



8<sup>th</sup> McDonnell Academy International Symposium  
Washington University in St Louis

November 7<sup>th</sup>, 2020

7:00am Central Standard Time, 10:00pm Japan Standard Time, 1:00pm Greenwich Mean Time

**The Origin of Eurasian Foodways and Cuisines:  
Environmental challenges and culinary solutions to food globalization in  
prehistory**

Organized by:

**Dr Xinyi Liu**, Associate Professor of Archaeology, Washington University in St Louis

**Dr Petra Vaiglova**, Postdoctoral Research Associate, Washington University in St Louis

Between 5000 and 1500 cal. BC, the Eurasian and African landmass underwent a continental-scale process of food ‘globalization’ of staple crops. During this process, the so-called ‘Fertile Crescent Founder Crops’, notably wheat and barley, moved from their origin of domestication in western Asia to ancient Europe, India and China, while broomcorn and foxtail millet moved in the opposite direction: from East Asia to West Asia, Caucasus and Europe. Rice traveled across East, South and Southeast Asia; African millets and sorghum moved across sub-Saharan Africa and subsequently the Indian Ocean. By 1,500 cal. BC, the process brought together previously isolated agricultural zones to form a new kind of farming system that enabled multi-cropping. This fundamentally transformed Eurasian diets and cuisines. Understanding the prehistoric roots of Eurasian foodways and cuisines provides perspectives that can not only transform our knowledge of the human past but also raise awareness of present-day and future challenges of food security. In this workshop, we consider the environmental and social drivers of the trans-Eurasian exchange of cereal crops with geographic focus on both sides of Asia: Anatolia and the Yellow River region. We emphasize the role played by the primary agent of agricultural production - the ordinary farmers in the past.

**Location: Zoom meeting room**

<https://wustl.zoom.us/j/99030675239?pwd=K1ZmMFRHeGkvZCtoYXk4QlJEa2lWZz09>

Meeting ID: 990 3067 5239

Passcode: 764786

If you experience problems joining the room, please email or text Petra Vaiglova at [petra.vaiglova@wustl.edu](mailto:petra.vaiglova@wustl.edu), +1 (860) 634-0676.

## Symposium Schedule

<b>Time</b>	<b>Speaker</b>	<b>Title of talk</b>
7:00am CST 1:00pm GMT 10:00pm JST	<b>Michael Spate</b> <i>University of Sydney, Australia</i>	Holocene climate change, seasonality and agriculture in the Kashmir Valley
7:20am CST 1:20pm GMT 10:20pm JST	<b>Shinya Shoda</b> <i>Nara National Research Institute for Cultural Properties, Japan</i>	Prehistoric Pottery and Beyond: Biomarker and Isomeric Identification of Crop Consumption Across Eurasia
7:40am CST 1:40pm GMT 10:40pm JST	<b>Giedre Motuzaitė Matuzevičiūtė</b> <i>Vilnius University, Lithuania</i>	Measuring variability in barley morphotypes as a tool in understanding climatic and social change
8:00am CST 2:00pm GMT 11:00pm JST	<b>Elina Ananyevskaya</b> <i>Vilnius University, Lithuania</i>	The effect of animal herding practices on the diversity of human stable isotope values in North Central Asia
8:20am CST 2:20pm GMT 11:20pm JST	<b>Dragana Filipović</b> <i>Kiel University, Germany</i>	The ‘millet effect’: investigating social and environmental consequences of the spread of millet in Europe
8:40am CST 2:40pm GMT 11:40pm JST	<b>Martin Jones</b> <i>University of Cambridge, UK</i>	Spice routes and grain routes
9:00am CST 3:00pm GMT 12:00am JST	<b>Harriet Hunt</b> <i>University of Cambridge, UK</i>	Spread of broomcorn millet and its culinary context: linking evidence from archaeogenetics and material culture
9:20am CST 3:20pm GMT 12:20am JST	<b>Amy Bogaard</b> <i>University of Oxford, UK</i>	Lost and found: the ‘new type’ glume wheat in central Anatolia and beyond
9:40am CST 3:40pm GMT 12:40am JST	<b>Rachel Reid</b> <i>Virginia Tech, the US</i>	Culinary traditions likely impacted the reception of new staple crops in prehistoric China
10:00am CST 4:00pm GMT 1:00am JST	<b>Michael Frachetti</b> <i>Washington University in St Louis</i>	Thinking about Eurasian Pastoralism, before and after the “Inner Asian Mountain Corridor”
10:20am CST 4:20pm GMT 1:20am JST	<b>Petra Vaiglova</b> <i>Washington University in St Louis</i>	New insight into dietary transformations in the Hexi corridor, northwestern China
10:40am CST 4:40pm GMT 1:40am JST	<b>Xinyi Liu</b> <i>Washington University in St Louis</i>	The wind that shakes the barley: Grain size and plastic responses to eastern environments and cooking
11:00-11:45am CST 5:00-5:45pm GMT 2:00am JST	<b>General Discussion</b>	

## Abstracts

### **Holocene climate change, seasonality and agriculture in the Kashmir Valley**

**Michael Spate**, Mumtaz Yattoo

*University of Sydney, Australia*

7:00am CST, 1:00pm GMT, 10:00pm JST

The development of agriculture in the Kashmir Valley in the Western Himalayas was previously understood to have been based on the adoption of West Asian cereal and pulse crops during a prolonged Neolithic period between ca. 5000-3000 BP. This was thought to have been then followed by the adoption of East Asian rice and millets during the early historic period ca. 2000BP, leading to a present day agricultural system dominated by summer season cultivation. These past stages were described as driven by two warm-humid climate events ca. 5000 and 2000BP. More recent archaeological fieldwork has indicated the presence of wheat, barley, lentils and broomcorn millet all directly dated to ca. 4500BP, while new palaeoclimate data have called into question the timing of warm-humid events in the valley. This presentation synthesises the currently available archaeological and climate records for the Kashmir Valley and considers the long-term development of food production in the valley and the influence of these on the cultural heritage of Kashmir today. The archaeobotanical record is also contextualised in relation to networks of exchange and interaction between agro-pastoralist societies in neighbouring regions of South and Central Asia.

### **Prehistoric Pottery and Beyond: Biomarker and Isomeric Identification of Crop Consumption Across Eurasia**

**Shinya Shoda**, Natsuki Murakami, Oliver Craig, Joon-ho Son, Giedre Motuzaitė Matuzeviciute

*Nara National Research Institute for Cultural Properties, Japan*

7:20am CST, 1:20pm GMT, 10:20pm JST

To better understand the dynamics of prehistoric crop consumption throughout the Eurasian continent this paper examines cooking remains from several sites in South Korea, Kazakhstan and Lithuania. Following its first detection with GC-MS – by this author in 2016 – miliacin, a biomarker of broomcorn millet, has been successfully identified from the foodcrust and matrices of potsherds, as well as amorphous charred remains across different geographical areas and time periods. GC-MS was also used to detect phytosterols and evaluate the isomeric distribution of thermally metamorphosed compounds originating from plants. To support the interpretation, EA-IRMS and GC-c-IRMS were used to examine the possible contribution from C4 plants, such as millet.

## **Measuring variability in barley morphotypes as a tool in understanding climatic and social change**

**Giedre Motuzaite Matuzeviciute**, Robert Spengler, Basira Mir Mahamad

*Vilnius University, Lithuania*

7:40am CST, 1:40pm GMT, 10:40pm JST

The farmers that settled in the valleys of Central Tien Shan region acted as key mediators for the crop transmission between China and Central Asia, therefore by understanding crop package and crop morphotypical selection might lead to understanding much wider processes of crop distribution across Eurasia. This presentation provides the largest database of barley caryopses measurements for Central Asia that are coming from two different periods within Chap site dated to ca 3500 BC (Bronze Age) and 1000 BC (Early Iron Age). The Chap archaeological site is located in the Tien Shan mountains of Kyrgyzstan in 2000 masl.

By comparing Chap's and adjacent regions' barleys between chronologically different periods, mainly Bronze Age assemblages with the Early Iron Age assemblage, a distinct increase in barley caryopses can be observed. Here we discuss several reasons for the change in barley caryopses dimensions and how it could be an indication of much wider social and climatic processes.

## **The effect of animal herding practices on the diversity of human stable isotope values in North Central Asia**

**Elina Ananyevskaya**, Giedre Motuzaite Matuzeviciute

*Vilnius University, Lithuania*

8:00am CST, 2:00pm GMT, 11:00pm JST

Human isotopic values from North Central Asia vary not only chronologically, but also spatially, which likely points to the exploitation of different resources for the subsistence. We argue that observed differences in the human isotopic ratios across North Central Asia are directly related to the animal herding strategies, which in turn were influenced by the local environment and landscape features. We present a collation of both new and previously published carbon and nitrogen isotopic values measured on human bone collagen dating from the Bronze Age to Medieval period Northern Central Asia. These data have allowed modeling human dietary variations in different ecotones and chronological periods of North Central Asia. Analysis of isotopic values of various domestic herbivore species demonstrated that horses, cattle, and sheep/goats in North Central Asia tend to exhibit different isotopic signatures. The strong regional variations, particularly evident in  $\delta^{13}\text{C}$  values across North Central Asia from Bronze to Middle Ages, might not only reflect the scale of  $\text{C}_4$  crop consumption by humans, but also be related to the differences in the exploited herding strategies, such as the focus on cattle, horses or caprines husbandry as well as vertical transhumance pastoralism.

## **The ‘millet effect’: investigating social and environmental consequences of the spread of millet in Europe**

Dragana Filipović

*Kiel University, Germany*

8:20am CST, 2:20pm GMT, 11:20pm JST

Translocation of crops has long been seen as a vector of food globalization, and the spread of broomcorn millet is a testament to this process. A series of questions have been and can be posed about the social and environmental circumstances and consequences of such a process. That the spread of broomcorn millet in Europe has now been pinned to the mid-2nd millennium BC instructs us to look at this particular period when searching for answers to the questions about the ‘effect’ of the early cultivation of millet here. This paper presents several cases in different parts of Europe where such effect may be visible in the palaeoenvironmental or archaeological record. The cases include studies conducted at different levels – from site-based to macro-regional – in eastern Europe, the Carpathian Basin and the south-western Baltic coast. Correlations are drawn between certain trends observed in the socio-economy and environment that may have resulted from, or have been influenced by, the start of millet cultivation in these regions. Establishing causal links, however, between the roughly synchronous developments remains a challenge. Select examples from recent and modern history help infer possible cause-and-effect relationships.

## **Spice routes and grain routes**

**Martin Jones**

*University of Cambridge, UK*

8:40am CST, 2:40pm GMT, 11:40pm JST

If we look back at food globalisation through the lens of the early historic/mediaeval spice trade, the earlier episode is striking for its emphasis upon starchy staple grains. The higher value spices, herbs and medicinal/ narcotic plants were better suited in the later episode to the forefront of cross-continental exchange, than their bulky starchy counterparts. However, such a pattern is not evident in the earlier episode.

Is this just a question of the formation of the archaeological record? Are those more easily conveyed, higher value plant resources part of the globalization process but escaping capture in the archaeobotanical record? Or is the prehistoric episode truly primarily about calorific potential staples?

One way of approaching that is to look through the lens another historic episode in which starchy staples once again moved, the post-15<sup>th</sup> century Columbian Exchange which, amongst other things, brought wheat to America, maize to Africa and potatoes to Europe.

In this brief talk, I shall look through those later lenses to reflect upon what forces might be at work during food globalization in prehistory.

## **Spread of broomcorn millet and its culinary context: linking evidence from archaeogenetics and material culture**

**Harriet Hunt**

*University of Cambridge, UK*

9:00am CST, 3:00pm GMT, 12:00am JST

Cultivated broomcorn millet had a significant role in the diet of north China from at least 6000 BC. Its trajectory from a wild ancestral form to domesticated crop remains unclear, but the genetic origins of cultivated populations lie in the western Loess Plateau. By 2000 BC, broomcorn millet became established as a staple cereal across central-eastern north China. Today in this region, some millet varieties have non-glutinous grain, while other varieties have glutinous grain on cooking, a trait which is under simple genetic control. The antiquity of the glutinous form is unknown, but it plausibly appeared and was selected for early in the crop's history. Glutinous varieties increase in prevalence towards northeastern China, and reach their highest frequency in Korea and Japan.

From 2000 BC onwards, millet expanded its range to China's northwest along the Hexi corridor, reaching Xinjiang, where it was grown the southwest Asian cereals. Modern millet varieties in northwest China are all non-glutinous, supporting the concept of a 'westernmost boundary' for glutinous forms that has also been charted in rice in southwest China, and has been suggested to approximate the limit of the summer monsoon. Ancient DNA analysis of desiccated millet from cemetery sites in Xinjiang, dated between 1700 BC – 700 AD, did not find any glutinous forms in this region in the past either.

Cooking technologies and traditions may explain the differential selection on grain quality in northeast and northwest China. We hypothesize that steaming technologies would have favoured the choice of glutinous varieties that give a delicate, cohesive cooked product. We explore the geographical distribution of ceramic and bronze cooking vessels from the Neolithic and Bronze Age onward, to determine whether a material culture boundary mirrored that of glutinous grain types.

## **Lost and found: the 'new type' glume wheat in central Anatolia and beyond**

**Amy Bogaard**

*University of Oxford, UK*

9:20am CST, 3:20pm GMT, 12:20am JST

Recent archaeobotanical and genetic work suggests that the 'new glume wheat' (NGW) emerged as a distinctive glume wheat crop in PPN-PN Anatolia and belonged to the *Triticum timopheevii* group. Archaeobotanical work over the last 20 years has established that NGW spread with einkorn and emmer to Europe, often appearing as part of a glume wheat mixture, especially with einkorn. NGW also appears along with einkorn at Jeitun. I argue that the emerging picture of NGW highlights two particular opportunities for understanding of East-West food globalisation in prehistory. First, our increasing ability to recognise subtle morphological and genetic variation will tend to diversify the 'taxa' traditionally traced in these accounts. Secondly, a focus on the spread of taxa can be reframed as the mobile evolution of agricultural niches, as practices shifted in response to new settings.

## **Culinary traditions likely impacted the reception of new staple crops in prehistoric China**

**Rachel Reid, Xinyi Liu**

*Virginia Tech, the US*

9:40am CST, 3:40pm GMT, 12:40am JST

Isotopic analysis of archaeological skeletons has been extensively applied in China in the past decades, with more than 50 publications featuring isotopic results from >2,000 human skeletal remains. We synthesized these data to investigate the historic geography of staple cuisines between 6000 BC and 202 AD. Between 6000-5000 cal BC we found evidence for an already distinct north versus south divide in the use of main crop staples (namely millet vs. a broad spectrum of C<sub>3</sub> plant based diet including rice). This divide became more pronounced between 5000-2000 cal BC. We infer that this pattern can be understood as a difference in the spectrum of subsistence activities employed in the Loess Plateau and the Yangtze-Huai regions, which are partly explained by differences in environmental conditions. The introduction of wheat and barley from southwestern Asia after 2000 cal BC resulted in the development of an additional east to west gradient in the degree of incorporation of different staple products into human diets. We found that wheat and barley were rapidly adopted as staple foods in the Continental Interior but very gradually adopted in the Loess Plateau. Although environmental and social factors certainly played a role in their reception, we argue that local cooking practices did as well. Wheat and barley may have been more readily folded into grinding-and-baking cooking traditions than into steaming-and-boiling traditions. Changes in these culinary practices may have begun in the female sector of society.

## **Thinking about Eurasian Pastoralism, before and after the “Inner Asian Mountain Corridor”**

**Michael Frachetti**

*Washington University in St Louis*

10:00am CST, 4:00pm GMT, 1:00am JST

The archaeology of prehistoric pastoralism in Eurasia has seen a fundamental pivot in the last 10 years, spurred by foundational research and progress in radiocarbon dating, Paleoethnobotany, dietary isotopic analysis, and other related scientific methods. The fundamental question for all these studies is how people structured their domestic economy and diet, their productive relationship with plants and animals, their fundamental practices of mobility and interaction, and the essence of their worldview and self identity. The proposed systemics underlying the “Inner Asian Mountain Corridor” or IAMC have reframed our understanding of the connections and interactions that helped to move these practices north/south and east/west across the Eurasian continent, especially in the Bronze Age. This presentation returns to the fundamental mechanism proposed for the IAMC, and examines their relevance for time before and after the essential Bronze Age uptick in transmission, with the goal of better contextualizing that time period, but also to set out key questions for the next decade of research in Eurasia.

## **New insight into dietary transformations in the Hexi corridor, northwestern China**

**Petra Vaiglova, Xinyi Liu**

*Washington University in St Louis*

10:20am CST, 4:20pm GMT, 1:20am JST

The Hexi corridor in northwestern China provided a passageway for the spread of southwestern Asian domesticates into central China. In addition to enabling the spread of crops and animals, the region experienced a dietary transformation which did not mirror the transformations that took place in the Loess Plateau of central China. The connective region of the Hexi corridor hosts a climatically varied landscape, with drier lowland areas in the northwest and wetter regions at higher altitude in the southeast. It thus provides a unique setting to investigate the mechanisms of adoption of the southwestern crops and animals in distinct microclimates. In this paper, we present the stable isotopic ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ) values of humans, animals, and a small number of plants from sites in the eastern and western parts of the Gansu province in the Hexi corridor to explore what role animal products played in the local culinary traditions. The results shed light on how communities in the contrasting climatic zones within the region developed distinct approaches for managing the ‘exotic’ animals.

## **The wind that shakes the barley: Grain size and plastic responses to eastern environments and cooking**

**Xinyi Liu**

*Washington University in St Louis*

10:40am CST, 4:40pm GMT, 1:40am JST

Between 5000 and 1500 cal. BC, the Eurasian and African landmass underpinned a continental-scale process of ‘globalisation’ of food and food-ways. By 1500 cal. BC, the trans-Eurasian exchange of cereal crops, brought together previously isolated agricultural systems to form a new kind of network. While the routes and chronologies of the dispersals of grain cultivations are much debated, recent discussion has moved beyond these topics to consider the context in which agricultural innovation occurred. It would seem that the reaction of an existing culinary and social system to novel crops are key drivers to their transportation, adoption and adaptation. One such feedback mechanism could be understood in the context of a deep-seated divide between Eastern and Western cooking preferences. Early communities in East and West Asia were characterized by a difference in food preparation technologies: boiling and steaming in the East, and grinding and baking in the West. In the context of the eastern dispersal of wheat and barley, isotopic data show a very gradual pace of adoption of these grains as a staple food in central-eastern China, contra to a rapid reception of these western cereals in human diets in the continental interior. The initial neglect and rejection of wheat and barley as staple grains may be connected with their incompatibility with the local cuisines in eastern-central China, which preferred compact grains and prioritizing starch quality. It has demonstrated, archaeobotanically, that wheat’s introduction to China may have involved selection for phenotypic traits adapted to the eastern boiling-and-steaming tradition. In this paper, we consider the eastern barley grains and their morphological variations. The observed patterns reveal plastic responses to novel environments and culinary traditions in Central, South and East Asia, and raise the question if the dispersal of grains were necessarily accompanied by the intrinsic cooking techniques.