - JANUARY 10TH

9:00 COFFEE & BREAKFAST FOR -10:00 PRESENTERS

(CATALYST CENTRE)

9:45 WELCOME & INTRODUCTION

LISA JANZ, ORGANIZER/FACILITATOR, UTSC

THEME: GSN PROJECT

10:00 KEYNOTE: GSN PROJECT: NEOLITHIC STUDY ON MONGOLIAN GOBI – STEPPE REGION

> DAVAAKHU ODSUREN MONGOLIA STATE UNIVERSITY OF EDUCATION

10:40 DISTRIBUTIONS OF ARCHAEOLOGICAL SITES AFTER THE LAST GLACIAL PERIOD

> BYAMBATSEREN BATDALAI, ARCHAEOLOGICAL RESEARCH CENTER, NATIONAL UNIVERSITY OF MONGOLIA

11:20 INTRA-SITE ANALYSIS OF DWELLINGS IN NEOLITHIC TAMSAGBULAG, MONGOLIA

KATIE MCCARTY, TRENT UNIVERSITY 11:40 RECONSTRUCTING NEOLITHIC SETTLEMENT STRATEGIES AND HUMAN-ENVIRONMENT INTERACTIONS ON THE MONGOLIAN PLATEAU: INSIGHTS FROM GEOARCHAEOLOGICAL ANALYSES AT TAMSAGBULAG

> **ZHE MA,** DURHAM UNIVERSITY

12:00 GSN FILM PROJECT

SANDRA CREIGHTON

12:30 LUNCH BREAK & POSTER PRESENTATIONS - 2:00 (CATALYST CENTRE):

> TOEING THE LINE: GEOMETRIC MORPHOMETRIC ANALYSIS OF NEOLITHIC AUROCHS PHALANXES FROM TAMSAGBULAG, MONGOLIA

CHARLIE LITTLER-KLEIN, UNIVERSITY OF TORONTO

TAMSAGBULAG, MONGOLIA: SITE REPORT MONA NOURI, UNIVERSITY OF TORONTO

SET IN STONE: GROUND STONE TOOLS AND WILD PLANT PROCESSING IN THE NEOLITHIC GOBI DESERT JULIA REIS CORDEIRO, TRENT UNIVERSITY

GENOMIC ANALYSES OF ANCIENT MONGOLIAN BOVINES KELSEY WITT-DILLON, CLEMSON UNIVERSITY THEME: FOODWAYS & LAND-USE THROUGH TIME

2:00 THE NEOLITHIC BIRD HUNTERS OF THE MONGOLIAN GOBI DESERT

ARLENE ROSEN, UNIVERSITY OF TEXAS AT AUSTIN

2:30 THE OASIS GROUND STONE TOOLKIT: UNVEILING HOLOCENE ADAPTATIONS IN THE GOBI DESERT

LAURE DUBREIL, TRENT UNIVERSITY

3:00 A TOAST ACROSS TIME: YANGSHAO PERIOD ALCOHOL PRODUCTION AND CONSUMPTION PRACTICES IN THE MIDDLE YELLOW RIVER VALLEY, CHINA.

CRYSTAL YU, STANFORD UNIVERSITY

3:20 VIBRANT PERIPHERIES: TRACING TRANSFORMATIONS IN FOODWAYS AND MOBILITY IN THE GOBI-STEPPE FROM THE LATE BRONZE AGE THROUGH THE XIONGNU PERIOD OF MONGOLIA

ASA CAMERON, YALE UNIVERSITY

3:50 BIOARCHAEOLOGY OF LATE BRONZE AGE MONGOLIA: METHODOLOGICAL CHALLENGES AND NEW INSIGHTS FROM THE GOBI-STEPPE

DANIELA WOLIN, SKIDMORE COLLEGE

4:10 IN PRAISE OF FLOODPLAINS: NEW INVESTIGATIONS AT KHAIRT SUURYN, A XIONGNU PERIOD (C.250 BC-200 AD) PIT HOUSE SETTLEMENT ALONG THE KHERLEN RIVER IN EASTERN MONGOLIA

CHRISTINA CAROLUS, YALE UNIVERSITY

SCHEDULE - JANUARY 11TH

9:00 COFFEE & SNACKS FOR -10:00 PRESENTERS

(CATALYST CENTRE)

THEME: HUMAN-ANIMAL RELATIONSHIPS

10:00 DEEPER NEOLITHIC ROOTS TO FEASTING IN NORTHERN CHINA

ZHE ZANG, JILIN UNIVERSITY

10:30 IDENTIFYING ANIMAL MANAGEMENT STRATEGIES IN PRE-DOMESTICATION CONTEXTS

LISA JANZ, UNIVERSITY OF TORONTO

11:00 RETRACING FORAGING PATHWAYS AND EQUINE BIOGEOGRAPHY: A ZOOARCHAEOLOGICAL AND ISOTOPIC ANALYSIS OF EQUIDS FROM NEOLITHIC TAMSAGBULAG

MOSES AKOGUN, UNIVERSITY OF TORONTO

11:30 тва

12:00 SEDIMENTARY LIPID BIOMARKERS IN MONGOLIAN ARCHAEOLOGY: GEOARCHAEOLOGICAL DEVELOPMENTS AND CHALLENGES

DON BUTLER, UNIVERSITY OF TORONTO

- 12:30 LUNCH BREAK (CATALYST CENTRE) - 2:00
- 2:30 GEOARCHAEOLOGY & ZOOARCHAEOLOGY LAB TOUR
- **3:00** ZOOARCHAEOLOGY DEMONSTRATION

4:00 PALEOBOTANY DEMONSTRATION



ABSTRACTS

KEYNOTE: GSN PROJECT: NEOLITHIC STUDY ON MONGOLIAN GOBI – STEPPE REGION

DAVAAKHU ODSUREN

MONGOLIA STATE UNIVERSITY OF EDUCATION

Stone tool sites in Mongolia's Gobi were first introduced to the Western world by R.C. Andrews' expedition in the early 20th century. Following this, the Mongol Soviet Historical Cultural joint expedition explored the Bayanzag area and vicinity, discovering several new sites. After the 1970s, researchers focused primarily on discovering early Paleolithic sites, somewhat neglecting Holocene period studies.

Since 2013, the Mongolian-Canadian GSN project has been conducting prehistoric research in Mongolia's Gobi and steppe regions. Over the past 12 years, the project organized 9 field expeditions, conducting excavations at hunter-gatherer sites, including Zaraa Uul, Tamsagbulag in eastern Mongolia, and Salaa Bulag in the southern steppe region.

The Zaraa Uul Holocene campsite dates to the middle and late Neolithic period. It contains cultural layers with stone tools, pottery, and animal remains. The team also discovered and published findings on a wellpreserved Paleolithic site containing numerous animal bones.

Following Zaraa Uul's research, extensive excavations began at the Tamsagbulag settlement in Eastern Mongolia. Tamsagbulag is a notable site preserving the remains of a Neolithic village with numerous semisubterranean dwellings. The team fully excavated four large semisubterranean dwellings, discovering summer dwelling remains,

anthropogenic black soil, and numerous animal remains. Finds included stone tools, pottery fragments, ornaments, and household items made of stone, bone, clay, and antler, as well as animal figurines and human and dog burials, providing insights into religious practices.

A key focus of the GSN project is an archaeological survey. The team has discovered numerous new sites dating from the Paleolithic to Medieval periods across the southern Gobi and steppe regions. Of particular interest are Neolithic hunter-gatherer campsites concentrated around sandy oases, which are planned for broader investigation in coming years.

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DISTRIBUTIONS OF ARCHAEOLOGICAL SITES AFTER THE LAST GLACIAL PERIOD

BYAMBATSEREN BATDALAI,

ARCHAEOLOGICAL RESEARCH CENTER, NATIONAL UNIVERSITY OF MONGOLIA

Mongolia's diverse geographical structure results in varied huntergatherer campsite locations. Based on Holocene climate characteristics, researchers divide it into early (11,500-8,000 BP), middle (8,000-4,000 BP), and late (from 4,000 BP) periods. This periodization aligns with hunter-gatherer campsite characteristics and preserved artifacts. Researcher L. Janz proposed the Oasis 1, 2, and 3 periodization, suggesting areas near open water were active living environments for hunter-gatherers.

Major Oasis 1 campsites were discovered in ancient lake basins of the Arts Bogd range, an extension of the Gobi-Altai mountains. Well-preserved remains including pottery fragments, stone tools, ornamental items, and animal bones are distributed along dried ancient lakeshores. These areas likely featured forest-steppe characteristics with abundant food plants during this period. The climate was most favorable during Oasis 2, with sites yielding various stone tools including adzes, axes, large bifacial arrowheads, and scrapers, along with locally distinctive pottery. Tamsagbulag and Zaraa Uul are the best-studied settlements from this period. During Oasis 3, as the climate became more arid, hunter-gatherers settled near springs. Sites like Salaa Bulag, Shavartin Bulag, Suujiin Bulag, and Jaraakhain Bulag springs represent this period, characterized by microliths and pottery fragments near spring water sources.

INTRA-SITE ANALYSIS OF DWELLINGS IN NEOLITHIC TAMSAGBULAG, MONGOLIA

KATIE MCCARTY,

Originally excavated in the mid 20th century, the Early Neolithic site of Tamsagbulag was first thought to be a cattle rearing agrarian community because of the immense amount of aurochs (wild cattle) remains, as well as ample evidence of pestles and grinders (Derevyanko and Dorj 1992). The most recent research conducted by the joint Mongolian-Canadian Gobi-Steppe Neolithic project, as well as radiocarbon dates taken shows that the site actually predates both agriculture and herding in the region by more than 2000 years (~8500-6500 cal BP), with an unusually high period of intensity use at ~7800-7500 cal BP, (Zhao et al. 2021). These excavations showed a much more intensive level of site use than expected alongside a primary reliance on large game (Janz et al. Nd; Janz et al. 2020), which is noteworthy; while sedentary hunter-gatherers are known, they are often heavily reliant on plant foods and/or small prey such as fish.

While further lines of information (e.g., analysis of faunal and botanical remains) are needed to determine seasonality, an investigation of patterns in artifact distribution can inform our understanding of *relative* length of occupation through a study of accretion and depletion as the relate to habitation, abandonment, and post-abandonment processes presented by LaMotta and Schiffer in 1999. This presentation utilizes spatial analyses to both visualize level-specific patterns in artifact distributions within each excavated dwelling, as well as identifying certain clusters of artifacts that may hold insight into potential trash management traditions. This analysis will then be used to hypothesize site formation processes and build a series of testable models for future investigation of relative occupation intensity.

RECONSTRUCTING NEOLITHIC SETTLEMENT STRATEGIES AND HUMAN-ENVIRONMENT INTERACTIONS ON THE MONGOLIAN PLATEAU: INSIGHTS FROM GEOARCHAEOLOGICAL ANALYSES AT TAMSAGBULAG

ZHE MA, DURHAM UNIVERSITY

Neolithic settlements on the Mongolian Plateau remain poorly understood, particularly in terms of their spatial organization, activity areas, and post-depositional processes. Reconstructing these aspects is challenging, and previous archaeological research has provided limited evidence of the environmental conditions and seasonal patterns of settlement. Excavations conducted at Tamsagbulag in 2021-2022 identified key structural features of pit dwellings, including pit boundaries, postholes, and dark-coloured soil blocks containing burnt wood and bones. However, the functions and formation processes of these features need to be confirmed by further investigations. This paper sampled and analyzed soils and sediments from the on-site settlement and off-site areas at Tamsagbulag to provide more detailed information on site stratigraphy and address interpretive challenges arising from the excavation. Multiple geochemical methods and micromorphological analysis of soil thin sections were employed, which shed light on the original composition of the sediments, as well as the processes of site formation and post-depositional alteration.

Gleysols, calcisols, fluvisols, and chernozem were identified in the profiles of the off-site areas, suggesting a complex and heterogeneous local environment. These findings provide a critical baseline for investigating the establishment and seasonality of Neolithic settlement by enabling comparisons between on-site and off-site soils.

Micromorphology samples taken from pit-dwelling TB12 and TB13 and trench H1 enable the identification and characterisation of the occupation surfaces and activity areas, the maintenance practices, and post-depositional processes. They also provide more detailed information about the identified archaeological features on the field including postholes, dark-coloured deposits, indoor and outdoor deposits from different phases. Geochemical analysis of bulk soil samples from the floor of TB13 helped to investigate anthropogenic impacts on the occupation surface, further clarifying activity areas and the maintenance practices during the Neolithic period.

Keywords: Neolithic settlements, Mongolian Plateau, Site formation processes, Postdepositional processes, Geochemical analysis, Soil micromorphology

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THE NEOLITHIC BIRD HUNTERS OF THE MONGOLIAN GOBI DESERT

ARLENE ROSEN,

UNIVERSITY OF TEXAS AT AUSTIN

Archaeological surveys in the Gobi Desert of Mongolia have begun to reveal new information about the landscape distribution and seasonal movements of mobile populations in this semi-arid steppe environment which preceded the late Holocene adoption of pastoralism. However, until recently we've had little information about their campsites and settlement activities due to the very small number of in situ archaeological remains. This made it difficult to understand the trajectories of subsistence pursuits and social organization preceding the onset of desertification in the late Holocene. The site of Burgasney Enger, located in the Ikh Nart Nature Reserve, Dornogovi Province, Mongolia is unique in the region. Our recent excavations have revealed an organized settlement with hut circles, elaborately constructed ovens, plant phytoliths and abundant bird bones indicating traditions of ecological knowledge at a "persistent place" adjacent to an extinct wetland environment. Semi-sedentary settlement there lasted from ca. 10,000 - 4,000 BP. The information from this site allows us to track adaptations to the increasingly dry environment and address the guestion of continuity and change in ecological traditions and knowledge.

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THE OASIS GROUND STONE TOOLKIT: UNVEILING HOLOCENE ADAPTATIONS IN THE GOBI DESERT

LAURE DUBREIL, TRENT UNIVERSITY

The Gobi Desert is a compelling case study for organizational change among northern hunter-gatherers during the Holocene as long cold winters combine with low vegetative biomass to create distinct adaptive challenges. Our research explores the role ground stone tool (GST) technology played in those adaptive challenges; our specific goals are to unravel the range of activities the Gobi Desert GST testify of and to explore their connection with wetland ecosystems.

Between 13.5 and 3.0 k cal BP, three stages of adaptation to post-LGM environments were proposed (Oasis 1 to 3) based on changes in settlement patterns and tool types. The development of GST technology by at least 8.0 k cal BP is a marker of the Oasis 2 period (Early Neolithic), also characterized by reduced residential mobility and preferential use of wetlands.

Post Oasis 1 GST toolkit comprises two categories of tool both commonly perceived as related to the exploitation of vegetal resources: - the 'hafted percussion tools' (such as axes and adzes), often viewed as specialized tools for wood working; - the 'grounding/pounding' implements (encompassing grinding slabs, handstones, mortars and pestles), often viewed as specialized tools for the processing of plants for consumption. Ethnographic studies however indicate that a variety of matters, not only plants, may be processed with hafted percussion tools and grounding/pounding implements. To what extent does the adoption of these GST during the Oasis 2 period signal changes in plant resources exploitation? How is this new technology related to a more intensive exploitation of wetland habitats?

We discuss here our endeavor to implement a multi-faceted analysis of Gobi Desert GST, integrating traditional ecological knowledge, experimental work, morpho-typological analysis, use-wear and residues approaches. We present an overview of our experimental work and ongoing methodological research regarding the impact of post-depositional processes on use-wear and residues preservation. We also discuss our current understanding of the function of axes and adzes, the set of grinding and pounding implements represented in the Gobi Desert assemblages, and of the connection between GST, the exploitation of plants and wetland resources.

Co-Authors: Julia Cordeiro¹, Angela Evoy² & Lisa Janz³

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A TOAST ACROSS TIME: YANGSHAO PERIOD ALCOHOL PRODUCTION AND CONSUMPTION PRACTICES IN THE MIDDLE YELLOW RIVER VALLEY, CHINA.

CRYSTAL YU, STANFORD UNIVERSITY

This study centers on the changes and continuities in alcohol production and consumption practices during the Yangshao period in the Middle Yellow River Valley region. We processed residue samples collected from pottery sherds from a trench feature at Xipo, a middle to late Yangshao period site occupied around 3600-2900 cal. BC. Combining multiple lines of evidence from starch, phytoliths, and fungi, this study seeks to understand if this type of pottery - the amphorae was used in the production or consumption of fermented alcoholic beverages. Drawing from a previous study that conducted residue analysis on pottery from the Xipo cemetery (ca. 3300-2900 cal. BC), this study investigates evidence of brewing from earlier periods of Xipo's occupation, also probing at the connection between brewing and feasting as the strata where the pottery sherds were collected are contemporaneous with the large houses interpreted as public spaces for feasting activities. Our results could then be compared with data from other Yangshao period sites, potentially shedding light on the development of cereal-based brewing practices in the Middle Yellow River Valley during the Yangshao period.

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VIBRANT PERIPHERIES: TRACING TRANSFORMATIONS IN FOODWAYS AND MOBILITY IN THE GOBI-STEPPE FROM THE LATE BRONZE AGE THROUGH THE XIONGNU PERIOD OF MONGOLIA

ASA CAMERON, YALE UNIVERSITY

From the appearance of monumental traditions in the Late Bronze Age (c.1500-1000 BC) through the emergence of the Xiongnu state (c.250 BC-200 AD), populations of the Gobi-steppe of Mongolia underwent a series of dramatic transitions. These changing dynamics altered how people interacted with and moved within the landscape, transformed subsistence and habitation practices, and spurred the development of inter- and intraregional political complexity. Investigation of shifting mobility patterns and foodways provides concomitant throughlines for these transitions, linking local and regional changes in community-level organization to better understand the position of Gobi-steppe populations in the rise of the first nomadic state in eastern Eurasia. This paper integrates several lines of novel biomolecular evidence (stable and radiogenic isotopes, lipid residue analysis, proteomics) and new zooarchaeological data from the Gobi-steppe of southeastern Mongolia to chart diachronic changes in human and livestock movement and subsistence during the Late Bronze Age, Early Iron Age (c.1000-400 BC), and the Xiongnu Period. These data are discussed in relation to what is currently known about the development of cultural and political complexity in Mongolia, with a specific focus on what regional changes in mobility and foodways can tell us about the transition toward pastoralism and the eventual formation and structure of the broader Xiongnu state.

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BIOARCHAEOLOGY OF LATE BRONZE AGE MONGOLIA: METHODOLOGICAL CHALLENGES AND NEW INSIGHTS FROM THE GOBI-STEPPE

DANIELA WOLIN, SKIDMORE COLLEGE

The prone burial tradition emerged in eastern and central Mongolia during the Late Bronze Age (c. 1500-1000 BCE). As with other monumental burials from the Bronze and Iron Age, most prone burials have been disturbed, resulting in poor preservation and a low recovery rate of human remains from these contexts. In this paper, we will present a critical overview of the bioarchaeological research that has been carried out for prone burials. We will then identify the greatest challenges that scholars face when studying these contexts and assess how these issues have impacted our understanding of life in the Late Bronze Age. Finally, we will use case studies from the Gobi-Steppe region to demonstrate how incomplete and fragmentary remains can still provide important information about diet, health, and mobility. Please note that this presentation will include images of human remains.

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IN PRAISE OF FLOODPLAINS: NEW INVESTIGATIONS AT KHAIRT SUURYN, A XIONGNU PERIOD (C.250 BC-200 AD) PIT HOUSE SETTLEMENT ALONG THE KHERLEN RIVER IN EASTERN MONGOLIA

CHRISTINA CAROLUS, YALE UNIVERSITY

Khairt Suuryn is a subterranean pit house settlement located along a terrace overlooking the Kherlen River floodplain in Dornod Aimag (eastern Mongolia). The site was discovered in 2022 by local residents after a windstorm blew off a layer of sand and exposed several large (roughly 16 m2) dark rectangular features. Our team began a project at Khairt Suuryn in Summer 2024 with a plan to document exposed features, evaluate the scale of the site, and determine its nature and periodization. We began by mapping the exposed contexts with a total station as well as collecting and plotting associated surface artifacts. Our team also employed gradiometry in a portion of the site area to explore additional unexposed features. In the course of these efforts, our team documented 4 pithouses and 6 likely midden deposits along the northeastern edge of the terrace along with an additional 25 possible pit house features spread across the entire 20,000 m2 site area. A small test unit was placed on a well-defined house floor as well as a nearby feature located on what is likely another house floor. These excavations included comprehensive flotation regimens designed to recover small ecofacts in addition to artifacts. Flotation yielded several important finds, including high quantities of broomcorn millet (Panicum miliaceum), large cereal grains (possibly wheat and barley, cf. Triticum aestivum andHordeum vulgare), and the remains of riparian fish (cf. Esox sp.). These test unit samples have also yielded the first documented recovery of foxtail millet macroremains (Setaria italica) known in Mongolia prior to the medieval period. The surface collection of diagnostic ceramics and results from the test unit provide evidence that the occupation at Khairt Suuryn dates to the Xiongnu Period, placing Khairt Suuryn within the exceptionally small known body of Iron Age Mongolian settlement sites that demonstrate evidence of both an agricultural and pastoral economy.

DEEPER NEOLITHIC ROOTS TO FEASTING IN NORTHERN CHINA

ZHE ZANG, JILIN UNIVERSITY

The Houtaomuga site is located at the dam of Lake Xinhuangpao in Da'an County in northeast China. Excavations from 2011 to 2015 revealed occupations ranging from the early Neolithic period to the late Liao Dynasty. This study focuses on a unique feature from the late Neolithic period at the site, the 5500-yearold G2 trench, with its many aurochs, to make a detailed analysis of faunal remains, to reconstruct the depositional process for the G2 trench, and to understanding this Neolithic society and economy better. I present data on the species in the G2 trench at Houtaomuga, animal species and elements distribution, butchering and cooking practices, scavenger damage to the bones, post-depositional weathering patterns, and isotopic analysis. Based on this evidence and the clustering in radiocarbon dates, I argue that the faunal remains in the G2 trench resulted from one or a few episodes of mass procurement of aurochs connected with feasting, followed by one or a few rapid depositional events, and the aurochs might experience the early management from human.

IDENTIFYING ANIMAL MANAGEMENT STARATEGIES IN PRE-DOMESTICATION CONTEXTS

LISA JANZ, UNIVERSITY OF TORONTO

The concept of domestication highlights a form of human intervention in animal reproduction that is at the extreme in a continuum of human-animal relations. Despite the extreme nature of this category of interaction, domestication remains difficult to distinguish archaeologically and biologically. Moreover, there is increasing reason to believe that pre-domestication forms of management would have preceded biologically and archaeologically recognizable forms of domestication by hundreds or likely thousands of years. Such forms of human-animal relations are even more challenging to recognize in the archaeological record. This presentation frames the question of hunter-gatherer herd management within the context of a 7000-8000 year old habitation site in far eastern Mongolia.



RETRACING FORAGING PATHWAYS AND EQUINE BIOGEOGRAPHY: A ZOOARCHAEOLOGICAL AND ISOTOPIC ANALYSIS OF EQUIDS FROM NEOLITHIC TAMSAGBULAG

MOSES AKOGUN, UNIVERSITY OF TORONTO

Tamsagbulag is an Early Neolithic site in eastern Mongolia inhabited by hunter-gatherers around 8500 BP. Upon their arrival at Tamsagbulag, these groups developed and occupied seasonal surface and subsurface dwellings, which continued for at least 2500 years before the site was eventually abandoned. The archaeological record from Tamsagbulag offers profound insights into the development of sedentism and the potential low-level management of aurochs by these sedentary hunter-gatherers. However, while the inhabitants of Tamsagbulag appear to have maintained strong dietary and social connections to aurochs, horses also played a significant role in their subsistence strategy. In this presentation, we provide a preliminary assessment of the identity of the horses hunted at Tamsagbulag by assessing the enamel folding patterns in our archaeological samples and comparing them with those of known equid present in the region during this period. Furthermore, we use carbon, nitrogen, and sulfur isotope analyses to investigate the biogeography of these horses and to understand the foraging strategies of the inhabitants of Tamsagbulag.

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SEDIMENTARY LIPID BIOMARKERS IN MONGOLIAN ARCHAEOLOGY: GEOARCHAEOLOGICAL DEVELOPMNETS AND CHALLENGES

DON BUTLER, UNIVERSITY OF TORONTO

Lipids are a diverse group of hydrophobic biomolecules comprised primarily of hydrocarbon chains or linked carbon rings, including fatty acids, waxes, oils, glycerides, steroids, and stanols. Different types of lipids are produced by plants, animals, and biological processes, making them valuable proxies for a host of human activities, wildlife biogeographies, and environmental conditions. Owing to their insolubility, strong affinity for mineral adsorption, and resistance to microbial decomposition, these compounds tend to be stable in soils and sediments at geological time scales. Their preservation in soils and sediments provide a versatile suite of biomarkers that are opening new pathways in the archaeology of northern paleo-habitat reconfiguration and human-wildlife response, peopling processes, and human-animal coevolution. Our research group is using lipid biomarkers to address questions concerning the evolution of human-livestock relationships in Mongolia. Sedimentary lipid analysis in Mongolian archaeology is gaining ground. Recent ethnoarchaeological research with herding families in eastern Mongolia is showing how the n-alkanes components of leaf waxes extracted from dung rich sediments record seasonal livestock corralling, grazing, and foddering strategies. These types of data are needed to track the development of early pastoralism and livestock domestication. At Airag Lake in western Mongolia, work on branched glycerol dialkyl glycerol tetraethers produced by soil bacteria are providing the temperature reconstructions needed to understand the impacts of climate change on livestock grazing patterns. Livestock fecal stanols have also need used to distinguish settlements and pastures at sites in the Orkhon Valley, central Mongolia. This presentation reviews these advancements and summarizes our geoarchaeological approach to sedimentary fecal stanols and the evolution of human-livestock relationships. Fundamental challenges include protocol development for extraction, separation, characterization, and species differentiation. Increasingly complex challenges include the microcontextualization of stanol deposition, movement, and preservation, calibrating relationships among stanol deposition rates and wildlife/human population levels, and determining whether variation in keystone species' stanol archives are viable proxies for local habitat reconfiguration.

POSTER ABSTRACTS

TOEING THE LINE: GEOMETRIC MORPHOMETRIC ANALYSIS OF NEOLITHIC AUROCHS PHALANXES FROM TAMSAGBULAG, MONGOLIA

CHARLIE LITTLER-KLEIN, UNIVERSITY OF TORONTO

Cattle domestication is well understood in Europe and the Near East, however the same cannot be said for East Asia. While cattle were long thought to have been introduced from Western Eurasia, increasing evidence suggests that the management of indigenous aurochs predated this introduction (Brunson et al. Nd; Zhao et al. 2021). Theoretical approaches to domestication now recognize it as a multilocal process involving multiple independent domestication episodes and introgression from local wild and managed herds (Brunson et al. Nd; Zeder 2015). Genetic evidence points to the likelihood of several domestication episodes in Europe, with frequent interbreeding between wild and domestic cattle (Cubric-Curik et al. 2022), and there may have been similar processes occurring in Mongolia, with the site of Tamsagbulag as a potential "ground-zero" (Brunson et al. Nd). Geometric Morphometrics (GMM) provides an opportunity to better understand morphological changes associated with the domestication processes. A GMM analysis of the first and second phalanxes from Neolithic settlements at Tamsagbulag revealed that the Tamsagbulag aurochs are a morphologically distinct group. Difference in phalanx morphology observed between species appear to be the result of the differential locomotive demands imposed by a species' natural habitat. GMM enables us to better understand domestication processes in historically understudied regions like Mongolia.

TAMSAGBULAG, MONGOLIA: SITE REPORT

MONA NOURI, UNIVERSITY OF TORONTO

Tamsagbulag is a Neolithic site in Mongolia that was occupied by sedentary hunter-gatherers eight to seven thousand years ago. Investigating this site is important as it gives a sense of the prehistory of East Asia, specifically the transition from mobile hunting and gathering to sedentism in northern climates, and the timing of this transition. This study uses flotation samples collected from the Tamsagbulag site to quantify and compare the lithic, ceramic, bone (fish and none-fish) content across samples/units. Our results show that there are vast differences in the content of samples from each unit, with few having high amounts of fish bone.

SET IN STONE: GROUND STONE TOOLS AND WILD PLANT PROCESSING IN THE NEOLITHIC GOBI DESERT

JULIA REIS CORDEIRO, TRENT UNIVERSITY

Knowledge regarding plant use by ancient hunter-gatherers of the Gobi Desert is incipient, as organic remains are rarely preserved in the context. The most reliable evidence of plant use is the adoption of Ground Stone Tool (GST) technology, around 8.0k cal yr BP. Through use-wear and residue analysis, the present research analyzed GSTs from the Gobi Desert collected in the 1920s by the Central Asiatic Expeditions of the American Museum of Natural History (NY). The tools show evidence of grinding underground storage organs, legumes, and cereals; the results of the analysis suggest the adoption of a broad-spectrum foraging strategy during a period of increased environmental moisture and higher vegetative biomass. Widespread adoption of GST technology is one of the distinct features of the Neolithization process in several parts of the world, often associated with the emergence of agriculture and sedentism. The Gobi Desert, however, follows an alternative trajectory, in which economies based on hunting and gathering persisted until a shift to nomadic pastoralism during the Bronze Age. The region, therefore, serves as an example of the complexity of Neolithization and may encourage further debate on these concepts - including their advantages, limitations, and broader implications for interpreting archaeological evidence from this period globally.

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GENOMIC ANALYSES OF ANCIENT MONGOLIAN BOVINES

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Domesticated cattle were introduced to Mongolia over 5000 years ago, but evidence suggests that humans may have interacted with wild aurochs prior to the introduction of cattle. We sequenced low coverage genomes from Mongolia from before and after the introduction of domesticated cattle. We compared these genomes to published ancient and modern cattle genomes to assess how aurochs and cattle in Mongolia changed over time. Our preliminary work suggests that ancient Mongolian aurochs are genetically very similar to aurochs populations from all over Eurasia, and to ancient Chinese cattle. Gene flow occurred between domesticated cattle and Mongolian aurochs, suggesting that humans were interbreeding the two populations. Interestingly, we see no evidence of ancestry from Mongolian aurochs in modern cattle populations. Future analyses will further clarify the history of cattle and aurochs, and their interactions with humans, in Mongolia.

1st Occasional Gobi-Steppe Neolithic Conference

The goal of this international conference is to introduce new ongoing archaeological research in Mongolia and northern China and celebrate more than a decade of research in Mongolia by the GSN project.

Presentations will focus on foodways, land-use, and human-animal relationships during the Neolithic, Bronze, and Iron Ages. It will be a special opportunity to network with international scholars working in East Asian archaeology and learn about recent findings and research directions in Northeast Asia with an emphasis on the Neolithic.



