

Caballero Ochoa, Andrea Alejandra [225] see López Luján, Leonardo

Cabello, Gloria [216] see Ballester, Benjamín

Cabrera, Oralia [13] see Carballo, Jennifer

Cabrero, Teresa (Shaft Tomb)

[23] *La piedra verde como motivo de la colonización del Cañón De Bolaños en el Occidente de México*

Uno de los factores más importantes para la colonización del cañón de Bolaños fue la necesidad de establecer contacto de tipo comercial con el área de Chalchihuites donde se explotaba la codiciada piedra verde o malaquita. Lograron su objetivo a través del establecimiento y control de una ruta comercial que atravesaba la región de Bolaños; la adquisición y redistribución de la malaquita primero; y la turquesa después, por todo el occidente de México fue el eje rector de su economía. La turquesa cuyos yacimientos se encuentran en Nuevo México, la adquirían mediante el contacto con los integrantes de las caravanas de comerciantes provenientes del Centro de México a través de la ruta comercial del interior.

Cagnato, Clarissa (University Paris 1-Panthéon Sorbonne), Olivia Navarro-Farr (College of Wooster), Griselda Pérez Robles (Proyecto Regional Arqueológico El Perú-Waka'), Juan Carlos Pérez Calderón (Proyecto Regional Arqueológico El Perú-Waka') and Damaris Menéndez (Proyecto Regional Arqueológico El Perú-Waka')

[174] *Feeding the Mountain: Plant Remains from Ritual Contexts on and around Structure M13-1 at El Perú-Waka'*

Structure M13-1, a major civic-ceremonial building at the center of the Classic Maya city El Perú-Waka' in northwestern Petén, Guatemala, held special significance to its citizenry. While it was likely ritually significant since the Early Classic period, evidence indicates it was the focus of sustained and repeated ceremonial acts of likely varying scales, accoutrement, and practitioners throughout the Late and Terminal Classic periods (circa AD 600-900). In this paper, we explore data from recent paleoethnobotanical analyses pertaining to numerous archaeologically documented contexts revealing that plant remains were among the offerings in various of these ritualized contexts. The contexts in question date to the Late Classic period and include a subterranean chamber, a fire shrine, and the tomb of the Late Classic Queen Lady K'abel. Even after El Perú-Waka's royal court declined in the early ninth century AD, Wakeños continued to ritually engage Structure M13-1, blanketing the structure in a variety of offerings ranging from gargantuan stela fragments to now nearly imperceptible plant remains. Paleoethnobotanical evidence, in conjunction with other archaeological data, provides key information regarding ancient ritual practices in the Maya region, in this case shedding light on how the Maya metaphorically fed this particular structure.

Cagnato, Clarissa [274] see Lamoureux St-Hilaire, Maxime

Cai, Dawei (Research Center for Chinese Frontier Archaeology), Quanjia Chen (Research Center for Chinese Frontier Archaeology), Hui Zhou (Research Center for Chinese Frontier Archaeology) and Dongya Yang (JLU-SFU Joint Laboratory for Bioarchaeological Res)

[116] *Ancient DNA Analysis of Early Neolithic Cattle from Houtaomuga site, Northern China*

The Houtaomuga site is located on the east bank of Xinhuangpao Lake, in Da'an County, Jilin Province, Northeast China. According to the archaeological excavations, the Houtaomuga site can be divided into seven phases from the early Neolithic to the Late Bronze Age (8000-2050 BP). Although many Bos skeletal remains were found in the phases Houtaomuga III (6300-5500 cal. BP) and Houtaomuga IV (5000 cal. BP), it was very difficult to identify to the species level. In this study, ancient DNA analysis of Bos remains was utilized. Our results showed that most Bos specimens belong to mtDNA Haplogroup C of wild Bos primigenius which was never domesticated in China. Only one sample from phase IV belongs to Haplogroup T3 of domestic cattle that originated in the Near East. Our research provides new insight into the origin of Chinese cattle.

Cain, Tiffany (University of Pennsylvania)

[280] *Formative Experiences: Everyday Life and Political Violence in Yucatán, 1847-1866*

How can we study political violence in the archaeological record? How does it impact civilian spaces and how can we rethink its consequences for everyday life? This paper argues for the interpretive value of civilian landscapes for the study of violent conflict. The tendency to treat political violence as an event (e.g., the Caste War of Yucatán) in archaeology, rather than a prolonged sociopolitical episode or process, impoverishes our archaeological theorization of violence: violence is forced to enter a sphere of exceptionalism, positioned outside of the "everyday." Yet, such violence is not confined to the battlefield or other archetypal conflict spaces. It enters into the domestic sphere and assaults civilian population centers. Here, I present the preliminary findings of an archaeological study of the postconflict landscapes of Quintana Roo, Mexico. I focus specifically on evidence likely representative of the early years of the Caste War or Maya Social War (1847-1901). I show that when we reconsider the common material proxies of war—fortification and abandonment—in a way that recenters ordinary people, we position ourselves to understand not only the mechanics of war but the transformative effect of political violence on people's lives and the landscape.

[280] *Chair*

Cajigas, Rachel (University of Arizona)

[110] *Discussant*

Çakırlar, Canan [27] see Marston, John

Caldwell, Megan (University of Alberta), Dana Lepofsky (Simon Fraser University) and Robert Losey (University of Alberta)

[380] *Ecological, Archaeological, and Social Perspectives of Northern Coast Salish Marine Resource Management Systems*

Coastal peoples around the world have complex systems of marine management that are situated within and influenced by a myriad of social and ecological actions and contexts. On the Northwest Coast of North America, as elsewhere, understanding the physical and non-tangible aspects of these systems requires using diverse kinds of knowledge and data. In this presentation, we bring together traditional ecological knowledge of Tla'amin First Nation elders with archaeological data to understand the marine resource management systems of the Northern Coast Salish of southern British Columbia. Our archaeological data include fish and shellfish remains from middens, and the spatial distribution and forms of associated intertidal stone and wood features. By analyzing the archaeological evidence through a series of nested spatial scales, and combining these analyses with Tla'amin knowledge of marine ecosystems, we show how ancient systems of management ensured equal access to and sustained use of a suite of marine resources throughout the late Holocene.

Calfas, George [124] see Fay, Kathryn

Cali, Plácido [292] see Sallum, Marianne

Callaghan, Michael (University of Central Florida), Daniel Pierce (University of Missouri) and William Gilstrap (University of Missouri)
[9] *Integrated Compositional Analysis of Lowland Maya Middle Preclassic Pottery at Holtun, Guatemala*

The archaeological site of Holtun is an intermediate sized Maya civic-ceremonial center with documented occupation from the Middle Preclassic through Terminal Classic periods (800 BC–AD 900) featuring well-preserved cultural deposits in multiple contexts. Previously, NAA was conducted on an assemblage from the Middle Preclassic ceramics in which four discrete compositional groups were identified. One such group in particular was composed almost exclusively of Mars Orange Paste Ware, a product thought to be from Belize, while the other groups are assumed to be of local production. As a complement to the previous study, samples from each compositional group, representing both local and imported assemblages, were analyzed using ceramic thin section petrography. Resulting petrographic fabrics were then compared to locally sourced geological materials. This paper presents the interpretation of the combined petrographic and chemical composition studies in an attempt to better characterize local products and to further our understanding of the source and means of transportation of Mars Orange Paste Ware found in Middle Preclassic ceramics at Holtun. Finally, this study provides new insight into the production technologies of lowland Maya Middle Preclassic pottery, with a special emphasis on the use of volcanic ash temper.

Callaghan, Richard (University of Calgary)

[180] *The Strategic Location of the Maldives in Indian Ocean Maritime Trade and Colonization*

The Maldives Islands, situated off the southwest coast of India, form a chain trending from north 6.930° to south 0.700° latitude, an extent of approximately 850 km. The chain divides the Indian into east and west as well as marking the divide between the seasonal monsoon weather patterns. Present evidence suggests that the island chain was occupied as early as the fifth or fourth century BC with close ties to India. The islands became strongly culturally and commercially connected to both Asia and Africa after Islam was brought to the archipelago in the twelfth century. Beginning in the sixteenth century they became increasingly important to European colonial powers. Their location is strategic for maritime trade in the Indian Ocean. Here computer simulations using wind and current data and sailing vessel performance characteristics are used to evaluate the possible routes traders and colonists may have used that relied on the Maldives particularly in the earlier periods of occupation. The chain provides a convenient way station while waiting for favorable shifts in the monsoon winds. The Maldives may have been particularly important in the colonization of the Comoros Is. and Madagascar and the east African Indian Ocean trade.

Callaghan, Richard [296] see Cush, Patricia

Calligaro, Thomas [23] see Querré, Guirec

Calvo, Sílvia [23] see Molist, Miquel

Camacho-Trejo, Claudia

[119] *The Legacy of a Tlamatini: H. B. Nicholson's Mesoamerican Archive*

H. B. Nicholson was considered the Tlamatini of Aztec studies. He was also known as a warm and generous professor who dedicated his life to the study of Mesoamerican cultures. His legacy is highlighted by his remarkable collection of articles, books, photographs, and slides acquired over more than five decades. After his death in 2007, Nicholson's family donated his entire private collection of books, articles, slides, and photographs to the University of California, Los Angeles. Five years ago, when that university was deaccessioning much of his collection, part of it was given to California State University, Los Angeles (CSULA). The gift included Nicholson's entire slide archive of more than 10,000 slides of published and unpublished images. For the past years, a group of CSULA students has worked to digitize these slides to organize and preserve the valuable and sometimes rare information that they contain. This paper will report on the content of the digitized archive and the importance of H. B. Nicholson's legacy to Mesoamerican studies.

[119] *Chair*

Cambra, Rosemary [30] see Gardner, Karen

Camp, Anna (University of Nevada, Reno)

[367] *Mats, Trays, Bowls, and Patches: Results from the Analysis of over 9,000 Years of Catlow Twine Basketry in the Archaeological Record*

Catlow Twine is a unique and diagnostic basketry type found in archaeological sites of the Great Basin and some parts of California. It has a relatively wide geographic distribution and is thought to have over ~9,000 calendar years before present (cal BP) of technological continuity. Through the reexamination and recording of specific attributes and the direct Accelerator Mass Spectrometry (AMS) dating of Catlow Twine basketry from sites in Nevada, California, and Oregon, I have observed these continuities and some discontinuities in this basketry type, and propose that Catlow Twine basketry had significant technological and personal significance to the people who manufactured it. The value of this type of basketry can be seen in the size and types of vessels that were made, the fineness of the weave, and the use and reuse of Catlow Twine baskets. These specific attributes observed through time and space demonstrate how basketry can be used as a cultural and technological marker in the archaeological record.

Camp, Stacey (University of Idaho)

[98] *Discussant*

Campana, Michael G. [181] see Ferrari, Giada

Campbell, John [52] see Deal, Michael

Campbell, Rachel (Missouri Department of Transportation)

[283] *Building the Wall: Excavations of Cahokia's East Palisade*

The East Palisade Project at Cahokia Mounds State Historic Site is an ongoing investigation with the main goal of fully determining the path of the multiple construction phases of the palisade walls surrounding the core of the site. Located in Ramey Field, just east of Monks Mound, excavations have occurred intermittently in this area since the 1960s. The study of the area has helped in the understanding of the construction of the palisade walls as well as the varying types of bastions used throughout the occupation of the site. The East Palisade Project has also hosted Cahokia's Volunteer Field School allowing the public to participate in archaeological investigations. This paper will summarize the history of the palisade excavations and the results of recent investigations.

Campbell, Ross (University of Georgia), Russell Cutts (University of Georgia), David R. Braun (George Washington University) and J.W.K. Harris (Rutgers University)

[154] *Statistical Evidence for a New Method of Identifying Anthropogenic Fire in the Archaeological Record*

Clarifying evidence for anthropogenic fire in the archaeological record has been subject to contention and vagueness. This uncertainty centers not on evidence for fire, rather what constitutes it being human-controlled. New research pursuing this question suggests that a peculiar angular fragment, termed thermal curved-fractures (TCF), are the byproduct of knapped materials (flakes, cores, bifaces) exposed at length to high heat. We present here results of experiments expanding our TCF database designed to test hypotheses: a) are TCFs significantly, statistically, distinct from unfired debitage, and b) are there potential TCFs residing in archaeological collections from sites purported to have evidence of (early) hominin-controlled fire? These results strongly indicate support for both hypotheses.

Campbell, Roberto (Pontificia Universidad Catolica de Chile) and Ismael Martinez (Independent Researcher)

[340] *4,000 Years of Animal Translocations: Mocha Island and Its Zooarchaeological Record*

Islands are territories that allow us to assess phenomena and processes in a way that is impossible to do in the mainland. One of these concerns the human interaction with animals that are usually considered as wild. The case of Mocha Island (Chile; South Pacific, 38,36°S) is remarkable because of its small size (50 km²), proximity to the mainland (30 km), three different and independent human occupation events, and an endemic terrestrial fauna constituted only by small reptiles, amphibians, and rodents. Here our research has shown the distinctive presence of translocated medium-to-large native mainland mammals—nutria (*Myoscastor coypus*), pudu (*Pudu pudu*), camelids (*Lama sp.*), fox (*Lycalopex sp.*), grison (*Galictis sp.*), and wild cat (*Oncifelis sp.*)—in relation to the different populations that have occupied this island: aceramic hunter-gatherers (1950–1300 BC), ceramic food-producers (AD 100/1000–1687), and Chilean tenants (AD 1840–today). This evidence leads us then to question the simple idea of “wild animal,” and opens up a set of much more complex and rich issues, such as wild management and the use of “living reservoirs,” the re-creation of known landscapes, the modification of landscapes, local extinctions, pet keeping, taming, and even the consideration of animals as nonhuman persons.

Campbell, Sarah K. (Western Washington University), Erin Benson (Indiana University), Brendan Culleton (Pennsylvania State University) and Douglas J. Kennett (Pennsylvania State University)

[228] *Habitat Change versus Human Impact: Size and Frequency Trends in Multiple Taxa of Marine Invertebrates at Tse-whit-zen Village*

Tectonic activity along coastlines can subtly or radically alter the substrate and elevation of the intertidal zone, thus affecting benthic marine invertebrates; however, there is no single signature for impacts. Research following mega-earthquakes in the last decade shows that the nature of the effects varies widely across taxa and locations. Analysis of the Tse-whit-zen village invertebrate fauna shows that mean sizes of bivalves of the genera *Macoma*, *Leukoma*, *Saxidomus*, and *Tresus*, and also of the gastropod *Nucella lamellosa* and the chiton *Katharina tunicata* vary significantly, and independently across seven chronological zones spanning the last ~2,200 years. Taxonomic abundance of these and other frequently harvested bivalves such as *Mytilus* and *Clinocardium* also vary significantly between these relatively short occupation periods that are bracketed by known tectonic events and global climatic warming and cooling events. To evaluate the relative influence of tectonic events and human harvesting, these empirical patterns are compared to expectations for which taxa should be impacted in parallel or inverse ways deduced from predator/prey relationships, habitat preferences, and constraints on colonization and growth. The effects of climate change on ocean temperatures are controlled for using a high-resolution shell isotope sequence developed from site-specific samples.

Campeau, Kathryn (University of Toronto), Tracy Prowse and Tristan Carter

[22] *Differentiating Commingled Human Remains through EDXRF (Energy Dispersive X-ray Fluorescence)*

The ability to differentiate commingled skeletal remains is critical in the analysis of mass burials, archaeological sites and mass fatality events in forensic cases. The potential application of EDXRF (Energy Dispersive X-ray fluorescence) to aid in differentiating commingled remains is being explored at the MAX Lab (McMaster Archaeological XRF Lab), expanding the lab's research focus from solely obsidian sourcing to include bioarchaeological applications. There are numerous factors affecting bone's chemical composition; consequently, an individual's bones should have a unique elemental characterization which can be determined using EDXRF, a quick, nondestructive technique. Drawing upon Gonzalez-Rodriguez and Fowler's (2013) research which utilized a portable XRF (pXRF), the hypothesis that it is possible to differentiate individuals based on their unique chemical composition was tested using EDXRF on three archaeological skeletons from southern Italy. Applying multivariate statistical analysis, PCA (principal component analysis), to acquired data, it was possible to show distinct elemental variations and groupings among these skeletons. Trace elements, and ratios thereof, provided a greater distinction between the individuals than major elemental concentrations. Current research involves applying this method to a set of commingled remains expected to contain three individuals, in order to determine whether they can be differentiated.

Campeau, Kathryn [22] see Carter, Tristan

Campetti, Casey (AECOM) and Christopher Adams (U.S. Forest Service—Gila National Forest)

[4] *Metal Sensing and Indigenous Copper from Isle Royale National Park and Gila National Forest*

Though much professional work utilizing metal sensing comes from within the historic period and battlefield archaeology, the application of metal sensing techniques to precontact sites has much to offer contemporary studies of copper use in the United States, particularly inter- and intrasite geospatial analyses of indigenous copper exploitation. Ongoing research in two U.S. regions is illustrative of the contributions metal sensing technology is making to studies of copper and copper technology. Recent work at relict shoreline sites on Isle Royale National Park in northern Michigan and Mimbres sites within Gila National Forest in New Mexico serve as case studies highlighting new insight into copper exploitation in the northern Lake Superior Basin and the American Southwest.

Campos, Cinthia M. (California State University, Los Angeles)**[386]** *An Interpretation of the Rock Art in La Cueva de la Huachiza, Santa Clara del Cobre, Michoacán*

The Cueva de la Huachiza is a tectonic cave formed within a basaltic flow in the municipio of Salvador Escalante just south of Lake Pátzcuaro, Michoacán. The cave was initially recorded in 2014 by Dr. Jose Luis Punzo-Diaz as part of Proyecto Arqueología y Paisaje del Area Centro Sur de Michoacán (PAPACSM). An investigation of the cave conducted this summer recorded pecked petroglyphs of a man facing an eagle, above a spiral motif. These motifs resemble those from contact period Codice de Carapan. In front of the petroglyphs a feather and burnt wood were recovered that are described in La Relación de Michoacán as sacred items. This paper will combine archaeology, ethnography, ethnohistory, and epigraphy to interpret the cave. The inscriptions and artifacts found within offer insights into Tarascan customs, ceremonies, and beliefs. The evidence suggests La Cueva de la Huachiza was perceived as a landmark in the sacred landscape and as having connections with Cumiechuquaro, the underworld. It is evident that this cave was an important religious site for the Tarascans, and future explorations will produce a better understanding of the use of caves in this largely understudied region.

[12] *Chair***Camurri, Erica****[132]** *Monte Bibebe (Monterenzio, Italy): Analyzing Patterns of Cultural Interaction between Celts, Etruscans, and Other Italic Populations in Northern Italy from the Fourth to the Second Century BC*

The site of Monte Bibebe, located near Bologna (northern Italy), contains the remains of a settlement on Pianella di Monte Savino and a necropolis on Monte Tamburino, altogether dating from the fifth to the second century BC. According to historical sources, this region was inhabited by Etruscans and other Italic populations, before it witnessed the invasion of Celtic tribes from the fourth century BC onward. Following these sources, the main consequence of the invasions has to be seen either in the assimilation or in the expulsion of the local groups by the Celts, just prior to the Roman conquest of northern Italy. Recent studies of the epigraphic record and the archaeological documentation of the region indicate a reality that is more complex and dynamic than previously assumed. Based on the site of Monte Bibebe, which has to be considered one of the best documented archaeological sites of the area, I will demonstrate that the different ethnic groups mentioned in ancient sources were in fact coexisting, reaching in some cases such a profound level of social and cultural interaction that it is difficult (if not impossible) to determine their ethnic identity: Were they Celts, Etruscans, Italics, Etrusco-Celts/Celto-Etruscans, or something else entirely?

Canaday, Timothy (Salmon-Challis National Forest), Bryan Hanks (University of Pittsburgh) and Roger Doonan (University of Sheffield)**[343]** *The Middle Fork Geophysics Project, Central Idaho*

The Middle Fork Salmon River is a designated Wild and Scenic river located within the heart of the Frank Church—River of No Return Wilderness in central Idaho. Over the last three years the University of Pittsburgh, the Salmon-Challis National Forest, and the University of Sheffield have collaborated on a minimally invasive multi-method geophysical and geochemical approach for characterizing intact archaeological deposits at seven prehistoric sites impacted by recreational activities. The objective of this work is to develop long-term management strategies for the protection of at-risk sites using minimally invasive methods such as fluxgate gradiometry, earth resistance electrical resistivity, magnetic susceptibility, and handheld portable XRF for soil chemistry. Preliminary results from several of the sites are presented.

Candan, K. Selçuk [227] see Kintigh, Keith

Cannon, Aubrey (McMaster University) and Andrew Roddick (McMaster University)**[22]** *A Culture of Innovation in Archaeological Science at McMaster University*

Archaeological science has exploded globally in the past several decades, a pattern that is evident in the range and sophistication of scholarship at a variety of Canadian institutions. McMaster University, however, has played, and continues to play, a particularly important role in the development of archaeological science. In this introductory paper, we explore the genealogy and early impact of a number of pioneering scholars at McMaster. We highlight the pivotal role of the Canadian Foundation for Innovation (CFI) in enabling the development of groundbreaking laboratory facilities for archaeology. We outline what we describe as the “cultural transmission” of the practice of archaeological science. What began with early pioneering developments in methods and applications was refined through the construction of CFI funded facilities. These spaces have permitted the emergence of new research applications at McMaster and, through graduates who have extended this legacy of innovation, at other institutions in Canada and internationally. We also argue that the diversity of archaeological science research at McMaster has been maintained with a particular anthropological focus. As will be seen in the papers in this session, exploring social questions of the past requires both analytical skill and a sophisticated theoretical awareness.

[314] *Discussant*

Cannon, Aubrey [22] see Carter, Kari

Cannon, Danielle (Kutztown University), Carly Plesic (Kutztown University) and Khori Newlander (Kutztown University)**[259]** *Provenance Analysis of Pottery Sherds from an Early Nineteenth-Century Milling Village in Northeast Pennsylvania*

As a cost-effective and nondestructive method for multi-element analysis, portable X-ray fluorescence spectrometry (pXRF) has the potential for broad archaeological application. Here, we employ pXRF for the compositional analysis of pottery sherds collected from Stoddartsville, an early nineteenth-century milling village built along the upper Lehigh River in northeast Pennsylvania. Our analysis demonstrates that we can use compositional data to source pottery sherds to regional potteries, documenting the links developed between Stoddartsville and the surrounding region as the village grew into a short-lived center of trade and industry. At a more general level, our study demonstrates the potential for historical archaeologists to use compositional data, even in the absence of makers' marks, to source historic artifacts and, in turn, develop insights into regional economies.

Cannon, Mike (SWCA Environmental Consultants) and Sarah Creer (SWCA Environmental Consultants)**[79]** *Patterns in the Transport of Tosawihí Chert to the Little Boulder Basin, Northern Nevada*

The Tosawihí chert quarries of northern Nevada have played a significant role in the development of hypotheses by Great Basin archaeologists about precontact procurement and transport of lithic raw materials. Here, such hypotheses are tested using data obtained from ongoing investigations in the nearby Little Boulder Basin. These investigations have resulted in the analysis of chipped stone assemblages from dozens of site loci, which consist primarily of Tosawihí chert and many of which can be dated to phases or periods in the local cultural historical sequence. Little Boulder Basin Tosawihí chert assemblages exhibit a classic “distance decay curve” and are consistent with the hypothesis that quarrying activity—specifically the amount of time spent processing material at the quarries—was constrained by transport distance. Further, temporal differences in processing and transport patterns are evident that are likely related to broader late Holocene changes within the region in foraging and mobility practices.

Cano, Martha [226] see Lopez, Carlos

Canterbury, J. Alex [162] see Trask, Willa

Canuto, Marcello A. (M.A.R.I./Tulane University)

[131] *Preliminary Lidar-Based Analyses of the La Corona–El Achiotal Corridor*

Located in the northwestern Petén, Guatemala, the Maya sites of La Corona and El Achiotal have been investigated since 2008 by a multidisciplinary U.S. and Guatemalan research project. While a primary goal of this project has been to reconstruct the region's political history, we are now beginning to investigate the management of local resources and general human impact on the landscape. In fact, the area between La Corona and El Achiotal is almost entirely unknown archaeologically, especially regarding settlement that is largely residential and dispersed due to the wetland environment. In 2016, a LIDAR survey, funded by the Pacunam Foundation and operated by NCALM, was undertaken in nearly 200 km² rectangular zone encompassing both La Corona and El Achiotal. This survey aims to record the full extent of ancient settlement around and between these two sites and cast light on land-use strategies in a region dominated by seasonal and perennial wetlands. In the following paper, we will present the preliminary results and interpretations of the LIDAR dataset focusing both on the methodological advantages of this technology and on the possibilities it creates for analysis and interpretation of ancient landscapes.

[131] *Chair*

Canuto, Marcello A. [39] see Bell, Ellen

Cap, Bernadette (University of Texas-San Antonio)

[7] *Implications for Spinning Thread in a Marketplace at the Classic Maya site of Xunantunich, Belize*

The identification of marketplaces among the Classic Maya has contributed to more complex understandings of their economies, but scholars are still working to determine the fundamentals and variations of Maya marketplace exchange across time and space. Recent investigations at the Classic Maya site of Xunantunich, Belize recovered a small assemblage of spindle whorls from the site's Lost Plaza, a posited marketplace. This the only example among the Classic Maya to directly connect the activity of spinning thread with a physical marketplace, from which I infer that thread was part of the marketplace exchange system. Classic Maya artwork provides examples of a variety of textiles, but due to tropical conditions few traces have been left of the production process. Spindle whorls represent one of the most durable lines of evidence for textile production. This poster presents details of the spindle whorl assemblage and associated features and soil chemical signatures to understand the activity of spinning thread within the Lost Plaza. Broad economic implications of thread as a marketplace good are also discussed. In Mesoamerica, spinning and weaving is depicted primarily as a female activity. The Lost Plaza assemblage provides an opportunity to discuss the role of gender in marketplace exchange.

[269] *Discussant*

Capellin Ortega, Anarrubenia P. (Graduate Center, CUNY), Cameron L. McNeil (Lehman College and the Graduate Center, CUNY) and Edy Barrios (CUDEP-USAC)

[71] *Investigating Ancient Foodways in the Copan Valley: Macrobotanicals from Late Classic, Terminal Classic, and Postclassic Middens in the Río Amarillo East Pocket*

In this paper, the analysis of macroremain samples from household contexts in the Río Amarillo East Pocket will be discussed. The analysis of these samples is part of a larger project to define the use of the environment by ancient inhabitants of the valley. Following upon the efforts of earlier projects such as PAC I and PAC II, we plan to assess macroremains from a diversity of groups and time periods to illuminate ancient consumption patterns. Hopefully, this data will increase our understanding of the sustainable practices of the ancient Maya and allow us to assess possible evidence of environmental stress related to Terminal Classic demographic drops.

Capone, Patricia

[138] *Museum Archaeology and Studying Technology*

Increasing combinations of perspectives and epistemologies contribute knowledge and consciousness of practice to the study of technology. Museum archaeology is well situated to study and interpret technology through material culture, archives, and engaging partnerships. Partnerships through museum collections continue to build and contribute to a variety of interests. The interdisciplinary direction of technological studies continues to expand. Projects also increasingly relate to forward thinking topics such as sustainability, and consciousness of practice. Examples of partnerships with various collections including the Peabody Museum, Harvard University demonstrate the advancement of knowledge in this area.

Capriata Estrada, Camila (Proyecto Qhapaq Ñan—Ministerio de Cultura del Perú) and Raúl Zambrano Anaya (Proyecto Qhapaq Ñan—Ministerio de Cultura del Perú)

[292] *Nieve Nieve, a Local Rural Community under Spanish Rule*

The archaeological site of Nieve Nieve is located in the middle Lurin Valley, Central Coast of Peru. The spatial configuration of this site differs drastically from other late prehispanic settlements in the valley. The presence of a colonial church as well as a series of architectonic compounds built along parallel and perpendicular streets not only indicate a well-planned construction but also the introduction of a new, and probably foreign, urban design. Yet, other aspects such as the construction techniques and internal distribution and use of spaces remain essentially local. We will present the results of our excavations at the site suggesting a strong permanence of local cultural elements during the first years of colonial times.

Capriles, José M. (Pennsylvania State University), Nicholas Tripcevich (University of California, Berkeley), Axel Nielsen (CONICET, Instituto Nacional Antropología y Pensami), Michael D. Glascock (University of Missouri Research Reactor) and Calogero M. Santoro (Universidad de Tarapacá)

[88] *Geochemical Characterization and Archaeological Utilization of the Cerro Kaskio Obsidian Source in Southwestern Bolivia*

Obsidian is not only an excellent raw material for the manufacture of stone tools but because of its compositional homogeneity, it can also be related to specific geographic sources. The geochemical characterization of obsidian sources can help to determine the geographic origin of different stone tools as well as aid to infer patterns of resource utilization and exchange. Although some of the most important obsidian sources in the Andes have been identified and adequately characterized, many remain unknown. Here we report for the first time, the location, description, geochemical characterization, and regional distribution of Cerro Kaskio, a new obsidian source from southwestern Bolivia. We show how artifacts made with Cerro Kaskio obsidian

were initially utilized by some of the first explorers to enter the territory during the late Pleistocene but also by subsequent populations of pastoralists during the late Holocene. Given the singular composition, high-quality, and long-term use of this source, we anticipate that additional sites with stone tools made with Cerro Kaskio obsidian will be identified in the future.

Capriles, José M. [134] see Valenzuela, Daniela

Caracuta, Valentina (Laboratory of Archaeobotany and Paleoecology-University of Salento. Italy), Bridget Alex (Department of Human Evolutionary Biology, Harvard), Lior Regev (D-reams Radiocarbon Laboratory. Weizmann Institute), Eugenia Mintz (D-reams Radiocarbon Laboratory. Weizmann Institute) and Elisabetta Boaretto (D-reams Radiocarbon Laboratory. Weizmann Institute)

[338] *The Ice-Age Landscape around Manot Cave (Israel) during the Upper and Middle Paleolithic: New Insights from the Anthracological Record and Carbon Isotopes Analyses*

Since 2012, a series of investigations in Manot Cave recovered charcoal samples from archaeological layers in order to study the landscape around the site between the Upper and the Middle Paleolithic (UP/MP). Samples of soils and loose charcoal were collected in different areas of the cave, while particular attention was paid to the sampling of the hearths found in Area E and I. Anatomical features of the charcoals were analyzed using a metallographic microscope in order to identify tree species which grew in the site area at the time of its occupation. *Amygdalus* sp. was found to be the most common species, while *Quercus* ssp. (type *callipronos* and *ithaburensis*) are comparatively rare. The anthracological study reveals the presence of an open forest, during the UP/MP, which differs from the modern maquis. Over thirty specimens of *Amygdalus* sp. were radiocarbon dated at the D-REAMS laboratory and subject to stable carbon isotopic analysis ($\delta^{13}C$) to obtain information on the local rainfall regime between 50,000 and 30,000 years cal BP. These analyses indicate climatic conditions during the ice-age were unlike modern conditions.

Caracuta, Valentina [338] see Boaretto, Elisabetta

Caraher, William [37] see Averett, Erin

Caramanica, Ari

[382] *A History of Landscape Transformation and Environmental Change across the Ascope Irrigation System of the Chicama Valley*

The sequence of landscape transformation across the area of the Ascope Canal System in the Chicama Valley involved both natural and anthropogenic events and processes that unfolded in nonlinear ways. We argue that early events were crucial in determining transformations later in the sequence. In the arid environment of the North Coast, water availability plays a key role in landscape histories. This paper highlights evidence for El Niño events, water management, and changing ecologies for the Paleoindian period through the Colonial period in the area, drawing from sedimentary, archaeobotanical, survey and ethnohistorical data. Retracing both the human and natural histories of this landscape reveals both their interdependence and the potential impact that early modifications had on later outcomes.

[382] *Chair*

Carballo, Jennifer (Harvard University, Peabody Museum) and Oralia Cabrera (Arizona State University)

[13] *Altica Ceramics and Figurines: Stylistic and Chronological Analyses*

Craft specialization and exchange feature prominently in explanations for the development of the first complex societies in Mesoamerica. It is clear from analyses of surface collections at Altica that during the Early and early Middle Formative periods (c. 1300–850 BC) its inhabitants exported obsidian tools and imported pottery from long distances, including the southern Gulf Coast. Altica is one of the few early agricultural settlements located in the northern Basin of Mexico from which we have excavated ceramics and figurines, and thus provides an important opportunity to investigate early craft specialization, including the interregional exchange of obsidian and ceramics. Employing a multi-scalar approach, we investigate differences in the uses and styles of newly excavated ceramic vessels and figurines from Altica, focusing particularly on objects decorated with symbols of ideological importance. We also compare these materials to pottery and figurines at contemporary sites. This study provides evidence of how the first sedentary communities of the Basin of Mexico participated in an extensive network of societies exchanging goods, ideas, and decorative motifs, during a significant period of increasing sociopolitical complexity.

Card, Jeb C. [395] see Fowler, William

Card, Jeb J. (Miami University)

[212] *Witches and Aliens: How an Archaeologist Inspired Two New Religious Movements*

Egyptologist and Folklorist Margaret Murray was a major figure in the creation of professional archaeology in the United Kingdom, President of the Folklore Society, and advocate for women's rights in higher education. However, another major part of her legacy was the mainstream acceptance of the concept of the "witch-cult," a hidden ancient religion dating back to the Pleistocene but continuing until at least the seventeenth century when it was persecuted by witch-hunters. Historians have subsequently found this concept to be unsupportable but it is still commonly found in the popular imagination. One obvious legacy was the role of the witch-cult in the formation of Wicca and other neopagan movements in the second half of the twentieth century. But another major product of Murray's archaeologically informed witch-work was the Cthulhu Cult, created in fiction by science fiction and horror pioneer H. P. Lovecraft. Not only has Lovecraft's Mythos inspired direct Lovecraftian magickal practices, but it has been a huge influence on paranormal and conspiracy beliefs centered around ancient civilizations and hidden secrets. Through these influences, core elements of early anthropology have persisted and grown outside of the professional establishment.

[212] *Chair*

Cardinal, J. Scott (New York State Museum) and Jennifer Loughmiller-Cardinal (State University of New York)

[287] *Through the Gates of Logic, into the Middle of . . . What?*

For several decades, middle ranged theories in archaeology have generally been understood and applied as a set of rhetorical and analogical linkages between the archaeological record and interpretive hypotheses of behaviors. Epistemologically, however, "middle range" has broader implications than this relatively narrow archaeological application. As a relative positioning, middle range denotes establishment of logical linking arguments between evidence and inferred or hypothetical context irrespective of theoretical scale. Archaeologically, these typically relate to inverse trajectories of causality (i.e., from effect to cause), but have potential be much more than mere methodological steps or analogies between field data and conclusions. Properly conceived, middle ranged theories should link data, through explicit or inferred causal mechanisms and sets of observations, to broad or generalized

theoretical abstractions. The latter step has traditionally been difficult to achieve with contemporary social theory as it is engaged and applied by archaeologists, leading to a broad disgruntlement with higher-level social theory and abstractions. We propose that this has been, in part, due to the overly narrow and insufficient applications of formal logic to middle-ranged linkages beyond the methodological scale, and present a suggested restructuring of archaeological middle range for identifying reasonable inferences at higher scales.

Cardona, Héctor [215] see Cardona Machado, Hector

Cardona Machado, Hector (El Colegio de Michoacán, A.C.), Héctor Cardona (El Colegio de Michoacán, A.C.), Verenice Y. Heredia Espinoza (El Colegio de Michoacán, A.C.) and John K. Millhauser (North Carolina State University)

[215] *La Obsidiana en el Occidente de México: "Ausencias" en la opulencia*

La región de Tequila es reconocida por la elaboración de una famosa bebida alcohólica, sello de la mexicanidad actual. Pero a partir de investigaciones arqueológicas realizadas en la zona desde hace más de un siglo, se ha reconocido la abundancia de fuentes y tipos de obsidiana que fueron utilizadas en época prehispánica para la fabricación de bienes tanto de lujo como para uso cotidiano. Esta actividad ha sido un componente importante de las narrativas académicas que procuran definir dinámicas que apuntan a la complejidad social desde el Formativo, siendo uno de los rasgos fundamentales de la propuesta de la Tradición Teuchitlán. Bajo este modelo, la obsidiana ha sido tratada como un "recurso raro," que debió ser controlada por la élite y que originó una red de intercambio, tanto regional como a larga distancia, lo que caracterizaría un tipo particular de economía incrustada en una organización estatal. Sin embargo, la evidencia empírica referida no señala un control sobre este recurso ni sobre la manufactura de artefactos, como tampoco a la naturaleza de las relaciones de intercambio. En este trabajo se evalúa tanto los datos como sus interpretaciones, proponiendo enfoques alternativos a la luz de nuevas teorías arqueológicas.

Cardoso, Hugo (Simon Fraser University), Joana Abrantes (University of Porto), Laure Spake (Simon Fraser University) and Luis Rios

[86] *A Test of Juvenile Age Estimation Methods Based on the Diaphyseal Length of the Long Bones*

Little work has been done on whether juvenile age estimation methods perform well beyond the population that was used as a reference. This study uses a sample of 81 known-age juvenile skeletons, aged between birth and 12 years, combining data from archaeological, anatomical and forensic reference collections in the United States, Canada, and South Africa. Ages were estimated from the diaphyseal lengths of the humerus, radius, femur and tibia, using Cardoso et al. (2014) and Stull et al. (2014) prediction models. Results show that methods based on size are only reliably applied across samples before the age of two years, after which population differences in growth become noticeable. Results also show that ancestry-specific bone size and limb proportions have little if any effect on the reliability of age predictions. The main factor to consider when selecting an age estimation method is population nutritional and health status, not ancestry. These findings have important implications for age estimation of juvenile skeletons in archaeological contexts, and suggest that bone size is not a reliable age predictor, particularly after the age of two years.

Cardoso, Hugo [193] see Tarle, Lia

Carey, Genevieve [394] see Guilfoyle, David

Carey, Mia (University of Florida)

[122] *I Don't See Color, but I See Your Hijab: How Public Archaeology Can Confront Race, Racism, and Islamophobia in Social Science Education*

Millennials are hailed as one of the most racially progressive generations in America's history. African Americans and other people of color are becoming consciously aware of the challenges that they face in navigating America as a minority. White millennials, who describe themselves as being racially progressive, typically lack awareness or understanding of discrimination and racism and use colorblindness as a way of coping with fear and ignorance. Their colorblindness invalidates the identities and experiences of minorities, and equates color with something negative. This leaves white millennials ill-equipped to deal with changing classroom demographics and the knowledge and experiences that minorities bring to the classroom. By embracing a culturally relevant pedagogy aided by archaeology, young, white social science educators can begin to bridge the gap by confronting their own white privileges and inherent biases.

Carillo Bosch, Vania [329] see Magnoni, Aline

Cariño Anaya, Tanya [329] see Magnoni, Aline

Carleton, William (Simon Fraser University), Mark Collard (Simon Fraser University) and Dave Campbell (Simon Fraser University)

[77] *Radiocarbon Dating Uncertainty Constrains Our Ability to Identify Cyclical Human-Environment Dynamics*

Archaeologists have long been interested in cyclical human-environment dynamics. This interest is indicated by the dozens of published studies that refer to "adaptive cycles" and by the fact that one of the highest cited papers in the history of archaeology focuses on the impact of cyclical drought on the Classic Maya. Unfortunately, recent work suggests that identifying cycles in archaeological and paleoclimatological time series data can be challenging when the observations are dated with radiocarbon assays. The problem is that the highly irregular, temporal uncertainties that are characteristic of calibrated radiocarbon dates can lead to the identification of spurious cycles. In the present study, we sought to delineate the conditions under which cycles can be confidently recognized in radiocarbon-dated time series datasets. To do so, we conducted simulation experiments involving thousands of artificial time series with known cyclical patterns, varying the parameters of each experiment to determine when radiocarbon dating uncertainty became too great to allow for the reliable detection of the known cycle. We found that, at best, we could correctly identify cycles only 42% of the time, indicating that the temporal uncertainty of calibrated radiocarbon dates makes it very difficult to identify cycles in archaeological and environmental records.

Carline, Kristin [231] see Buehlman-Barbeau, Savanna

Carlson, Catherine

[311] *Discussant*

Carlson, David (Texas A&M), Angelina Perrotti (Texas A&M University), Michael Waters (Texas A&M University) and Jessi Halligan (Florida State University)**[81]** *Modeling Age and Sedimentation Rates at the Page-Ladson Site*

Stone tools and mastodon bones occur in an undisturbed geological context at the Page-Ladson site, Florida. Age models were created for excavation unit 50N/23E and core PLAD-AUC14-4A to estimate age ranges and sedimentation rates. The models were constructed using Bayesian models as implemented in OxCal to calibrate ages, combine equivalent age estimates, exclude outliers, and estimate deposition rates. The models were used to provide age estimates for artifacts recovered from the site, correlate deposition at the site with the Late Pleistocene transgression, and provide influx estimates for *Sporormiella* spores as proxy evidence for the presence of megafauna. Taken with other evidence, the analysis demonstrated that about 14,550 years ago people butchered or scavenged a mastodon next to a pond in a bedrock sinkhole within the Aucilla River. This occupation surface was buried by approximately 4 m of sediment during the late Pleistocene marine transgression, which also left the site submerged. Peak concentrations of *Sporormiella* occur around ~13,700 cal y BP may indicate peak megafaunal abundance in the vicinity of the sinkhole. A rapid decline in spore concentrations by ~12,600 cal y BP occurs after the onset of the Younger Dryas Stadial.

Carlson, Justin (University of Kentucky)**[253]** *Discussant***Carlson, Kristen (Augustana University)****[332]** *Bull Creek: A Paleoindian Camp in the Oklahoma Panhandle*

Bull Creek is one of a handful of Paleoindian camps, which has survived the taphonomic consequences of time. In this presentation we will discuss our current understanding of the site and its inhabitants. The topics discussed include environmental reconstruction and the broader use and reuse of the surrounding region by Paleoindian people. Snapshots of butchering techniques have been captured at Bull Creek as well as differential seasonal use of the site. After the third season of excavation Bull Creek is beginning to provide a picture of life in the Oklahoma panhandle as early as 10,300 years ago.

[332] *Chair*

Carlson, Kristen [332] see Bement, Leland

Carlson, Meredith (Bryn Mawr College), Jonathan S. Reeves (George Washington University), David R. Braun (George Washington University) and Matthew Douglass (University of Nebraska—Lincoln)**[154]** *An Experimental and Archaeological Investigation of the Role of Edge Angle in Lithic Artifact Damage: Applications to the Koobi Fora Fm. Kenya*

The analysis of damage patterning on lithic artifacts has the potential to distinguish between predepositional use of artifacts and postdepositional taphonomic processes, providing important evidence for particular hominin behaviors. Previous study has suggested that damage accrues in a non-random fashion in archaeological assemblages. Limited work has been done using the quantified variable of edge angle to account for patterns of edge damage. This study focuses on assemblage-level patterns of flake edge angle and their relationships to macroscopic damage. Experimentally produced lithics were subjected to different use and taphonomic treatments. This provided a means for investigating the relationship between edge angle and damage across a variety of different processes. Preliminary results suggest the pattern of damage across edge angles varies based on the processes of use or taphonomy to which an assemblage is subjected. These results were compared to damage patterns of surface collections from two Okote Member (1.6 -1.39 Ma) sites in the Koobi Fora Formation, Kenya exhibiting both ancient and modern instances of edge damage. We use this dataset to explore the extent to which experimental edge damage/angle relationships conform to archaeological data. An overview of potentially diagnostic angle/damage relationships is presented. Research sponsored by NSF-IRES (OISE-1358178 and 1358200).

Carlson, Risa (U.S. Forest Service)**[49]** *Raised Marine Predictive Model Advances Knowledge of Early Holocene Site Assemblages in Southern Southeast Alaska*

In 2009, Carlson and Baichtal used the age and elevation of raised marine deposits left during the highest marine transgression to create a hypothetical early Holocene shoreline in the Alexander Archipelago of southern Southeast Alaska. Over the past seven years, archaeological surveys that employed this predictive model revealed over twenty new early Holocene sites. Our understanding of the Holocene island landscape has increased dramatically with the discovery of these sites in new geographical areas of the archipelago. The sites are directly upland of the ancient shoreline that dates from 9,300 to 7,000 RCYBP. They are characterized by dense lithic deposits in and around carbonaceous hearths that include microblades, microblade cores, small unifacial tools of curated materials, flake cores, large expedient unifacial flake tools, utilized flakes, and byproducts of bifacial tool production. Microblades and simple unifacial tools were modified in multiple ways to perform a variety of tasks. A small component of fauna includes burnt and calcined bones, worked sea mammal bones, marine shells, and fish and bird bones. These new sites expand on traditional characterizations of artifact assemblages and material types used for tool production during the early Holocene in Southeast Alaska.

Carlson Dietmeier, Jenna (College of William and Mary)**[248]** *Carolina's Cattle: Eighteenth-Century Livestock Production at Drayton Hall*

Utilizing faunal evidence from two assemblages from Drayton Hall, this paper explores the changing cattle husbandry strategies employed in the eighteenth-century South Carolina Lowcountry. Before colonists had perfected rice production in the region, they worked with the varied terrains and natural resources of the Lowcountry to create a very successful livestock industry in the early eighteenth century. Cattle remains from the Pre-Drayton assemblage (circa 1730s) reflect this thriving livestock industry, indicating that cattle were raised at the site for market in a largely free-range system. In contrast, cattle remains from the South Flanker Well assemblage (circa 1770s) suggest cattle being raised in a more hands-on manner, with some individuals likely serving as draught oxen. Through analyses of general species distributions, kill-off patterns in cattle, and pathologies present on the cattle cranial and lower limb elements at Drayton Hall, one can appreciate the changing relationships between humans and cattle in the eighteenth-century Carolina Lowcountry.

Carlucci, Eric (Indiana University- Bloomington), Jianfeng Cui (Peking University) and Ling-Yu Hung (Indiana University- Bloomington)**[213]** *Portable XRF Analysis of the Pigments of Majiayao Pottery from Dayatou, NW China*

The site of Dayatou is located on a terrace bluff in the Tao River Valley in Gansu province, Northwest China. In 2015, the Tao River Archaeological Project team conducted systematic collection across the surface of the bluff and recovered thousands of Majiayao culture potsherds. To identify the technology and provenances of these potsherds, in the 2016 field season we used a portable XRF in a handheld configuration to analyze the chemical

elements of the black paint decorated on 124 selected samples. For comparison, we also used the same method to analyze the paste composition of each sample. All the samples had enough clear painted and unpainted spots for analysis. These samples were selected from random bags of sherds collected from areas across the site. Different from previous studies, our case study provides a micro perspective on the technology and organization of pottery production at a single settlement. Portable XRF analysis proves to be an effective source for this research because of the efficient and accurate chemical identification. The data we have collected provide a general overview of the site, and will lend to future research on ceramics at the site of Dayatou, and for the Majiyao as a whole.

Carmichael, Patrick

[270] *Really Ugly Nasca Pots of Ancient Peru, and Why They Are Important*

Polychrome ceramics of the Nasca culture (south coast of Peru, c. 100 BC–AD 600) are world renowned as one of the most colorful and artistically complex creations of the ancient Americas. Up to ten distinct colors depicting fabulous supernatural creatures adorn unique vessel forms with eggshell thin walls fixed in perfect oxidizing firings. Such masterpieces fill art books and spawn enthusiastic but fanciful speculations about Nasca society and its artisans. This paper rounds out the view of Nasca pottery production and its place in society by focusing on what is not shown in art books—the remarkably ugly, poorly made, and badly fired products of neophytes and the ungifted. Such pieces provide valuable information on the construction, painting, and firing stages of production, but also lead us to consider the individual potter as agent, the family workshop, and the potting community. The role of polychromes in Nasca society was potent. An informed understanding of their production, circulation, use, and deposition must include not only the brilliant and spectacular but also the unsightly and hideous.

Carmody, Stephen (Sewanee: University of the South), Ryan Hunt (Rhodes College), Jera Davis (Office of Archaeological Research, Moundville Stat), Natalie Prodanovich (Rhodes College) and Jon Russ (Rhodes College)

[173] *Inhaling Prehistory: Exploring the Smoking Culture of the Eastern Woodlands*

Pipes, pipe-smoked plants, and the tradition of smoking in the Eastern Woodlands of North America have long interested anthropologists and archaeologists because these artifacts and activities are viewed as material correlates of ritual, ceremonial, and religious activities. While pipes are regularly recovered from archaeological sites, the remains of plants materials that were smoked are far more difficult to recover. Traditionally, pipe-smoked plants, such as tobacco, have been identified through the analysis of macroremains recovered from archaeological sites. The earliest comes from Middle Woodland period contexts at the Smiling Dan site in Illinois. However, pipes themselves predate evidence of tobacco in the region, leaving many questions unanswered about the smoking culture. Over the past two decades' chemical analysis of pipe residues have made substantial contributions in this area. A chemical signature for nicotine identified in a pipe from West Virginia demonstrated the efficacy of gas chromatography/mass spectrometry (GC/MS) and pushed the earliest dates for tobacco use back approximately 2,000 years. Here, we present the results of our recent GC/MS study on pipe residues from the region. We use these results to contribute to ongoing investigations into the timing, transmission, use, and customs surrounding tobacco and the smoking culture.

Carney, Molly

[177] *Gene-Culture Coevolution, Pit Hearth Cooking, and the Diabetes Epidemic among North American Indigenous Populations*

While the diabetes epidemic among indigenous Native American populations has been examined for more than 30 years, the nuances between environmental and genetic causes of this disease remain understudied. In this paper, I explore the idea that the diabetes epidemic among Native American populations may be partially attributed to the introduction of a diet suited for Westernized populations. I will specifically look at gene-culture coevolution and the salivary amylase gene (AMY1) copy numbers among different world populations, arguing that populations with higher AMY1 copy numbers are better adapted to digest starchy foods such as wheat, rye, millet, or rice. Conversely, many Native American populations used technological adaptations such as pit oven cooking to process the sugars found in native root foods, thereby bypassing the need for genetic adaptation. I examine two populations, in the American Southwest and in Mexico, to illustrate these differences in native and introduced diets and their subsequent health effects. By looking at gene-culture coevolution, the ethnographic record and archaeological evidence, we are better able to address some of the causes for the high prevalence of diabetes among Native Americans.

Carney, Molly [260] see Downey, Caitlin

Carpenter, Jennifer [77] see Jackley, Julia

Carpenter, John (Centro INAH Sonora) and Guadalupe Sanchez (Instituto de Geologia-UNAM/INAH)

[84] *El Corrido de Pablo y Suzy Pescado: Inspiring Archaeological Investigations in Northwest Mexico*

We discuss Paul and Suzy Fish's integral role in archaeological research in northwest Mexico, an important region that has been little studied by relatively few archaeologists to date. Over more than 25 years, along with our colleagues and many students, our archaeological investigations have included a reanalysis of the funerary mound at Guasave, Sinaloa and an evaluation of the relationship between Mesoamerica and Northwestern Mexico, the Pleistocene people of Sonora and Mexico, the Early Agricultural period at La Playa (SON F:10:3) and other sites, paleoethnobotanical studies and environmental reconstruction in several sites in Sonora, regional systematic survey of the Río Fuerte Valley in Sinaloa, the long-distance exchange routes linking West Mexico with northwest Mexico and the American Southwest, research at the exceptional Fin del Mundo Clovis site and 12,000 years of human adaptations and the climatic changes in the Sonoran Desert. Most recently, we have begun research in the Sahuaripa region of eastern Sonora in order to investigate both the long-distance and regional interaction spheres and socio-político-economic organization of the Río Sonora and Serrana archaeological traditions. We believe that this research effectively expresses the depth and breadth of Paul and Suzy's multifaceted archaeological perspectives.

Carpenter, Lacey (University of Michigan)

[278] *Residential Variability and Change through Time at San Martín Tilcajete*

Social evolutionary transformation involves and affects all levels of human society, including household. The formation of a state-level society at the Tilcajete sites has been documented through extensive horizontal excavations focused on the civic-ceremonial buildings at a two Formative Period sites in the southern branch of the Oaxaca Valley. This paper presents findings from two seasons of work in 2014 and 2016 focused on the residential sectors at El Mogote, occupied during the Early Monte Albán I phase (500–300 BC) and El Palenque, occupied during the Late Monte Albán I phase (300–100 BC). I examine residential variability within each site as well as change through time. I argue that the timing and nature of changes to residential architecture, activities, and assemblages reflect the dynamic role household decisions played in the sociopolitical transformations at the sites.

[278] *Chair*

Carpenter, Michelle (Idaho State University)**[260]** *An Analysis of the Jamestown Diet*

Our current knowledge of the historic fort of Jamestown in Virginia has developed through interpretation of the archaeological record and historical documents. The success of all colonies in the New World depended on the integral ability to produce food. Prior to developing a stable food source, the colonists at Jamestown relied heavily on those provisions they brought with them from England. We can learn about these provisions from ship manifests, colonists' diaries, and inventory lists. Careful examination of the faunal remains found at Jamestown can potentially reveal new information that is not based on misleading historical documents. This presentation hopes to show that the diet of the colonists during the winter of 1609/1610 was altered drastically by an acute lack of food. This idea will be supported by analysis of faunal remains discarded in wells located throughout the island. These wells date as far back as 1607 until a period when the fort was more stable in food production in 1612. Stable isotope analysis of these faunal remains will reveal which were provisions the colonists brought with them from England and which were raised in the New World.

Carpiaux, Natalie (University of Wisconsin—Milwaukee)**[102]** *Oneota Household Dynamics at the Koshkonong Creek Village*

Despite a long history of research into the Late Prehistory of the Upper Great Lakes, insufficient attention has been paid to the nature of early Oneota households. Little is known about their size or composition, nor the nature or degree of interaction between and among them. Contemporaneous houses of different sizes and styles have been noted together at Oneota sites in the southeastern Wisconsin, further emphasizing the need for a greater understanding of Oneota household dynamics. This study begins to explore some of these issues, through a feature-level stylistic analysis of ceramics from one Oneota site. The Koshkonong Creek Village (47JE379), or KCV, is a large Oneota habitation in southeastern Wisconsin. Three field seasons have revealed densely packed, overlapping features at this site, representing continual occupation dating from approximately AD 1000–1400. At least two separate house structures have been identified; a long house and wigwam style dwelling. The pattern duplicates household forms seen at other sites in the area. The numerous ceramics from the Koshkonong Creek Village site show a variety of design elements, some unique to the Koshkonong region or even the site itself. A household approach is applied to the ceramics to investigate household organization at the site.

Carpio, Margaret (MOCHE, Inc.), Patrick Mullins (University of Pittsburgh and MOCHE, Inc.), Brian Billman (UNC-Chapel Hill and MOCHE, Inc.) and Rachael Lew (MOCHE, Inc.)**[230]** *Movement and Vision: Reconstruction and Analysis of a Multi-Occupation Fortified Site Complex in the Moche Valley*

This poster reports the results of noninvasive field prospection using aerial drone photogrammetry to map and reconstruct surface architecture at two multi-occupation archaeological sites in the Moche Valley of Peru. Sites MV-42 and MV-49 (Puente Serrano) make up a fortified and possibly ceremonial center complex located in the middle valley. The sites were occupied contiguously during the Salinar, Gallinazo, and Early Moche phases (EIP; 400 BC–AD 400), with a later reoccupation by the Chimu phase (LIP; AD 1000–1470). Aerial drone maps were imported into GIS software to allow for more robust analyses working toward interpreting and analyzing human movement while ascending to the summit. These data will help us to better assess the importance of vision in settlement location and protective architectural positioning using view sheds and inter-visibility analyses with the surrounding landscape.

Carr, Sean (Penn State University) and Alma Gabriela López Rivera (Tula Region Interaction and Migration Project [TRIMP])**[120]** *Technological and Archaeometric Analysis of Obsidian from Cerro Magoni*

This study addresses one of the fundamental goals of the TRIMP—to contextualize local processes with broader patterns on regional scales—by combining formal technological and geochemical source analysis of obsidian recovered from recent archaeological excavations at Cerro Magoni, a hilltop Epiclassic site in Tula, Hidalgo. Archaeologists can use a variety of archaeometric techniques to better understand ancient interaction networks. Obsidian is a chemically homogeneous volcanic glass that was widely traded in Mesoamerica throughout the prehispanic era. This valuable resource was procured at geographically specific source areas, each of which has a unique chemical signature. Portable X-ray fluorescence (pXRF) permits archaeologists to detect the unique trace-element signature of obsidian artifacts with a high degree of certainty. With this information, the original source of each obsidian artifact can be determined. This paper presents a preliminary appreciation of patterns in local lithic production and regional exchange networks through the combined results of 1) formal technological analysis of the obsidian assemblage from Magoni, and 2) pXRF source analysis of a sample of the assemblage to provide additional insight into the social and economic networks that operated during the Epiclassic period in the Tula region and beyond.

Carr, Christopher (University of Cincinnati), Jeffrey Brewer (University of Cincinnati), Nicholas Dunning (University of Cincinnati), Kathryn Reese-Taylor (University of Calgary) and Armando Anaya Hernández (La Universidad Autónoma de Campeche)**[337]** *Using Lidar to Locate and Classify Ancient Maya Water Storage Features at Yaxnohcah, Campeche, Mexico*

Airborne lidar presents a valuable tool to investigate water management in a water-scarce region of the Maya lowlands. We analyze 25 km² of lidar elevation data for the ancient Maya site of Yaxnohcah in Campeche, Mexico. Using the hydrologic tools in the GIS software ArcMap we identified hundreds of closed depressions (many extremely small). These features may have a natural origin (e.g., a sinkhole) or may be anthropogenic (e.g., from quarrying), or may be data artifacts. We used a series of filters to narrow the list of closed depressions to those which have the potential to be used for water storage. We examined many of these features on the ground and excavated several, with the archaeological data indicating their origins during the Middle Preclassic period (900–400 BC). As the lidar also shows residential and monumental structures, we examine the spatial relationships between structures and water storage features (including watershed area, drainage lines, and water storage capacity).

Carr, Christopher [337] see Dunning, Nicholas

Carr, Philip (University of South Alabama)**[193]** *Representing and Intervening: Team-Based Learning in AN 442 Cultural Resource Management*

Team-Based Learning (TBL), a powerful pedagogical tool, has several essential elements: forming permanent teams; flipping the classroom; following a specific sequence of individual work and teamwork, and providing immediate feedback. In combination, these elements create a motivational framework in which students increasingly hold each other accountable for coming to class prepared and contributing to solving meaningful problems in various manners. Creating in-class application activities as part of the flipped classroom strategy is an essential element and can be daunting for first-time adopters of TBL because of the upfront commitment to their creation. Employing the thought process “representing and intervening” from philosophy provides a strategy for constructing these activities by which students are provided the “textbook” view of a topic outside of class (representing) and are given the meaningful and “messy” real world (intervening) activities in class. By working through the activity, students clarify and deepen their understanding of the textbook view and hone their experience with significant problems. TBL holds great promise for undergraduate students in the classroom acquiring a deep knowledge and an enduring understanding of archaeological method, theory, and practice.

Carriere, Ed [138] see Croes, Dale

Carrillo Bosch, Vania (Dirección de Registro Público de Monumentos y Zonas Arqueológicas e Históricos)

[328] *Protection of Cultural Heritage: The Case of Yaxcabá and Yaxunah, Yucatán*

The objective of the paper is to present and compare the notions held by the contemporary residents of the town of Yaxcabá, the municipality's head, and the village of Yaxunah in Central Yucatán, about the protection and conservation of the archaeological sites on their lands. Even though Yaxcabá and Yaxunah are less than 20 km apart, these two population centers display social, political, and economic differences and have been influenced by varying amounts of exposure to archaeological research projects and tourism. As a result the notions of cultural heritage vary among the inhabitants of Yaxcabá and Yaxunah. We will also provide recommendations for how to integrate local residents' full participation in promoting the protection and conservation of cultural heritage. Archaeologists need to be fully aware of the different land tenure and management systems of the lands onto which archaeological sites are located, as these will affect the way communities relate and engage with the ruins. Close collaboration of archaeologists and local communities are essential for a successful cultural heritage conservation and management process.

[328] *Chair*

Carrizosa Montfort, Fernando [225] see De Anda Rogel, Michelle Marlene

Carroll, Jon (Oakland University)

[350] *Using Aerial Remote Sensing to Assess Error and Uncertainty in Archaeological Site Mapping*

Archaeologists often find themselves excavating sites where previous investigations have been performed, and documentation relating to earlier work may be of varying quality. This discussion focuses on the use of a topographic mapping drone to assess error and uncertainty in archaeological site survey performed at Tel Lachish, Israel since the 1930s. Systematic assessments of historical map datasets were performed within a Geographic Information System (GIS) allowing for an enhanced understanding of site excavation over time. These assessments allow researchers to avoid previously disturbed areas with a much greater degree of confidence maximizing valuable field time.

Carson, Mike (Micronesia Area Research Center [MARC])

[208] *Changing landscapes of the Paleolithic/Neolithic transition in Taiwan*

Toward understanding the Paleolithic/Neolithic transition in Taiwan, a paleo-terrain approach allows reconstruction of the ancient landforms and habitats of where people lived. Those ancient contexts help for us to situate the activities of people using their landscapes in different ways at intervals of 7,000, 6,000, 5,000, and 4,000 years ago. This approach needs to account for significant change in tectonic movement of land masses, slope erosion and redeposition patterns, fluctuating sea level, and other factors coordinated with the geographic distribution of cultural sites at specific measured time periods. By building a stronger sense of the natural and cultural context during the time period of study, other questions can be explored more productively.

[110] *Moderator*

[253] *Discussant*

Cartagena, Isabel [134] see Gayo, Eugenia M.

Cartagena, Isabel [134] see Loyola, Rodrigo

Carter, Alison K. (University of Illinois Urbana-Champaign)

[333] *Houses (and Gardens?) at Angkor*

Household archaeology and a focus on residential spaces is an emerging field in Southeast Asia. At Angkor, this approach has great potential for exploring the resiliency of nonelite members of society through changes in environmental and sociopolitical processes. In this paper we present results from the ongoing analyses of a 2015 excavation of a house mound within the Angkor Wat enclosure. Using a variety of techniques including macro- and microbotanical analyses, geoarchaeology, soil chemistry, and spatial analyses of artifacts we aim to identify specific activity areas on top of the mound. Botanical analyses are especially informative for identifying the presence of household gardens and subsistence practices of the people on the mounds. Radiocarbon dates suggest a continuous occupation of the mound during the Angkorian period, with reoccupation or reuse during the post-Angkorian period. Although issues of preservation and the nature of Angkorian house construction (which built houses on stilts with their house floors above the ground) are challenging, we see great potential in this research.

[271] *Chair*

Carter, Benjamin (Muhlenberg College)

[372] *Discussant*

Carter, Kari, Aubrey Cannon (Department of Anthropology, McMaster University) and Eduard Reinhardt (School of Geography and Earth Sciences, McMaster U)

[22] *ITRAX XRF Analysis of Shell Midden Sediments from Sites on the Central Coast of British Columbia*

We present the results of using an ITRAX XRF core scanner on fine-fraction shell midden sediments. High-resolution multi-element analyses of central coast sites confirm patterned intra- and intersite variability in the relative abundance of phosphorus and calcium determined on the basis of earlier low-resolution studies. Analysis of Namu site deposits dating from 11,000–2000 cal BP show the relative absence of residual calcium in early shell-free deposits (ca. 11,000–7000 cal BP) but overall continuity in the relative abundance of potassium throughout the deposits. We outline preliminary interpretations of these results, and the further potential for the application of this method on the Pacific Northwest Coast and at shell midden sites globally. The precision and replicability of this technique, and its capacity to produce reliable results from very small quantities of material, support wider use of small-scale sampling of shell midden sites combined with intensive analysis of midden constituents.

Carter, Michael (Director, Industry Relations, Master in Digital Media), Jean Li (Department of History, Ryerson University) and Alex Ferworn (Department of Computer Science, Ryerson University)

[18] Looting, Robotics, and Experiential Archaeology for Non-Archaeologists

This paper will examine a recent effort to develop an interdisciplinary graduate level digital media and physical computing course, framed as experiential archaeology for non-archaeologists. By combining theory and practice of digital media, archaeology and a computer science course in robotics as an introduction to the cultural heritage destruction of the el-Hibeh site in southern Egypt due to pervasive looting, graduate students in digital media worked alongside undergraduate students in computer science to design, develop and “deploy” functional robots that could be hypothetically used to examine the extent of looting holes and tunnels within a simulated archaeological landscape. Egyptologist and co-Director of the el-Hibeh site, Dr. Jean Li framed the archaeological, historical and current best practices of Egyptian archaeology while Dr. Alex Ferworn, a specialist in disaster management robotics design, provided the practical technical knowledge to address design, functionality and applicability in the field. This interdisciplinary approach demonstrated how non-archaeological students from varied fields of expertise and skill, could negotiate archaeology, digital media and physical computing in the creation of new archaeological knowledge in methods and practice. In doing so, archaeology and the application of digital media became the basis of their experiential learning.

Carter, Tristan (McMaster University), Zachary Batist (University of Toronto), Kathryn Campeau (University of Toronto), Yosef Garfinkel (Hebrew University) and Danny Rosenberg (University of Haifa)**[22] Social Interaction at Distance over the Long Term: Obsidian Sourcing from the Southern Levant (Ninth–Fourth Millennia cal BC)**

The McMaster Archaeological XRF Lab is dedicated to undertaking major regional obsidian sourcing studies, not least in the Eastern Mediterranean where we have the North American geological source sample collection. We take a holistic, integrated approach, melding chemical composition with the artifacts’ techno-typological characteristics, contextual information and other pertinent data to produce “thick description” narratives. In this case we consider obsidian circulation and consumption among Southern Levantine populations over five millennia, from Pre-Pottery Neolithic B to the Early Bronze Age (ninth–fourth cal millennia BC). Artifacts were analyzed using EDXRF spectrometry from Nahala Lavan 109, Beisamoun, Sha’ar Hagolan, Ein el Jarba, Tell Tsaf, Tell Ali and Marj Rabba. Sourcing data is then located within a broader Levantine, South-East Anatolian and Mesopotamian context using Social Network Analysis. The results show that while the relative quantities of these exotic products (closest sources >800 km distant) in circulation did not change significantly, the range of raw materials increased significantly through time, from an initial reliance on central Anatolian products, to the use of central, eastern and north-eastern Anatolian and Armenian obsidian. The expanded socioeconomic networks that underpinned these Southern Levantine communities’ access to obsidian are interrogated with regard to larger cultural dynamics of these periods.

Carter, Tristan [22] see Campeau, Kathryn

Carvajal Contreras, Diana**[270] Rethinking the Formative Stage: A Reconsideration from Two Archaeological Sites on the Colombian Caribbean Lowlands**

The concept of formative in Colombia is traditionally framed as a transitional period within the unilineal cultural evolution in the Americas, characterized for several indicators such as sedentary life, diversity of socioeconomic forms and the emergence of new technologies such as pottery. In this paper, we revised two archaeological sites: Monsu and Puerto Hormiga, incorporating zooarchaeological analysis, technological and use-wear analyses to provide understanding into past human behavior including interaction with tropical environments, changes in subsistence, seasonality, mobility and adaptation. With this understanding, we discuss the scope of the concepts developed around the formative stage for the comprehension of early human adaptations in the Caribbean Lowlands.

[220] Discussant

Carvalho, António Faustino [23] see Rodriguez-Rellan, Carlos

Carvalho, Milena (University of Louisville)**[165] An Assessment of Small Game Exploitation at Gruta Nova da Columbeira in the Middle Paleolithic (Portugal)**

In Europe, differences in subsistence between Neanderthals and anatomically modern humans are one of the ways in which archaeologists detect behavioral shifts in the Middle to Upper Paleolithic transition. In this paper, I present faunal and stable isotopic analyses of *Oryctolagus cuniculus* (the European wild rabbit) from levels C.6, C.7, C.8, and C.9 of Gruta Nova da Columbeira, a Mousterian cave site located in central Portugal. I use these data to test two subsistence models: 1. Anatomically modern humans gained a competitive advantage over Neanderthals by exploiting broad-spectrum diet type prey items such as the rabbit (as in Fa et al. 2013); and 2. Neanderthals practiced a broad-spectrum diet in local environments exemplified by sites such as Bolomor Cave (as in Blasco and Peris 2012). To conclude, I explore whether central Portugal displays the same shift in subsistence patterns from the Middle to Upper Paleolithic transition as elsewhere in Europe and if using the concept of a transition is an efficient way to track human adaptation to environmental change in the Pleistocene.

Casana, Jesse (Dartmouth College)**[29] A Hot New Technology: Advancing Methodologies for Archaeological Aerial Thermography**

Since the 1970s, archaeologists have known that a wide range of features, including subsurface architecture, pits and ditches, pathways, and surface artifacts should theoretically be visible in an aerial thermal image, but technological hurdles largely prevented thermography from being deployed in most field settings. Recent research has begun to take advantage of new lightweight, uncooled thermal cameras, increasingly reliable drones, and photogrammetric image processing software, revolutionizing archaeologists’ ability to collect and mosaic thermal imagery. Utilizing data from archaeological sites in North America and the Middle East, this paper presents new methods for acquisition and processing of aerial thermal imagery using a camera system that collects raw thermal imagery at very high spectral resolution. These data offer many possibilities for quantitative, raster-based methods to filter out noise, improve feature recognition, and perform archaeological feature discrimination. Results reveal a great deal regarding the varied archaeological sites investigated by this project, in many cases rivaling results of more conventional archaeo-geophysical data, and thereby offering researchers a powerful new method to explore the archaeological record in a way that is rapid, inexpensive, and nondestructive.

Casanova Vasquez, Erick (Universidad Nacional Mayor de San Marcos), Abigail Gamble, Beau Murphy (University of New Mexico), Karissa Dieter and Steven A. Wernke (Vanderbilt University)**[75] Houses of Colonial Chiefly Authority: Local Elites in the Social Order of Mawchu Llacta, a Colonial Reducción Town in the Southern Highlands of Peru**

As a result of the Toledan Reforms in the Viceroyalty of Peru during the late fifteenth century, new settlements known as reducciones were established to centralize indigenous populations. Such is the case of Mawchu Llacta, originally Espinar de Tute, in the Caylloma Province, Arequipa. The introduction of these sweeping reforms brought a series of major changes to the social order. External agents were established as the new bearers of power and local elites took on a secondary status. However, a dearth of archaeological data limits our understanding of the social and political character

of local elites in reducciones. Excavations by the PATA project during the 2016 season inside three structures that are the likely dwellings of curacas allow us to learn more about the role played by these local authorities within their community. Initial evidence suggests that these houses served a semi-public role as gathering spaces for religious festivals and community events, though diversity in the lifeways of the three elite households is also clearly displayed. The comparative analysis of the architectural elements and cultural materials provide us with enough information to better define the principal activities of local elites and how they participated in a new colonial social order.

Casanova Vasquez, Erick [75] see Berquist, Stephen

Casar, Isabel (Instituto de Fisica UNAM), Pedro Morales (Instituto de Geologia Universidad Nacional Autonom), Ernesto Velasco (Centro INAH Tamaulipas) and Abigail Meza (Instituto de Investigaciones Antropologicas Univer)

[290] *Reconstruction of Diet and Mobility Patterns in Human Remains, Bone, and Teeth from a Mortuary Cave (Cueva De La Sepultura) in Tamaulipas, Northeastern Mexico, through Stable Isotope Analysis*

Bone and teeth were analyzed from multiple burials from a mortuary cave in the North of Mexico, dated around 1400 and 400 BC. Samples from 14 jawbones were analyzed to obtain the $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ of the bone collagen as well as $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ in bone bioapatite; M2 or M3 from the jawbones were cut into a series of layers to obtain multiple isotopic signatures from enamel, structural carbonate and collagen from the dentine of each tooth, representing different periods in the life of the individual. $\delta^{13}\text{C}$ of both dietary components shows a heavy reliance on C4 and CAM resources and probably maize with seasonal variations. Unusually high $\delta^{15}\text{N}$ may represent high levels of hunting activity as well as high $\delta^{15}\text{N}$ from ^{15}N enriched soils or CAM plants. The isotopic analysis supports the possibility of a mixed economy for the individuals from the mortuary cave with changes in diet related to hunting, fishing, recollecting local wild plants, as well as adopting low intensity agriculture of domesticated plants to different degrees.

Cascalheira, João (ICArEHB—Portugal), Nuno Bicho (ICArEHB—Portugal) and Celia Goncalves (ICArEHB—Portugal)

[154] *An Android-Based System for Archaeological Survey and On-Site Stone Tool Analysis*

A recent survey project is documenting new Stone Age sites in various regions of Mozambique, including the areas of Niassa in the north and Limpopo in the south. Most of this work involves the identification and characterization of hundreds of surface lithic scatters among which thousands of stone tools must be analyzed. A digital recording system was required that would allow to 1) register information of each scatter, including context description and geographical coordinates; 2) do on-site lithic analysis using custom data entry forms and allowing direct input from digital calipers; and 3) rapidly organize, visualize, and share survey data between survey teams at a daily basis. This poster displays the application of a freeware Android-based system, composed of two self-authored smartphone apps with fully customizable configurations and thus usable by other researchers. The apps use the built-in GPS chips and direct mini-USB (OTG) input capabilities of smartphones to, respectively, get sites' coordinates and gathered lithic measurements data from digital calipers. The system also allows to easily export site and lithics data into Google Fusion Tables cloud-based service, where team members can visualize and manage data, including photographs of each scatter or stone tool, and create custom maps.

Cascalheira, João [154] see Goncalves, Celia

Casella, Melissa [194] see Sparks, Shane

Case, Nicholas (San Diego State University), Julia Clark (American Center for Mongolian Studies), Tumurbaatar Tuvshinjargal (National Museum of Mongolia) and William Taylor (University of New Mexico)

[114] *Photogrammetry, Provenance, and Preservation of Tangible Heritage in the Khangai Mountains, Mongolia*

This study presents results from the photogrammetric documentation of rock art in western Mongolia. Unlike many traditional rock art documentation techniques practiced in Mongolia, photogrammetry presents unique advantages for the study and preservation of cultural heritage. These include the production of a digital 3D model, preservation of color and original lighting conditions, ease of documentation, and the inclusion of contextual information such as surrounding features, panel orientation, and geologic context. Using photogrammetric techniques, we documented 10 late Bronze Age standing stones and three separate rock art localities in the Khangai mountains of Bayankhongor province, western Mongolia. By taking images at different times of day, we were able to produce high-visibility images of "deer stone" stelae, obviating the need for chalk or other substances which can damage the stone surface. By integrating our data with aerial photography, we produced high-resolution digital maps of our study sites. Results suggest that 3D photogrammetry may be profitably integrated into future research of late Bronze Age monuments in Central Asia.

Case, Emily and Emma Britton (UC Santa Cruz)

[155] *Compositional and Lead Isotope Analyses of Carretas and Huerigos Polychrome from Northwestern Chihuahua*

The northern Mexican state of Chihuahua contains many little-known archaeological sites. Established collections, such as E. B. Sayles's 1933 survey collection, can provide new insights using analytic techniques not available when they were originally acquired. We analyzed a subset of Sayles's collection, including Carretas and Huérigos polychrome ceramic types, for glaze compositional information and geographic sourcing of the lead flux. Analyzing the samples using laser ablation inductively coupled mass spectrometry (LA-ICP-MS) determined new compositional information. Isotopic analysis using acid dissolution ICP-MS and subsequent comparison with previously analyzed samples from lead ore mines in the Chihuahua area contributed to geographic sourcing of the lead component. Chemical characterization suggests that both Carretas and Huérigos polychromes used similar, consistent and effective glaze recipes in their creation. Lead isotope ratios suggest pottery creators likely procured ore for glaze-paint production from mines in northern Chihuahua. However, lack of comparative isotopic data from the immediate area around sampled sites means the comparisons and conclusions presented here are preliminary.

Caseldine, Christopher (Arizona State University)

[335] *New but Classic: An Examination of Hohokam Canal System 1 during the Classic Period*

Canal System 1, the largest of the four major systems along the lower Salt River, brought water to fields associated with some of the most well-known Hohokam villages, including Mesa Grande, Los Hornos, and Los Muertos. Previously, it was thought that the system reached its maximum extent prior to the Sedentary Period. Recent data and reconstructions of the development of Canal System 1, however, indicate that the system may not have reached its full extent until the Preclassic/Classic transition or the early Classic. If so, the expansion of the system would represent the final major irrigation construction with the lower Salt River Valley. In this paper, I examine Canal System 1 during the Classic. I suggest that sociopolitical changes, which occurred within the system during the late Preclassic and early Classic, led to a fundamental reorganization of the system that may have reverberated throughout the valley.

[335] *Chair*

Caseldine, Christopher [335] see Howard, Jerry

Cases, Bárbara [134] see Valenzuela, Daniela

Casey, Joanna

[161] *From the Field to the Festival: Reading the Landscape of Cloth in Axum, Ethiopia*

The city of Axum in northern Ethiopia is well-known for its high quality, hand woven cloth. Sundays and festivals bring throngs of local people who, to the outside observer, appear to be uniformly dressed in beautiful white handspun clothing embellished with colorful woven borders and embroidery. This apparent uniformity belies a very complex set of activities that lead to the production, distribution and consumption of cloth in Axum. Each step in production is dominated by people of particular ages, genders, economic levels, religions and ethnicities, who work entirely independently in different parts of town and have complete autonomy over the products of their labor, but usually very little interest in the finished product. Consumption is a matter of taste, tradition and finances. In the town shops lure wealthy customers with new embroidery styles named for current events, while village women enhance inexpensive industrially produced cloths that develop a parallel conversation about feminine craft in rural households. The purpose of this paper is to chart the landscape of cloth in Axum through production, trade and consumption and to challenge the perception that the production of cloth resides in the moment of weaving and in the skills of the master weaver.

Cassedy, Daniel (AECOM)

[260] *Archaeology of British Military Logistics in the French and Indian War*

The Hudson River in upstate New York formed a strategic military corridor between the North American British and French colonies for centuries. In the 1750s, it was the setting for multiple British expeditions moving north to contest the French coming south out of Lake Champlain and Canada. Because the fighting was seasonal, as were the garrisons of the forts and storage depots, the facilities had to be frequently rebuilt, and the entire supply chain had to be renewed annually to move tons of food and weapons by bateaux and ox cart to the front lines. Primary historic documents combined with data from excavations at multiple sites along the river between Albany and Lake Champlain have provided evidence to help re-create and understand this complex logistical supply chain and better illuminate the daily lives and experiences of eighteenth-century soldiers.

Cassen, Serge (CNRS), Pierre Pétrequin (CNRS), Guirec Querré (Ministère de la Culture) and Valentin Grimaud (Université de Nantes)

[23] *Spaces and Signs of Transfer of Jade and Callaïs in the Neolithic of Western Europe*

Two different groups of green stones with a distant origin are found together in the Neolithic tombs of the Carnac Region (Brittany, France): the Alpine jades (jadeite, omphacite, eclogite) were used as raw material for polished axes and disc-rings, while the Iberian callaïs (variscite, turquoise) for pendants and beads. The way in which these transfers took place will be the subject of this presentation, highlighting the specific features of each geographical area. With such aim in mind, the rows of steles and the iconographic programs inscribed in the standing stones of the study area will be analyzed in order to propose a comparison of the respective symbolic systems. If the land routes from the Alps begin to be better monitored during the fifth millennium, the sea routes to/from the Iberian Peninsula remain theoretical but very promising. We will offer several arguments in favor of the latter hypothesis.

[23] *Discussant*

Cassen, Serge [23] see Querré, Guirec

Casson, Aksel (Slippery Rock University)

[43] *Developing Long-Term Public Archaeology in Slippery Rock, Pennsylvania*

Slippery Rock University (SRU) maintains the historic Old Stone House as a museum in Slippery Rock, Pennsylvania (Butler County). In addition to living history and educational events held on site, an active archaeological excavation is being conducted on an external structure, hypothesized to be a summer kitchen. Preliminary excavations have been a joint venture between SRU students and faculty and members of the local community—including amateur archaeologists. This presentation will discuss efforts to develop long-term integrated public archaeology using the Old Stone House and the new SRU Archaeology Lab to foster engaged community stewardship and interest in cultural heritage management among town and gown alike.

Castañeda, Amanda M. (Texas State University- San Marcos)

[126] *Characterizing Hunter-Gatherer Ground Stone Bedrock Features in the Northeastern Chihuahuan Desert*

Ground stone bedrock features are common at archaeological sites in the Lower Pecos Canyonlands of southwest Texas. These features are human-made depressions pecked, ground, or worn into bedrock or large boulders, and were used for a variety of processing activities by the indigenous peoples. Although archaeologists in the region have informally recognized different “types” of ground stone bedrock features (e.g., slicks, grinding facets, deep mortars), there have been no dedicated studies of bedrock features. Due to their widespread occurrence in the region, bedrock features represent an untapped research avenue regarding the lifeways of Lower Pecos hunter-gatherers. Therefore, to gain a better understanding of these features, 824 bedrock features were mapped, documented, and analyzed at ten sites across the Lower Pecos. Structure from Motion (SfM) photogrammetry was utilized to map the bedrock features and provide high resolution three-dimensional data to gather metric measurements. Statistical analyses were employed to characterize the range of bedrock feature variation. This paper discusses the potential implications of bedrock feature morphological variation and explores the role(s) these features played in Lower Pecos hunter-gatherer lifeways.

Castañeda, Amanda M. [126] see Hanselka, Kevin

Castanet, Cyril [131] see Nondédéo, Philippe

Castañón, Mijaely (Instituto Nacional de Antropología e Historia), Lissandra Gonzalez (INAH-Michoacán), Alejandro Valdes (INAH-Michoacán) and José Luis Punzo (INAH-Michoacán)

[12] *Characterization of Ceramics Uncovered in the Parota River Basin and Lake Sirahuen Basin, Michoacán, Mexico: Fluorescence Analysis in Ultraviolet Light and Petrography in Thin Sheets*

This poster shows the results of the petrographic characterization of the ceramics found in the basins of the Parota River and Lake Sirahuen, two archaeological areas surveyed as part of the Proyecto Arqueología y Paisaje del Área Centro Sur de Michoacán. Fluorescence techniques applied are an induction of ultraviolet light and petrographic analysis in thin sheets; the first technique was used as an experimental test to identify variances in a very large sample and thereby to reduce to a viable quantity for lamination. Petrography into thin sheets yielded information on mineralogical composition, manufacturing techniques, and data used to propose a first approach in identifying regions for raw material extraction.

Castañón, Mijaely [12] see Gonzalez, Lissandra

Castañón, Mijaely [12] see Valdes, Alejandro

Castellanos, Jeanette [125] see Foias, Antonia

Castelli, Clotilde [62] see Horta, Helena

Castells Navarro, Laura [139] see Armit, Ian

Castillo, Cristina (Institute of Archaeology [UCL])

[177] *Cereals in Southeast Asian Prehistory*

Rice is the most important crop in Southeast Asia today. The evidence is that rice was equally important in Southeast Asia's past. From the Neolithic period to the Middle Ages, rice has been discussed as food, a ritual item, a farming system, a culinary tradition, a tradable commodity and the basis of power. However, was it always the staple crop in Southeast Asia? The archaeobotanical studies conducted in Central Thailand by Weber revealed that in some instances and places, millet was more important than rice. In this paper, we discuss cereals and their role in Southeast Asia. Sites belonging to different periods in Mainland Southeast Asia are presented with information derived from the study of plant remains, including cereals and weeds of cultivation.

Castillo, Feren [170] see Uceda, Santiago

Castillo, Mario (University of California, Berkeley) and Patricia Fournier (Esquela Nacional de Antropología e Historia)

[84] *Settlement Ecology in the Tula Region of Mesoamerica: A Local Landscape Perspective*

Based on seminal contributions by Suzy and Paul Fish associated with full-coverage surveys and agave cultivation, this paper explores changes in regional settlement patterns in relation to land-surface morphology in the Tula region in Mesoamerica during the Classic to Postclassic periods (200 CE–1500 CE). Drawing on our field surveys, independent settlement data from the Tula Region, and landform segmentation and classification in Geographic Information Systems (GIS), this paper illustrates that place to place landscape variation provides a more complex picture of changes in regional settlement patterns over time. In addition, to interpret the landscape ecology of settlement patterns, geomorphometric analysis provides an additional tool for assessing potential taphonomic impact on archaeological remains. In this paper we provide preliminary results and discuss how integration of other spatial datasets can provide a more robust framework from interpretation of settlement changes in relation to Mesoamerican's local landscape ecologies in central Mexico.

Castillo Butters, Luis (Universidad Católica del Perú) and Aldo Watanabe (Ministerio de Cultura, Perú)

[29] *Drones, Photogrammetry and 3D Modeling in Peruvian Archaeology*

Air photography, using Drones and 2D/3D Models produced with Photogrammetry, is changing the way we do field archaeology. This technology also can be a powerful tool in telling a story about the sites and the work that we, as archaeologists, do there. However, several technological adaptations have to be developed in order to take full advantage of these new technologies. In this paper, we will walk you through the process of combining air and ground based 3D modeling along the North Coast of Perú, which utilizes air photography technology to produce a new way to render our visions of the past.

[170] *Discussant*

Castillo-Cardenas, Karime (UCLA)

[36] *Technology Transfer, Variability, and Adaptation of Glass Production in Colonial Mexico: Preliminary Results from a Local and Global Perspective*

Glass arrived in the Americas as a fully developed technology and glass workshops appeared in New Spain soon after the establishment of the colonial regime. Little is known about the way this technology was adapted to the local resources and conditions, the variety of products made, and how this technology changed and assimilated within the viceregal world and the Spanish Empire at large. Through a multi-scalar and multidisciplinary approach incorporating archaeology, history, ethnography and scientific investigations, this project unfolds the social changes and the processes of adoption of glass technology in colonial Mexico within the context of the local sociopolitical milieu and global influences that shaped its development. Historical research performed at national and local archives in Mexico and Spain, combined with ethnographic research and the scientific study of glass artifacts, have provided crucial information on the social and technical aspects of glassmaking and glassworking in New Spain, thus placing Mexican archaeological glass collections in a global context.

Castro, Silvina (CONICET, Laboratorio de Paleocología Humana, Universidad Nacional de Cuyo), Gustavo Lucero (Laboratorio de Paleocología Humana, Universidad), Valeria Cortegoso (CONICET, Laboratorio de Paleocología Humana, Univ) and Marsh Eric (CONICET, Laboratorio de Paleocología Humana, Univ)

[91] *Costs of Acquiring Lithic Materials in High Altitude Environments (Northwestern San Juan Province, Argentina): A GIS-Based Evaluation*

Based on geo-archaeological studies on the Argentine–Chilean border in the southern Andes, a method is proposed for ranking lithic sources based on the quality of the material, cost of accessibility, and location along travel corridors. In the upper Las Taguas river valley (northwestern San Juan Province, Argentina, 5500–3700 masl), 32,622 lithic artifacts from 30 sites were analyzed to study the variation in the use of seven lithic sources between 10,000 and 500 cal BP. We ranked the time required to travel from each site to all sources with anisotropic analysis based a surface elevation

model and Tobler's cost for movement on slopes. Considering Andean topography the accessibility of each source is ranked in terms of its distance to travel corridors and movement based on least cost path calculations. Finally, based on detailed analyses of archaeological material and regional models, we propose distances that may help to estimate lithic sources as nonlocal or extra-regional.

Castro, Victoria [134] see Valenzuela, Daniela

Castro Irineo, Jacqueline [225] see Chávez Balderas, Ximena M.

Catanach, Samuel (Arizona State University) and Mark R. Agostini (Brown University)

[34] *Relational Native Ontology and Tewa Ethnogenesis in the Pueblo of Pojoaque*

This paper recognizes the collaborative potential between American Indian Studies and an emerging landscape archaeology in furthering interdisciplinary studies of the American Southwest. Here the authors call for the continued reinterpretation of ancestral and contemporary Tewa sites by employing Native ontological and decolonized historical approaches to archaeological and ethnographic contexts situated in the backdrop of a larger and active cultural landscape. Such methods offer nuanced insight into the functions and meanings relating to multiple interacting identity communities through time, population movements, and other types of migration. In particular, we discuss the effects of early Spanish colonialism and later American colonialism, mass migrations, indigenous language, and the potential relationship between archaeological inquiry and Pueblo people in what is now the modern day Pueblo of Pojoaque.

Cattáneo, Roxana [226] see Flegenheimer, Nora

Cattáneo, Roxana [227] see Izeta, Andres

Cau Ontiveros, Miguel Ángel (ICREA and University of Barcelona)

[166] *Discussant*

Cau Ontiveros, Miguel Ángel [166] see Mas Florit, Catalina

Cauchois, Hinanui (University of Hawaii at Manoa) and John O'Connor (University of Oregon)

[302] *Preliminary Investigations at Raiatea, Society Islands, French Polynesia*

The Society Islands are of primary importance for understanding human impacts on island ecologies and the dispersal of precontact voyaging populations in East Polynesia. Raiatea, the largest island of the Leeward Group, is recognized through Polynesian oral traditions as a locus of regional interaction and a departure point for migrations that colonized the distant islands of Hawaii and Aotearoa (New Zealand) in the second millennium AD. Here we present results from our first season of fieldwork in the district of Tumaraa, western Raiatea. Subsurface testing has provided a stratigraphic profile for coastal flats and offshore islets (motu). Excavations at the megalithic Marae Tainuu revealed evidence of a substantial occupation history, with the exposure of early architecture, a dense deposit of subsistence remains, and evidence for the manufacture and use of lithic tools. Long-term project goals include a detailed analysis of the historical ecology of Tumaraa from which to situate this region in the broader context of East Polynesian settlement history and examine the impacts of human activity on coastal and offshore environments.

Cegielski, Wendy (Arizona State University)

[234] *Chronology and Social Process in Bronze Age Spain*

This research presents an evaluation of the use of morphometrics of ceramic vessels for organizing site chronologies and social interaction. The object of morphometric analysis is to study how changes in artifact shape covary with time and space. This particular method is tested against Bronze Age ceramics from the Valencian region in Spain along the Western Mediterranean. The characteristic stylistic homogeneity of these ceramics has proven especially resistant to chronological fine-tuning through stylistic analyses and absolute dating. This study uses simple metric indices produced from ceramic rim drawings commonly available in publication for archaeological assemblages to characterize patterns in rim morphology through time and space. The development of methods that easily and successfully improve the chronological resolution of these "resistant" assemblages is essential for projects tackling cause and process. This is the case as applied to the wider goals of this research project, using social network analysis to understand processes that maintain stability of social structures in the Valencian Bronze Age.

Celhar, Martina [282] see Zaro, Gregory

Cercone, Ashley (University of Manitoba) and Kristin Donner (Skirball Cultural Center)

[132] *Ceramics Production and Trade in Western Anatolia: A Reexamination of the Ceramic Mold-Making Process at Seyitömer Höyük in Kütahya, Turkey*

During the Early Bronze Age at Seyitömer Höyük, ceramics began to be standardized in their shape and size through the use of a mold-making process. Evidence from the archaeological record suggests that this innovative technique was incorporated at the site due to the increase in trade and demand for ceramics from other settlements in Anatolia, from nearby Küllüoba to faraway Troy. The early use of a mold-making process established Seyitömer Höyük's pivotal role as a ceramic hub and trading center. This paper provides an overview of the evidence for ceramic production and trade at the site; and reexamines the current theory of how molds were utilized. Using ceramics housed at the Kütahya Archaeological Museum and Dumlupınar University Archaeological Museum, we analyze how molds were employed to create an abundance of ceramics and propose a new theory detailing this seminal production process.

[132] *Chair*

Cerda, Melissa

[66] *Discussant*

Cerezo-Román, Jessica (Cal Poly Pomona)**[335] *Cremation Mortuary Ritual among the Classic Period Hohokam and Trincheras Traditions***

Cremation and related fiery rituals performed by Phoenix and Tucson Basin Hohokam in Southern Arizona and Trincheras Tradition populations in Northern Sonora are examined and contrasted in order to understand different regional spheres of social interactions. These were done by examining biological profiles and posthumous treatments of individuals to better understand who they were and how they were treated at death in the Classic Period (AD 1150–1450/1500). These data were compared between sites and at a regional level using quantitative and qualitative data. Preliminary results suggest major differences in cremation mortuary and fiery rituals between the Hohokam of the Phoenix and Tucson Basins. However, similarities were found between the Tucson Basin Hohokam and the Trincheras Traditions on how individuals were treated at death by their peers. These similarities suggest stronger spheres of interaction than previously envisioned between these regions that could possibly relate to shared perceptions of the human body and ideologies related to the use of fire and pyrotechnologies.

Cerimele, Nicole (University of Oklahoma)**[365] *Human-Animal Interactions at the Start of the Middle Holocene: New Evidence from Pit Deposits in Northeast Florida***

Northern Florida has provided some of the oldest evidence of riverine subsistence in the lower southeastern United States, redefining our understanding of how these communities interacted with animals. Previously, these data were restricted to bioarchaeological analyses of mortuary pond assemblages, such as the Windover site. Recent testing at Silver Glen Springs, along the St. Johns River, has uncovered direct evidence of animal exploitation that increases our knowledge of subsistence patterns in the early Middle Archaic. Specifically, excavations below a mined-out shell mound encountered numerous freshwater shell-bearing pits containing remarkably preserved faunal material. Radiocarbon dating has placed this material between 8900–7000 cal BP, and coeval with an apparent increase in surface water availability. This poster presents the results of a zooarchaeological analysis of pit contents, including a determination of species composition, diversity, and depositional treatment. This analysis reveals a heavy reliance on aquatic species, making it among some of the earliest recorded evidence for riverine-centered faunal exploitation in the region.

Ceron, Jasmina (University of Otago)**[229] *The Potentials of Anthracology and the Study of Archaeological Parenchyma in Vietnam Archaeology***

Archaeobotanical studies in Southeast Asia has been gradually developing in the archaeological scene in providing interpretation of the past. In this paper, a macrobotanical study of Vietnam, focusing on the anthracology (wood charcoal) and archaeological parenchyma, was initiated. The principles and methods used by the archaeologists in other regions in the analysis of wood charcoal and parenchymatous plant tissue are applied in the analysis of the plant remains recovered in the archaeological sites in Vietnam. The results will provide significant contributions to address questions relating to the past landscape, managing of the plant resources, seasonality, and the plant usage practices in the region.

Cerquera Benjumea, Gustavo (BAKOTA Project) and Hamima Halim (BAKOTA Project–Johns Hopkins University)**[196] *Death Games: Exploring the Békés 103 Cemetery Using 3D Technology***

3D modeling has become an important tool in the distribution and analysis of archaeological data. This technology also has the potential to make archaeological information more widely available to the public. The goal of this project was to develop an interactive 3D environment based on the Békés 103 cemetery in the Körös region of eastern Hungary. This environment allows users to navigate the site in the first person while examining the burial practices of the Bronze Age people who populated this site. To accomplish this, 3D models of exposed cremation urns and restored vessels were created using a combination of photogrammetry and video production techniques such as green screen, rotoscoping, and Adobe's AfterEffects software. Video production techniques were introduced to the process in order to maximize efficiency in a limited timeframe. Completed models were later incorporated into a 3D environment developed with the Unity game engine. This project can be helpful in demonstrating how 3D technology can be an effective way of collecting, disseminating, and promoting archaeological knowledge.

Cesaretti, Rudolf (Arizona State University)**[277] *Settlement Scaling in Medieval Europe and Tudor England***

From an archaeological perspective, the settlements of Late Medieval Europe lie far to one end of the social complexity spectrum. But from a modern perspective, they are decidedly ancient. Without the institutions and technologies of modern capitalism or the industrial revolution, Late Medieval settlements are commonly characterized as unproductive consumers within dynamic agrarian economies. Both economists and historians have assumed that the benefits of urban agglomeration economies—their economies of scale and increasing returns to scale—are unique to industrial and modern cities. However, recent theoretical advances suggest that the underlying causes of these agglomeration effects come from the density of socioeconomic interactions, and are therefore generalizable to settlements past and present. Here, I present two case studies from Medieval Europe and Tudor England that both exhibit the scaling properties of modern cities. Using a new database integrating historical and archaeological datasets, Medieval settlements are shown to exhibit economies of scale in their use of space. Using historical tax records, Tudor English settlements exhibit increasing returns to scale in economic output during a period widely characterized by "urban decline." These case studies force us to reconsider the role of settlements and urbanization in premodern economic development in general.

Cesario, Grace (Graduate Center, CUNY)**[35] *The Importance of Wild Animal Resources in Skagafjörður, North Iceland***

In both past and present, pastoralism has been an integral part of life in Iceland. In fact, status is generally defined by how many cattle one can keep; however, wild resources are abundant in Iceland and are also used to supplement the diet. For much of Iceland's history, wild resource use and access was heavily regulated through formal laws and social contracts that often favored elite landowners. Using case studies from Skagafjörður, North Iceland, this paper will explore the use of wild resources compared to domesticates. Preliminary zooarchaeological analyses of sites in the Hegranes region suggest that larger, wealthier farms used fewer and less varied wild resources than smaller, abandoned farms. This differential use of resources hints at the complex relationship between wealth and access to resources and, further, to the ways people would have thought about their use of wild animals—as a vital part of daily life or as something to be exploited occasionally. I argue that wild resources would have been vital to the smaller farms that could not support a large herd of domesticates, while larger farms likely had a very different relationship with the few wild resources they utilized.

Chala-Aldana, Döbereiner (Institute of Archaeological Sciences, Eberhard Karls Universität Tübingen), Hervé Bocherens (Department of Geosciences, Biogeology, Eberhard Ka), Christopher Miller (Institute of Archaeological Sciences, Eberhard Kar) and Kurt Rademaker (Department of Anthropology, Northern Illinois University)**[143] *Mobility among Hunter-Gatherers in the Central Andean Highlands during the Early-Middle Holocene: GIS Models from Sr and O isotopic Analyses***

Cuncaicha rockshelter (4,480 masl) is one of the highest hunter-gatherer occupation sites found so far in the Americas; it brings new insights about human adaptation to extreme living conditions and subsistence strategies within the Peruvian puna. This research intends to define the possible type of occupation and mobility patterns at the site during the Early and Middle Holocene through Sr and O isotopic analyses in dental enamel of the human individuals and faunal remains found buried in this site. The Pucuncho Basin, in which Cuncaicha is located, presents a particular $87\text{Sr}/86\text{Sr}$ ratio different from the lower-altitude ecological zones that surround it, allowing the assessment of mobility of the individuals, whereas the $\delta 18\text{O}$ provides clues for defining water sources as well as likely elevations where people could live. We conclude with a GIS-developed mobility model based on these isotopic analyses to explain how year-round occupation of the highlands could be the most plausible strategy for surviving and taking advantage of most of the perennial resources available in the puna, such as obsidian for tool making and camelids for hide, bone and meat consumption.

Challis, Sam (Rock Art Research Institute, South Africa)

[28] *Rock Art and Emergent Identity: the Creolization Process in Nineteenth-Century South African Borderlands*

Statements of authorship of rock art necessarily involve statements of identity. What happens, then, when identity is assumed or implied? This paper examines a well-known historical rock art panel in South Africa, supposed to portray a narrative of the demise of the San from their own perspective. To the contrary it finds that in fact the "colonists" sporting wide-brimmed hats and toting guns are, more likely, members of an emergent identity of creolized raiding bands drawn from markedly different precolonial indigenous groups, as well as "runaway slaves" and Europeans.

Chalmer, Nyra (Simon Fraser University), Spencer Greening (Gitga'at First Nation), Chris Picard (Gitga'at First Nation), Ginevra Toniello (Simon Fraser University; Hakai Institute) and Dana Lepofsky (Simon Fraser University; Hakai Institute)

[176] *The Gitga'at-Simon Fraser University (GSAHP) Archaeology and Heritage Project: Developing Community-Based Heritage Management Strategies in Gitga'ata Territory*

The Gitga'at First Nation, traditionally known as the Gitga'ata, of the Tsymsyen peoples on the Northwest Coast of British Columbia is facing major marine developments in their ancestral territory, most notably tanker traffic related to several crude oil and liquefied natural gas export projects. While the Gitga'ata hold extensive oral knowledge about their history and past landscape use, until recently, little was known about the territory archaeologically. To address this knowledge gap, in 2013 the Gitga'at-Simon Fraser University Archaeology and Heritage Project (GSAHP) was initiated to collect baseline archaeological data to inform decision-making related to development and community-driven research initiatives. Over the last several years, the GSAHP research team has investigated over 150 coastal archaeological sites, contributing significantly to our understanding of the Gitga'ata eco-cultural landscape. Many of these culturally significant places are touchstones of Gitga'ata identity, representing an unbroken connection between Gitga'ata people and their ancestors and illustrating the inextricable link between community well-being and their eco-cultural landscape. Through connecting archaeology with community knowledge and oral history, the nation is taking a proactive approach and developing holistic, long-term heritage management strategies reflecting their community's values in the face of developments taking place in Gitga'at ancestral territory.

Chamberlin, Matthew (James Madison University)

[129] *Women's Mobility and Inter-Pueblo Exchange in the Salinas Area, AD 1100-1300*

Katherine Spielmann's work in the Salinas Pueblo area of New Mexico has, among other things, emphasized how ritual and economic interconnectivity among late prehistoric pueblo villages articulates with internal social and cultural changes. One thread of this work, developed by several of her students, has been change in gender relations during the rise of the large towns of the Pueblo IV period (AD 1400-1600), especially involving women's roles in exchange, production, and ceremonial life. Transformations in gendered agency may have been crucial in the development of inter-pueblo exchange in earlier periods in the Salinas area as well, as suggested by evidence of change in women's mobility and involvement in symbolic communication over the transition from dispersed settlements to aggregated plaza-pueblos from AD 1100-1300.

Chan, Annie (University of Pennsylvania)

[33] *The Monumentality of Ancient Pastoral Landscapes in Western Tian Shan (Xinjiang, China)*

This paper examines the spatial configuration of stone structures built for ritual and funerary uses in the steppes of Western Tian Shan based on results of survey and excavation in the Bortala and Ili River Valleys in Xinjiang, China. Marked by clusters of structures attributed typologically to different epochs of human activity, these sites evince a recurring architectural expression of ritual and funerary customs spanning upwards of centuries. The additive process by which some of these structures came into existence, as previous field research in contiguous regions has noted, highlights the temporality of these locales and the perpetuation of pastoral landscapes. In dissecting monumentality, this paper contends that the influence of these structures on routes of movement among early pastoral societies manifests on a diachronic scale.

[33] *Chair*

Chan, Amy (UCLA)

[154] *An Analysis of Funerary Food Offerings and Imagery in Theban Tombs from New Kingdom, Egypt*

Food played an important role in ancient Egyptian funerary practices, but there has not been an examination of the types of food offered. I examined food offerings and their corresponding imagery in Theban tombs from New Kingdom, Egypt (1550-1070 BCE) in order to analyze how food in funerary rituals changed over time. Through museum records, excavation reports, and examinations of artifacts in the British Museum, the Petrie Museum and the Museo Egizio in Turin, I determined the most common food types offered and depicted in imagery in the New Kingdom dynasties. There was more stylistic variation in physical bread molds than in the depiction of bread. Also, the overall amount of food left in tombs and the amount of food depicted in imagery declined during the late New Kingdom. From the stylistic differences between physical bread offerings and their depictions, I conclude that food production in ancient Egypt was open to the general population which allowed for personalized expression as opposed to the limited and controlled medium of illustration. I also argue that there was a shift away from the practice of offering an abundance of food toward simplistic burial customs in response to economic hardship and stylistic preferences.

Chang, Claudia

[268] *Moderator*

[268] *Discussant*

Chang, Hong [99] see Cui, Jianxin

Chang, Huaiying

[58] *Resources, Technology, and Distribution: A Discussion on Models of Early Bronze Production in China*

This presentation tries to provide several models to capture major shifts of the bronze production system in the China's Bronze Age. The earliest evidence of bronze production was found in the Yellow River Valley dated to 2500 BC. But during 2500–1900 BC, most products were small bronzes cast by two-part molds. Copper or arsenic bronze products made by hammering also existed but no evidence proves tin bronze technique was yet invented. Around 2300 BC, political entities in the middle Yellow River valley procured the basic skills for bronze manufacturing, which eventually led to the section-molds technique employing tin bronze for casting vessels established about 2100 BC. After the Erlitou period, this technique became the mainstream tradition in Early China producing prestige vessels for elite class in the Central Plains between 1800–1200 BC. The pattern that resources and technology monopolized by the Central Plains dynasty was significantly transformed about 1000 BC due to the expansion of the Zhou Dynasty. The new political regime transferred not only techniques but also the authority to procure raw materials to regional political entities. This change opened the prologue of a new era of bronze production and the exploitation of new ore resources.

Chang, Melanie (Portland State University) and April Nowell (University of Victoria)

[210] *A Census of Women in the Upper Paleolithic*

Binary models of gender are often uncritically applied in paleoanthropology, even if the biological sex or gender identity of a specimen or representation is ambiguous. In the Upper Paleolithic, indicators ranging from simple bifurcating lines to overt representations of secondary sex characteristics may be used to identify an illustration, engraving, or piece of portable art as "male" or "female." These taxonomic rubrics are rarely stated explicitly. Still, the impression given by an overview of the relevant literature is that Paleolithic artists (usually assumed to be male) overwhelmingly objectified females in their works, with corresponding interpretations of the meanings of these representations and the artists' intent that reflect modern biases. We present an empirical survey of human representations in Paleolithic art using an explicit classification scheme that relies on unambiguous markers of biological sex to identify representations as biologically male or female. We attempt to resolve the many ambiguous instances by comparisons to less ambiguous representations and assess the likelihood of abstract representations (disembodied "vulvas" or "breasts") to be intentional representations of females. Within this context, we discuss the difficulties inherent in recognizing sex (much less gender) in Paleolithic art and the consequences of unfounded assumptions in scientific and popular discourse.

Chapman, John and Bisserka Gaydarska (Durham University, UK)

[20] *Can Urban Agglomerations Be Seasonal, Low-Density and Egalitarian? New Interpretations of the Ukrainian Trypillia Megaliths*

Recent geophysical investigations of Trypillia megaliths created a second methodological revolution, following the first revolution (1970s) defined by the discovery of the megaliths and their dating to the fourth millennium BC. So far, this second revolution comprised primarily a methodological advance based upon detailed geophysical prospection; but its potential gains may be subverted without a fundamental re-interpretation of the very nature of megaliths. The prevailing view of the megaliths for over 40 years is as oversized examples of the Childean 'Neolithic package' of permanent settlement, domesticated plants and animals and artifact assemblages containing polished stone tools and pottery. Here, many thousands of people formed large villages, central places, proto-urban sites or fully urban settlements—in effect, the first Eurasian cities. However, doubts about the standard view have emerged from our recent investigations. A tipping-point has been reached for the standard model, with as many as nine lines of independent evidence combining to create such doubts that the only logical response is to replace the standard model with a less permanent, more seasonal settlement mode or a smaller permanent settlement involving coeval dwelling of far fewer people. We consider the new interpretation of megaliths as seasonal, low-density, egalitarian cities.

Chapman Ashlock, Dawn [394] see Ashlock, Phillip

Chappell, Duncan [271] see Huffer, Damien

Chaput, Michelle [227] see Martindale, Andrew

Charles, Douglas (Wesleyan University) and Jane E. Buikstra (Arizona State University)

[102] *Constructing Archaeological Knowledge: Interpreting Hopewell in the Illinois Valley*

Through several books and articles, Martin Byers has developed an interpretation of the Hopewell phenomenon in the American Midwest that radically departs from the general consensus. To date he has focused almost exclusively on Ohio Hopewell. Many of the important sites in that region were excavated almost a century ago and the reports and records are less detailed than we would wish. In his latest book, *Reclaiming the Hopewell Ceremonial Sphere*, Byers seeks to extend his vision beyond Ohio to the Mann Site in Indiana, the Kolomoki site in Georgia, and the Elizabeth and Mound House sites in the lower Illinois River valley. The complex theoretical framework Byers constructs drives his interpretation of Hopewell sites. Our familiarity with the Illinois valley sites as excavators and report authors/editors provides us the opportunity to empirically examine the sequence of construction and use postulated by Byers. We also critically evaluate our own assumptions and biases as they shaped our interpretations at the time. The objective of this paper is not to squabble with Byers, but to examine the role theory and assumption play in the construction of archaeological knowledge.

Charles, Frances

[228] *Discussant*

Charlton, Michael (UCL Institute of Archaeology) and Jane Humphris (UCL Qatar)

[203] *Experimental Iron Smelting at Meroe, Sudan*

The Royal City of Meroe, situated 250 km north of Khartoum in the Republic of Sudan, was a capital of the Kingdom of Kush from the fourth century BC. Famed for its pyramids and other monumental architecture, Meroe was also home to extensive bloomery ironworks exemplified by numerous slag mounds scattered across the site. Superficial investigation of furnace and slag remains were undertaken in the 1980s and raised numerous questions about the technology. New archaeometallurgical research was initiated by UCL Qatar in 2012 to make sense of the scale and economy of the ancient iron industry. In concert with targeted excavation of iron-making workshops and materials characterization of metallurgical residues, a series of experimental smelting campaigns were undertaken in 2015 and 2016 in order to test hypotheses about resource use, furnace operation, and workshop organization. Experiments yielded mixed success in terms of slag and iron production, but were nonetheless fruitful in furthering the development of a general iron production model for Meroe. This paper describes the two smelting experiments conducted at Meroe and offers a quantitative assessment of their results. A direct comparison is also made between the experimental findings and the archaeological remains under study.

Charlton, Michael [203] see Humphris, Jane

Charm, Elisheva (Columbia University) and Severin Fowles (Barnard College)**[192]** *Indigenous Way Stations of Colonial New Mexico: New Evidence from the Rio Grande del Norte National Monument*

As the horse spread across the American Southwest on the heels of Spanish colonial project, Native American ways of moving were abruptly transformed. This was particularly the case for the many indigenous peoples from the Plains and Rocky Mountains who used equestrianism to build new regional economies based on wide-ranging nomadism. Along with these new ways of moving came a new emphasis on particular sorts of archaeological sites—notably, on the “way station” as a point on the landscape that was owned by none but visited by many different ethnic groups in the course of long-distance travels. In this poster we consider the distinct archaeological signature of colonial era way stations through an analysis of a large archaeological complex surrounding a spring in the Rio Grande del Norte National Monument.

Charpentier, Anne [378] see Speller, Camilla

Chase, Adrian (Arizona State University) and Jonathan Paige (Arizona State University)**[89]** *Terminal Classic Chert Use at Nohmul, Belize*

Stone tools and debitage were recovered from Late to Terminal Classic contexts of the site Nohmul in 1978 as part of a dissertation project. Since then, Nohmul has been heavily damaged by a road contractor who used structures from the site as road fill. Additionally, the chert production economy in lowland Mesoamerica has become an issue of great debate. Nohmul is situated roughly 30 km from the Northern Belize chert-bearing zone and 30 km north of Colha, the argued center of lithic production in the region during the Terminal Classic. Consequently, these understudied artifacts from Nohmul have the potential (1) to broaden our understanding of chert consumption and production in the region, and (2) to provide researchers additional datasets for comparison to other Terminal Classic assemblages within and outside the Northern Belize Chert Bearing Zone. Our analysis of the Nohmul assemblage has found evidence for local reduction of cobbles, and core maintenance, as well as production and maintenance of tools. We discuss these findings in relation to the broader chert economy in the region.

Chase, Amy (Memorial University of Newfoundland), Genevieve von Petzinger (University of Victoria) and Oscar Moro Abadia (Memorial University of Newfoundland)**[175]** *Neanderthal Artists? Exploring Misconceptions about Neanderthal Symbolic Capacities through Rock Art Studies*

The question of whether Neanderthals created art is one that is currently under debate within the field of prehistoric art studies. Originally thought to be brutish and unintelligent, Neanderthals have recently come to be acknowledged as complex humans with symbolic capacities, through discoveries of Neanderthal-associated modern behaviors including burials, pigment use, and ornament creation. One of the last hold outs separating the symbolic and artistic abilities of Neanderthals from those of Modern Humans (*Homo sapiens*) has been the creation of rock art. This is now being challenged by recent discoveries of possible Neanderthal rock art in Spain and Gibraltar. This paper will discuss what the implications would be if Neanderthals did, in fact, create rock art, and how it would affect the way we study rock art and conceptualize the uniqueness of humans.

Chase, Arlen**[131]** *Discussant*

Chase, Zachary [222] see Ore Menendez, Gabriela

Chastain, Matthew (Massachusetts Institute of Technology), Jianli Chen (Peking University) and Xingshan Lei (Peking University)**[213]** *Materials Processing in the Production of Ceramic Bronze-Casting Molds from the Zhouyuan area, China, c. 1100–771 BCE*

The extraordinary bronze ritual vessels of Shang- and Zhou-period China were cast in multipart ceramic molds, constructed from many individually formed mold sections. This piece-mold casting method was unique to ancient China, and an essential component of the technology appears to have been the use of a specialized type of ceramic paste to form the casting molds. This ceramic material was soft, porous, and rich in silica, making it quite unlike pottery clays in terms of composition, properties, and apparent techniques of production. This presentation outlines a reconstructed operational sequence for the selection and processing of materials used to make ceramic bronze-casting molds. Western Zhou-period casting molds from three foundry sites in the Zhouyuan area of Shaanxi province were analyzed using petrographic microscopy, scanning electron microscopy, and X-ray and infrared spectroscopy. Replication experiments were conducted using soils collected from nearby the foundry sites. By identifying several activities fundamental to the piece-mold casting process, this research demonstrates the potential for the laboratory analysis of ceramic foundry debris to further our understanding of early Chinese metal-making practices.

Chatelain, David [131] see Canuto, Marcello A.

Chatters, James (Applied Paleoscience), Vera Tiesler (Universidad Autonoma de Yucatán), Andrea Cucina (Universidad Autonoma de Yucatán), Diana Arano Recio (Instituto Nacional de Antropología e Historia) and Pilar Luna Erreguerena (Instituto Nacional de Antropología e Historia)**[140]** *The Life of the Adolescent Paleoindian Female from Hoyo Negro, Quintana Roo, Mexico*

Cave divers discovered remains of an adolescent human female in an immense, submerged chamber of the Sac Actun cave system in 2007. Until recently, her remains had only been studied from photographs, photo-based 3D models, and minimal sampling. Now her skeleton has been removed from the cave, conserved, and subjected to bioarchaeological, chemical, and histomorphological analysis. Her unusually complete and well-preserved skeleton, a rarity for late Pleistocene females in the Americas, provides striking insights into the lives of women among the earliest Americans. Naia, as she is known, had endured a healed spiral forearm fracture—a potential indicator of rough handling—and died between 15 and 17 years of age, having suffered a period of intense metabolic stress in the last months of her life. Radiographs and macroscopic analysis reveal numerous, strongly patterned Harris lines in her long bones, carious lesions, moderate LEH, malocclusion, dental crowding, and delayed development of the mandible, demonstrating that she struggled to maintain a stable protein supply and providing strong hints about the nature of Paleoindian subsistence in Central America. Dated between 13,000 and 12,000 cal BP, Naia's remains join the few other early females to suggest that America's first women led short, difficult lives.

[140] *Chair*

Chatters, James [86] see Brown, James

Chávez, Andrea [62] see Torres, Mauricio

Chávez Balderas, Ximena M. (Proyecto Templo Mayor/ Tulane University)

[225] *Representing the Underworld: Manipulation and Reuse of Animal Bones from Offering 126*

Offering 126 was discovered during the Seventh Field Season of the Templo Mayor Project. This ritual deposit was buried in the West Plaza of the Sacred Precinct, during the reign of Ahuizotl (AD 1486–1502). Mexica priests deposited inside a box made of stone slabs, more than 9,000 animal bones from 94 individuals, corresponding to wolves, pumas, jaguars, bobcats and birds of prey, among others. These animals were covered with a layer of marine organisms such as corals, shells, snails, starfish, and sand dollars. On top of these, the priest deposited flint knives and stone sculptures. This impressive offering was covered with the monolith of Tlaltecuhli, goddess of Earth. In this paper we will present results on the analysis of animal bones, with emphasis on taphonomic processes. We can conclude that all the specimens were buried at the same time, but they were sacrificed over on multiple occasions. Their pelts were used with ritual purposes or as garments, while their bones were preserved in storage. Manipulation of bones in different decomposition stages supports this idea. In addition we will talk about the symbolism of this ritual deposit, characterized by its biological richness.

[119] *Discussant*

[225] *Chair*

Chávez Balderas, Ximena M. [225] see Elizalde Mendez, Israel

Chávez Balderas, Ximena M. [293] see Pérez Pérez, Julia

Chazin, Hannah (Stanford)

[242] *Is the Anthropocene a Beastly Problem? Thoughts on Human-Animal Relationships and Contemporary Narratives of Change*

Pizzly bears and coywolves have been making headlines over the past few years. Offspring of illicit pairings between species of charismatic and aggressive megafauna, these hybrid monsters are presented as signs and portents of a troubled future. This paper explores the relationship between contemporary discourses about unruly and uncanny hybrid species and academic efforts to define and engage with the Anthropocene. It questions the relationships between tacit understandings of the animal as a 'determined' entity (to which the human is or is not reducible) and narratives about the human past and the relationship between humans and nonhumans over various timescales. This paper argues that the concern engendered by new, boundary-transgressing hybrid species relies on certain ideas about human-animal relationships. These ideas are shaped by imaginaries of how humans and animals relate as either wild or domesticated—premised on a temporal narrative of increasing human intervention and mastery over the natural world. In contrast, my work on human-animal relationships in ancient pastoralist societies suggests a different way of considering these questions. Viewing the herd as a human-animal hybrid shifts how we tell the history of human-animal interactions, moving the emphasis away from domestication.

[242] *Chair*

Chen, Fahu [26] see Guanghui, Dong

Chen, Hong

[78] *Determination of Use-Wear Evidence on Quartzite Tools: Experimental and Archaeological Studies*

Use-wear analysis has become an essential method for functional study of archaeological lithic artifacts. Quartzite is one of the main raw materials for lithic tools during Paleolithic period in many sites in the world. However, use-wear studies on quartzite tools are poorly developed due to its poor quality and rough surface. In this paper, the objective is to provide some reference data of determination of use-wear evidence, including both of the experimental and archaeological studies. In order to identify the use wear and their basic pattern on quartzite artifacts, two groups of experiments were conducted in related to the different working motions and contact materials. On the basis of experimental data and reference, some archaeological artifacts from the Wulanmulun site were selected for comparable use-wear analysis. The Wulanmulun site is a new important Paleolithic site in Ordos City of Inner Mongolia, with an age of 60–50ka. About 1500 lithic artifacts were excavated in 2010, which are mainly of quartzite. The analytic results suggest that many lithic artifacts display used wear, and several show hafting wear. Compared to the experiments, the main working motion is considered as slicing and cutting (sawing), and the contact material is dominated by animal substances.

[78] *Chair*

Chen, Hui (Wuhan University), Zhichun Jing (University of British Columbia), Changping Zhang (Wuhan University) and Weidong Hou (Henan University)

[72] *A Comparative Study on Ceramic Production from Central Plain China and South China in Early Shang Dynasty*

The site of Panlongcheng is located 450 km south of Zhengzhou in present-day Hubei province serves as the join point between the Central Plain Culture and the Lower and the southern regions of Yangtze River. Unlike almost all of more than twenty bronzes vessel shapes are represented in the Panlongcheng finds, there are three different ceramic types discovered at Panlongcheng: Typical Central Plain style (Erligang style), local style and numerous stoneware/hardware (some glazed). In pursuit of studying of ceramic production system on both sites, this Paper presents a comparative petrographic study of full range of variation of ceramic samples from Zhengzhou and Panlongcheng. The results of this research suggest that, despite similarities in type, form and stylistic attributes, the ceramic vessels from Panlongcheng are significantly different from Zhengzhou in terms of temper composition and fire temperature. The significant difference between stoneware and other type of ceramics may suggest that stoneware were nonlocal production. The results of petrographic analyses of ceramic thin sections from both sites may make us rethink the relationships among function, style, pattern, technology and ethnicity in production of ceramic.

Chen, Jianli (School of Archaeology and Museology, Peking University)

[26] *The Beginning Use of Iron in Ancient China and the Early Silk Road*

This paper analyzes iron objects and iron making remains from the eastern Silk Road area, such as Xinjiang, Qinghai, Gansu, Ningxia, and Shaanxi provinces, and found that there are several characteristics about the development of iron technology: 1) iron production not only related to geographical distribution of ore resources, but also to state pattern; 2) Iron played a vital role in everyday life; 3) The development and transmission of iron metallurgy had some relation to the evolution of bronze metallurgy; and 4) The origin of iron using and making in ancient China was the results of the interaction

between China and central Asia areas via the early Silk Road. It suggests to further carry out field survey of iron manufacturing sites in more different areas and to construct a whole sequence of installations and techniques.

[58] *Discussant*

Chen, Kunlong (University of Science and Technology Beijing), Jianjun Mei (Needham Research Institute, Cambridge, UK), Thilo Rehren (UCL Institute of Archaeology, London, UK) and Congcang Zhao (Northwest University, Xi'an, China)

[26] *Trans-cultural Interaction in China's Shang Period: An Archaeo-Metallurgical Perspective*

The production of ritual bronze vessels is an internationally recognized feature of Bronze Age China, contrasting strikingly with other early civilizations across the world. Their manufacture exploded in the Shang period (sixteenth to eleventh centuries BC), when bronze metallurgy spread across the whole territory of present-day China. However, while the production of ritual bronze vessels predominated in the Central Plains, recent research is showing how surrounding regions exhibited strong local characteristics in bronze production, reflecting idiosyncratic ideological, cultural, and technological choices. A "core-periphery" diffusion model to explain Bronze Age metallurgy, rooted in the traditional dynastic evolution, remains the paradigm in both Chinese and Western literature. This mainstream interpretation emphasizes the domination of the Central Plains but oversimplifies the complicated historical trajectories and interactions among many geographically different regions. This paper will present recent archaeometallurgical studies of different regions such as Hanzhong, Northern and central Shaanxi focusing on their material and manufacturing features. The "core-periphery" paradigm will then be reexamined and characteristics of regional metallurgies and their relationships will be discussed further.

Chen, Liang (Northwest University), Yan Zhang (Sichuan Provincial Institute of Archaeology), Jing Zhao (Shaanxi Provincial Institute of Archaeology), Zhouyong Sun (Shaanxi Provincial Institute of Archaeology) and Elizabeth Berger (University of North Carolina at Chapel Hill)

[115] *Heath and Stress of Ancient People on the Shanbei Loess Slope in China: The Social and Environmental Impact*

This paper investigates the impact of social and environmental changes on the health of people living during the Warring States period (ca. fifth–thirteenth century BC) on the Shanbei Loess Slope, a marginal area that connects the Guanzhong Plain and the Shanbei Plateau. Two human skeletal assemblages representing two different cultural settings, but with a long-standing history of conflict, were selected: 1) Zhaitouhe cemetery (n = 73) (Xirong Culture, the minority), and 2) Shijiahe cemetery (n = 33) (Qin Culture, the dominant majority). Bioarchaeological data including traumatic injuries, osteoarthritis, dental pathology, and other nonspecific stress indicators were examined to elucidate the experiences of violence and labor over the life course, and to infer the social and environmental challenges of living in each of these two groups. Preliminary results from the trauma analysis suggests that the Zhaitouhe-the Xirong minority population experienced a higher risk of violent injuries. In addition, it appears that most individuals in this marginal group lived a lifestyle with more repetitive hard-work than their counterparts in the dominant culture. Bioarchaeological analyses suggest that social stratification has wide-ranging consequences over most if not all aspects of lifeways and life history.

Chen, Maa-ling (National Taiwan University)

[208] *Movement of People and Its Cultural Reconstructions: Spatial Construction and Cultural Fluidity in Paiwan, Taiwan*

Cultural cognition is figurative, metaphorical, analogical, and participatory in nature. Spatial constructions, presented as figurative patterns, are regarded in this paper as the imagery conceptualization processes. These processes map or encode spatial cognition and relative cultural aspects dwelling in people's minds onto new lands through daily human activities and physically spatial constitutions when people move. Therefore, analyzing spatial constructions of a social group during migration processes is a way to present metaphoric conceptualization processes and conceptual. It would then be possible to identify social groups and their cultural continuities and fluidities during historic processes and movements

Chen, Quanjia (Research Center of Chinese Frontier Archaeology of Jilin University), Jun Chen (Research Center of Chinese Frontier Archaeology of), Ping Ji (Research Institute of Cultural Relics and Archaeol), Chunxue Wang (Research Center of Chinese Frontier Archaeology of) and Yonggang Zhu (Research Center of Chinese Frontier Archaeology of)

[116] *Preliminary Research on the Bone, Antler, and Tooth Artifacts from Haminmangha Site, Inner Mongolia*

The Haminmangha Neolithic site is located at Horqin Left Wulat Middle Banner, Inner Mongolia Autonomous Region and dates back to 5500–5000 BP according to radiocarbon dating results. More than 100 bone, antler, and tooth artifacts were unearthed from Haminmangha. These artifacts include stone knives with bone handles, bone darts, arrowheads, needle cylinders, needles, daggers, awls, and hairpins, horn, antler awls and borers, tooth ornaments, and other bone and antler materials. According to the analysis of these artifacts, we can deduce the retouching technology and manufacturing process for them as well as the characteristics of the artifacts that deepen our understanding of the production and living conditions of humans at the Haminmangha site.

Chen, Shuxiang and Qifeng Xi (Hubei Provincial Institution of Cultural Relics an)

[58] *The Management of Techniques and Labor in Copper Production: Based on the New Materials in Tonglushan Sifangtang Cemetery*

Since November 2014, the Hubei Provincial Institute of Archaeology has found 123 tombs in Tonglushan Sifangtang Cemetery, Daye, Hubei province in China. It is the first time for Tonglushan ancient copper mine site and Chinese mining archaeology to find a laborers' cemetery, which is highly related to a mining site. Given its wide distributed area, well-protected situation, and rich clues related to mining culture, this achievement provides significant data for understanding the management of Tonglushan copper production. Therefore, the findings in Sifangtang cemetery offer significant data for the research of the distribution of labor and techniques and the organization of workers during spring and autumn period in Tonglushan, as well as ancient China.

Chen, Wei-chun

[36] *Test Excavation of the Seventeenth-Century Provincia, a Dutch Fort in the Southwest Taiwan*

In the seventeenth century, Taiwan was considered as an outpost for the Dutch East Indies Company to trade with China and Japan, and to compete with its European counterparts in the region. Located in the contemporary Tainan City, Taiwan, Provincia stood as the Island's first planned city by the Dutch in AD 1625, the second year when they traded the city land with 15 cangan cloth from the indigenous Siraya. In AD 1653, a fort called Fort Provincia was constructed as a result of Han Chinese rebels against the Dutch colonial governance. Fort Provincia and its immediate surrounding area have continuously been reconstructed and used by various succeeding regimes after the end of the Dutch rule in AD 1662. The excavation of the vicinity of the Fort's foundation carried out by this study yields evidence of early human existence which extends the antiquity of the area around Fort Provincia further back in time. Based on the new findings, this study clearly demonstrates the prolonged duration of cultural changes from the prehistoric past to the historic present. In addition, the evidence shed new lights on our understanding of the successive occupation and the formation processes of the area through time.

Chen, XiangLong

[117] Farming vs. Herding: Subsistence Practice during the Late Neolithic Evidenced by Stable Carbon and Nitrogen Isotopes in Shengedaliang, North Shaanxi, China

In order to explore subsistence patterns in northern Shaanxi Province around 4000 BP, human and animal bones from the Shimao, Zhaimouliang, Shengedaliang, Huoshiliang, and Muzhuhzuliang sites were sampled for stable carbon and nitrogen isotope ratio analysis. The results show that most people primarily subsisted on C4 resources, e.g., millet and millet-related animal products, despite the fact that there was some intake of C3 plants by some individuals. Stable nitrogen isotope values indicate that there were differences in meat consumption between individuals at the site. Pigs were mainly foddered with millet and millet byproducts, as well as some cattle, according to their high $\delta^{13}\text{C}$ values. However, the sheep/goats consumed wild C3 plants at those sites. Our above findings indicate that subsistence patterns in northern Shaanxi around 4000 BP were characterized by millet farming, while the grassland animal husbandry (e.g., cattle and sheep/goats raising) displayed very little contribution to local economy. The intensive millet farming in northern Shaanxi provided enough food for population growth, ensured the accumulation of wealth, and consequently accelerated social differentiation and complexity.

[117] Chair

Chen, Xuexiang (Department of archaeology, Shandong University) and Wei Gong

[78] Archaeological Survey of Mound Sites in Southwestern Shandong, China: Plants and People

The surveyed area, Heze city of southwestern Shandong, China, is located at the lower reaches of the Yellow River. Most archaeological sites in this region were deeply buried, from 3 m to more than 10 m. Very few archaeological works especially excavations had been taken due to the depth. Our survey of 2012–2015 revealed that these sites had been continuously occupied for a long history. The occupation started from Beixin culture (c. 5000–4100 BC), continued to Dawenkou culture (c. 4150–2650 BC), Longshan culture (c. 2650–2050 BC), and to early Bronze Age of Yueshi culture, Shang and western Zhou dynasties. Then they were used as graveyards during eastern Zhou and Han periods. Since Sui-Tang dynasties, there had been temples built on these mounds. About one hundred soil samples were collected and floated during the survey. The results indicated people had been engaged in the dry land agriculture, planting millets (*Setaria italic* and *Panicum miliaceum*), bread wheat (*Triticum aestivum*), soybean (*Glycine max*), as well as explored wet land for rice (*Oryza sativa*) cultivation. Rice remains were mainly from Longshan culture (c. 2650–2050 BC), and declined dramatically after that. This may indicate changes of environment.

Cheng, Wen Yin (University of Toronto) and Chen Shen (University of Toronto, Royal Ontario Museum)

[78] Mineralogical Makeup of Casting Molds and Its Archaeological Implications for Bronze Making Techniques in Ancient China

In order to understand how bronze vessels were produced and the knowledge involved we cannot limit our study to simply the bronze vessels themselves. Thus, the analysis on bronze mold production plays a key role to our understanding of bronze vessel production. The focus in this study will be on the 155 mold fragments currently housed at the Royal Ontario Museum, originally from Anyang dated to the Shang dynasty. Petrographic analysis was utilized for this research on raw materials and how the fabrics were processed to distinguish the texture and production method that may have applied to form these artifacts. Mineralogical analysis can shed new light between fabric types and previously distinguished mold forms as well as how distinct the various fabric types were within the different layers of the bronze mold itself. Thus giving us new insight on both the knowledge involved in the mold production and the technology available to the bronze craftsmen of the Shang dynasty.

Cheng, Zhijie and Yuzhang Yang

[78] Archaeobotanical Records of the Middle and Late Neolithic Plant Food Utilization from North Jiangsu Plain

As a transition zone between southern and northern China, the Huai River valley possesses distinct uniqueness in climate, environment, agriculture, archaeological culture, and other aspects. We have taken a series of archaeobotany case studies on the Neolithic sites of different period, such as Shunshanji, Longqiuzhuang, Wanbei, in the lower Huai River valley. Combined with previous archaeobotany research in this area, we can summarize the plant food utilization in various periods. The clue of plant food utilization is not consistent in the lower Huai River. According to the existing archaeobotany evidence, this area stayed in a stage of low-level food production for a long time during 8500–6500 BP. Gathering was the uppermost way to obtain plant food; rice farming was a supplementary means of livelihood. As a lack of enough archaeobotany evidence, it is not clear how the plant food utilization developed during 6500–6000 BP. The rice farming tradition was in continuation. After 6000 BP, the mixed-farming of rice and millet came into being and developed rapidly in the lower Huai River valley. But it was different from the mode of the upper reaches; rice farming was of equal importance with millet farming.

Cheng, Zhijie [78] see Yang, Yuzhang

Chenoweth, John (University of Michigan-Dearborn), Mark Salvatore (University of Michigan-Dearborn) and Laura Bossio (University of Michigan-Dearborn)

[265] British Peasant Ideologies and Technological Approaches to Marginal Caribbean Landscapes

British colonial ideology originated, in part, from a view of the proper relationship between people, land, and government that was rooted in the ecology of Britain itself. This view was informed in the Caribbean by Barbadian and other large-scale sugar planting colonies, but the British Virgin Islands are ecologically and politically distinct. This paper employs high-resolution satellite imagery and GIS modeling to explore what happens when a British "peasant" ideology is laid onto a very different Caribbean landscape in an end-of-slavery experiment intended to place free Africans in their "proper" role. These data are combined with historic maps to analyze the different productive potentials of different parts of the site of Kingstown, British Virgin Islands, home to a group of free Africans settled there by the British Government in the 1830s. While the Kingstown people's response was probably complex, this paper explores the limits under which they would have worked, had they employed the British model.

Cheong, Kong (American University)

[347] Chirping Birds, Barking Dogs, and Singing Men: Ancient Ceramic Effigy Vessel Flutes from Tala, Jalisco, West Mexico

Duct flutes are an important class of aerophone instrument among the ancient and modern indigenous Americans. Duct flutes can be further classified into tubular and vessel types. While they are widely distributed, vessel flutes, unlike tubular flutes, are rarely depicted in regional iconographies. This is perhaps because they are small in size and generally hidden by the player's hands and are thus difficult to portray in murals, vases and sculptures. However, this is not the case in West Mexico as data from our survey of online museum databases shows, they are third most commonly represented in ceramic sculptures. In this paper we describe, and examine, a collection of seven unpublished ceramic vessel flutes from Tala, Jalisco, Mexico.

[347] Chair

Cheong, Kong [173] see King, Adam

Chesson, Meredith S. (University of Notre Dame)**[141]** *"It comes from gathering": Collaborative Archaeology and Future Directions*

This session interrogates the practice, theoretical foundations, and outcomes of collaborative archaeology, and explores how collaborators are transforming our discipline today. Today's papers demonstrate how collaborative archaeology offers epistemological resources that traditional, public and even community archaeology cannot provide, and how collaborative approaches force us to reexamine the disciplinary goals, practices, and outcomes of archaeological practice widely. We have divided the session papers into three broad themes: (1) Service: Working for Communities, Not on Them, (2) Conflict Resolution and Archaeological Engagement, and (3) Redefining the Discipline of Archaeology. As an example, I briefly present ethnoarchaeological research on homemaking on the islands of Inishark, Inishturk, and Inishbofin in western Ireland, highlighting how the documentation of delph, dressers, and shop ledgers serves these communities in preserving and celebrating island heritage today.

[141] *Discussant***[141]** *Chair*

Chesson, Meredith S. [142] see Kaya, Deniz

Chevez, Estrella [162] see Winterhalder, Bruce

Chhay, Rachna [333] see Carter, Alison K.

Chia, Richard (Simon Fraser University)**[77]** *Historical Ecology of Tiv Migration and Conflicts in the Benue Valley of Nigeria: Implications for Food Security*

When the Tiv, a Bantu language speaking group migrated into the Benue Valley of Nigeria from southwestern Cameroon over five hundred years ago, they faced hostilities from different groups in the valley. Hilltops readily served as important settlement locales to protect the Tiv from violence and conflict. As they migrated from one hilltop to another they eventually settled over much of the Middle Benue Valley. Archaeological research in the valley has investigated these ancient hilltop sites with emphasis on Tiv migrations and settlement history. But none of these investigations has considered the role of the biophysical environment regarding food resources and food production. This presentation reports on the ongoing archaeological research to investigate the relationship between conflict and food production by the hilltop communities, and resilience to food crises during such conflicts. Using archaeological, ethnographic, ecological, and historical data these findings will address issues of conflict and food security in the valley today.

Chiarulli, Beverly (Indiana University of Pennsylvania), Eleanor King (Howard University), Anne Pyburn (University of Indiana Bloomington) and Anabel Ford (University of California Santa Barbara)**[9]** *A Comparison of Expedient Tools from Four Sites in Belize*

Small lithic flakes have been recovered from most Maya sites in Belize. They are often viewed as byproducts of the lithic manufacturing process. A closer analysis of small flakes recovered from four sites (Cerros, Chau Hiix, Maax Na, and El Pilar) has found that while many of the flakes may have been removed during tool manufacture, the expedient tools themselves were used in a variety of household activities especially those associated with cutting or carving bone or wood. This poster compares flake samples from these four sites to determine if the flake tools reflect economic differences in the communities.

Chiarulli, Beverly [83] see King, Eleanor

Chicoine, David [231] see Whitten, Ashley

Childs, Terry (Department of the Interior)**[315]** *Discussant***Chilton, Elizabeth (UMass Amherst)****[311]** *Moderator***[311]** *Discussant***Chinchilla, Oswaldo (Yale University)****[218]** *American Pompeii: Old Evidence on Late Classic Ties between the Pacific Coast and the Antigua Valley*

An archaeological collection from finca Pompeya in the Antigua Guatemala valley provides significant information about Late Classic interaction with the adjacent Pacific coast. Excavated in 1893, the collection was eventually scattered to several museums in Germany, the United States, and Guatemala. However, it can be reconstructed from a photograph made not long after the discovery, and from newspaper reports that provide rough descriptions of the excavations. The objects themselves are still preserved, and provide important data for the study of highland-coastal interaction during the Late Classic period. This time period marked the height of the expansion of the Cotzumalhuapa polity in the coastal piedmont of Escuintla, which exerted a strong influence in elite culture at several sites in the Antigua Guatemala valley. The Pompeya collection also illustrates the history of early archaeological research and collecting in Guatemala.

[39] *Discussant***Chinique de Armas, Yadira (Department of Anthropology, University of Winnipeg)****[30]** *Sources of Variations in Breastfeeding and Weaning Practices among Caribbean Populations*

Breastfeeding in humans is a biocultural process shaped by complex interactions of beliefs about health and nutrition, construction of childhood and parental identities, religious values, and lifestyle. While some studies have stated that the type of subsistence does not determine weaning ages in a population, these factors could have affected weaning food choices. This paper analyzes carbon and nitrogen stable isotopes in bone collagen of four precolonial Caribbean populations: Paso del Indio (Puerto Rico) and Canimar Abajo, Cueva del Perico I and Cueva Calero (Cuba) to explore how the subsistence strategies affect the length of breastfeeding and weaning food choices that these Caribbean populations made in the past. Ages for the start

and the end of weaning and possible food sources used during the weaning process were assessed using the Bayesian probability model “Weaning Ages Reconstruction with Nitrogen isotopes” (WARN). The model suggested a major dietary change around two years of age for most populations. No direct correlation was found between the start of weaning and the availability of cultigens. However, populations with agriculture or horticultural practices weaned their children using foods with lower nitrogen isotopic values, which suggest that plants may have had an important role as weaning foods.

[30] *Chair*

Chinique de Armas, Yadira [30] see Buhay, Bill M.

Chiou, Katherine (University of California, Berkeley) and Luis Jaime Castillo (Pontificia Universidad Católica del Perú)

[174] *Performing the Moche Feast: Plants, Ritual Practice, and Spectacle in the North Coast of Peru*

The site of San José de Moro in the Jequetepeque Valley of the North Coast of Peru is renowned for the discovery of several “Priestess” burials containing women interred with the material accoutrements of the goddess figure from the Moche pantheon. As a burial ground for the Moche elite, San José de Moro presents an excellent case study for ritual performance with burial-related ceremonies taking place concurrently with feasting. In this paper, we discuss the plant evidence for large-scale feast preparations at San José de Moro during the Late Moche period (AD 600–800) where archaeobotanical remains of sacred plants such as the San Pedro cactus (*Trichocereus* sp.) and coca (*Erythroxylum* sp.) were recovered alongside substantial quantities of domestic food taxa such as algarrobo (*Prosopis pallida*), guayaba (*Psidium guajava*), chile pepper (*Capsicum* spp.), and maize (*Zea mays*). This case study is part of a budding research trajectory that shifts plant analysis beyond subsistence reconstruction and into the realm of social negotiation including ritual practice.

Chiou-Peng, TzeHuey (Univ. Illinois UC) and Jianfeng Cui (Peking University)

[26] *Incipient Metallurgy in Western Yunnan: Current Study and Issues*

This work discusses results from current studies and issues on the production and use of early Yunnan metals, as well as possible interaction between western Yunnan sites and their counterparts in surrounding regions. Archaeological materials from recent excavations at western Yunnan sites witness the earliest signs of copper-base metallurgy in Yunnan dating around the middle of the second millennium BC; they offer illuminating data for studying the step-by-step development of metallurgy in the region. However, current research on the nascent stage of Yunnan metal industry also has generated a good number of issues for continuing research and speculations. Multidisciplinary analysis of excavated materials from these sites points to the possibility that impacts from cultures near the Steppes in northwestern China had contributed to the advent of metals into Yunnan; the underlying factors that propelled such unique north-to-south technological transmission are also beginning to be understood. However, a number of questions pertaining to stratigraphy and chronology also demand to be examined in conjunction with the narratives of east Asian archaeology in order to invite meaningful discussions from broader perspectives.

Chiriboga, Carlos [131] see Acuña, Mary Jane

Chirikure, Shadreck (Department of Archaeology, University of Cape Town, South Africa)

[138] *Cross-Craft Overlaps in Materials and Symbolism: Insights from Legacy Crucibles from the Great Zimbabwe Archive*

The legacy collections from Great Zimbabwe (CE 1000–1700) emanated from uncontrolled treasure hunting expeditions of the late nineteenth and early twentieth century and the sporadic professional digs conducted at various points throughout the twentieth century. As a result of this colorful history, most materials from the site are scattered in different archives where they are gathering dust with little or no research being performed. This contribution discusses a technological and typological analysis of crucibles from the legacy collection spread across Zimbabwe and South Africa. The crucibles were used for processing gold, bronze, brass, and copper at the site. Typological studies revealed the existence of specialized and non-specialized vessels, which were used for identical technical purposes. However, the non-specialized crucibles resembled quotidian pottery used for mundane activities. Quite interestingly, metallurgy and pottery-making are often portrayed as distinctly gendered pursuits, with minimal overlaps in symbolism and the participation of men and women. Geochemical and mineralogical work exposed that the two types of vessels were made using clay from the same granitic derived lithology. This raises significant questions about material and symbolic overlaps in pyrotechnologies that used the same materials and symbols in the indigenous development of African metallurgy.

Chisholm, Brian [258] see Hepburn, Joseph

Chisolm, Linda [257] see Urban, Thomas

Chiu, Scarlett (Academia Sinica, Taiwan), Nicholas Hogg (University of Otago, New Zealand), Yu-yin Su (University of Sheffield, United Kingdom) and Shih-Ya Chang (Academia Sinica, Taiwan)

[374] *Stressing Differences While Appearing to Be the Same: A Case Study from Lapita Pottery Motif Analysis*

In previous research, employing a dataset composed of motifs recorded from 60 Lapita sites spread across the southwestern Pacific, we argued that a general trend of making highly similar, but not identical, motifs can be seen when motif repertoires of different island groups are compared. We thus proposed that the elements of surprise or amusement, generated from making something similar yet different from what the intended audience expected to see, was employed to stress shared traditions while also making a statement of being different, may be the underlying concept of making Lapita pottery decorations. In this paper we intend to examine the underlying motif construction rules employed by potters within these different island groups during the Lapita era, to identify whether they had specific preferences as to the rules used when applying motifs belonging to the ten most popular motif themes within our dataset.

Chiykowski, Tanya (Binghamton University)

[266] *Impressive Terraces and Ephemeral Houses: Domestic and Defensive Architecture at Cerro de Trincheras*

Around AD 1200, Trinchereños (members of the Trincheras Tradition of the Sonoran Desert) covered the hillside of Cerro de Trincheras, Sonora, Mexico in over 900 terraces. After such extensive investment in shaping and laying out space within the site, they then proceeded to live in relatively ephemeral domestic structures on the hillside. This paper addresses the apparent contradiction of impermanent houses on robust platforms by examining how Trinchereños built, maintained and managed space within the site. To do so, I present excavation data from Cerro de Trincheras, and surrounding sites. The construction of this site occurred during a period of population movement and upheaval, with large-scale migration, and site

establishment in the middle Magdalena Valley. Placing domestic architecture at the center of my analysis provides a perspective for how the interrelated components of domestic, ritual and community architecture impacted the economic, social and religious behavior at the site.

Chmilar, Jennifer [44] see Vadala, Jeffrey

Choi, Audrey (Wellesley College), Jaime Ullinger (Quinnipiac University) and László Paja (University of Szeged)

[196] *Identifying Pre-Incineration State from Heat-Induced Fracture and Warping Patterns Found on Human Cremains in a Hungarian Bronze Age Cemetery*

Attempts to determine the status of human remains prior to their final deposition are complicated in the analysis of cremains. Forensic and archaeological studies, however, have advocated for the interpretation of heat-induced fracture and warping patterns as indicators of the pre-incineration state of the body and of the characteristics of the funeral fire. The purpose of this research is to examine the possible internal social structures of a Bronze Age population in the Körös region of Eastern Hungary by testing whether or not trends in the distribution of macroscopic heat-induced features exist across the cemetery site of Békés 103. Fragments from fourteen cremation urns were assessed for the presence of diagnostic fracture and warping patterns according to their anatomical region. Their relative frequencies were then compared among human burials, among urn layers, and among individual bone fragments that exhibited colors possibly indicative of temperature exposure. Results reveal that statistically significant differences in the frequencies of a few features, such as postcranial warping and "thumbnail" fractures, exist and may suggest the presence of discrepancies in bone biomechanics and/or funerary preparations within the examined sample of Békés 103.

Choin, Jeremy [330] see Damgaard, Peter de Barros

Chovanec, Zuzana (University Albany)

[173] *The Scientific Investigation and Cultural Implications for the Use of Prestigious Substances in the Ancient Mediterranean*

The role of organic residue analysis in archaeological research has shifted from an intermittent side project of interested analytical specialists to becoming standard components of an archaeological research program with a growing number of archaeologists being trained in both excavation and analytical instrumentation. Such developments within the field of archaeology not only highlight the benefits of applying a range of scientific techniques, but also expand the scope of archaeological research questions. However, as organic residue analysis becomes an increasingly technical and specialized subdiscipline of archaeology, much explanatory time focuses on integrating scientific data with archaeological material correlates with perhaps less consideration of broader anthropological implications. This paper aims to examine the interpretative progression from archaeological site, through scientific analysis, and ending with broader cultural implications as they pertain specifically to the case of the use of psychoactive substances on the eastern Mediterranean island of Cyprus. The investigation of the history of intoxication in the Mediterranean Basin is fraught with interpretative problems, chief among which is the fact that the substances being investigated have long histories of use with wide geographic ranges. Further issues that will be addressed pertain to the documentation of organic substances in prehistoric settings.

Christensen, Alexander (Defense POW/MIA Accounting Agency)

[41] *Reconstructing Korean War Battlefields from Body Recovery Information*

During the Chinese Spring Offensive of April and May 1951, Chinese People's Volunteer Forces pushed United Nations troops back from their defensive lines in the Republic of Korea, with extensive casualties on both sides. Because UN forces were driven back, many of the dead were not recovered and identified until the battlefields were retaken. In some cases this occurred days after the battle, but for many it was weeks, months, or even years later. Individual Deceased Personnel Files (IDPFs) for each casualty provide information on where remains were recovered, the condition they were found in, and the identification process. The IDPFs from two different battles, the 7th Infantry Regiment's defense of the Kansas Line on April 25, 1951, and the 2nd Infantry Division's defense of the No-Name Line 24 days later, were examined to investigate the distribution of casualties across each battlefield, and in particular how the recovery locations fit with more traditional historical accounts. In general, files for individuals recovered immediately after the battles contain the least information about the condition and location of the remains, while those recovered later, by personnel not involved in the battles, provide artifactual, anthropological, and archaeological context, including inventories and sketch maps.

Christiansen, Eric [237] see Searcy, Michael

Christensen, Kim (University of California Berkeley)

[122] *Archaeological Pedagogy, Gentrification and the City: Community-Engaged Scholarship in San Francisco*

The Bay Area, and San Francisco in particular, is experiencing rapid gentrification due to the influx of highly paid workers employed by the tech economy centered in Silicon Valley. As the cost of living increases, long-time residents are being actively pushed out, and various community organizations have sprung up in response to highlight and address these issues of gentrification, displacement, and homelessness. In this paper, I explore the process and results of partnering with community groups including the Anti-Eviction Mapping Project during the fall of 2016 as part of teaching an introductory archaeology class for the UC Berkeley/UC Extension San Francisco Fall Program for Freshmen and the American Cultures Engaged Scholarship (ACES) program. While archaeological methods and interpretations can bring understanding to change over time, persistence, and historical context, how in particular can we contribute meaningful and useful information to community partners fighting contemporary displacement? How can an engaged pedagogy contribute to both student learning and social justice? While this is only the beginning of a longer-term research program, this paper appraises the benefits, pitfalls, and paths forward for engaging archaeological knowledge with teaching and learning and pressing local contemporary issues.

[122] *Chair*

Christensen, Marianne [231] see Morello Repetto, Flavia

Christie, Jessica (East Carolina University)

[179] *Navajo Landscape Construction at Canyon de Chelly: A Quintessential Place*

My paper will discuss how the Navajo construct Canyon de Chelly as a quintessential place on the reservation. The canyon has been occupied at least since Basketmaker times in the first centuries AD. Archaeological investigations have identified Ancestral Pueblo cliff dwellings from roughly AD 700 to 1300 followed by a brief Hopi presence. Navajo people began to settle Canyon de Chelly in the late 1700s. Unlike the Ancestral Pueblos, the Navajo lived on the canyon bottom and reused some of the facilities of their predecessors for storage. They also added their rock art to earlier panels. What

makes Canyon de Chelly a quintessential place unlike other historical sites on the reservation are the rich oral narratives populated by the ancestral Holy People, which claim the canyon as Navajo intangible heritage. I will analyze these processes through White House ruins and Spider Rock where archaeological materials and ceremonial knowledge have been dynamically linked to construct a decidedly Navajo political history. The argument that the Navajo have been in the canyon as long as their spiritual ancestors, the Holy People, has been used in land claims cases. Canyon de Chelly is being reinvented as quintessential place in spiritual, political, and economic contexts.

Christie, Jessica [272] see Watson, Lucia Clarisa

Christopher, Ssebuyungu [153] see Ziegler, Michael

Chyla, Julia (Antiquity of Southeastern Europe Research Centre, University of Warsaw)

[316] *El Castillo and Its Regional Context in Huarmey Valley through GIS*

Huarmey valley, at the southern fringe of Peruvian North Coast, was inhabited for millennia. It is a rich, multi-cultural area, where almost all types of archaeological sites are represented. The discovery of an imperial mausoleum at El Castillo in 2012/2013 is an example how little we know about this region. During the previous seasons modern state-of-art techniques of documentation were used on daily basis at the time of excavations. The successful attempts to implement new noninvasive, remote sensing techniques of archaeological prospection on precolumbian sites resulted in the development of highly accurate, rapid and relatively inexpensive methods of evaluation and inventorying of the Peruvian heritage. Spatial data collected at the time of excavations, especially of mausoleum and remains of architectural monuments around, as well as those gathered during archaeological survey of the valley rise a lot of questions about the site's role in social and geographical landscapes of Wari Empire during the Middle Horizon period. Proper process of gathering, processing archival, field, and digital data allows to expand our knowledge about the past and reconstruct its forgotten landscapes.

Ciani, Michael

[385] *The Bear in the Footprint: Using Ethnography to Interpret Archaeological Evidence of Bear Hunting and Bear Veneration in the Northern Rockies*

Archaeological evidence of prehistoric bear hunting and bear veneration in the northern Rocky Mountains and northwestern Plains is presented. Ethnographic documents and the writings of trappers, traders, and explorers are assessed in order to establish an interpretative framework to help decipher archaeological contexts in the region that include bear remains and rock art depicting bears. Examining prehistoric archaeological contexts in Montana and Wyoming within this framework suggests evidence of bear hunting and veneration similar to the regional ethnographic record. Data trends imply there may be a relationship between such sites and variables like location, seasonality, function, and age. Contexts with bear remains sometimes imply a winter occupation, and site constituents hint at the ritual treatment of bear skulls and paws. An apparent increase in bear hunting during the Late Prehistoric Period may have been influenced by the bears association with warfare and healing. Possible motivations for hunting are explored and include economic, social signaling, bear power attainment, and revenge incentives. Compatible theoretical approaches are briefly articulated in an effort to more clearly understand bear hunting and veneration in ecologic, symbolic, and utilitarian terms.

Ciesla, Magda (Jagiellonian University in Kraków), Anna Kraszewska (Jagiellonian University in Kraków) and Pawel Valde-Nowak (Jagiellonian University in Kraków)

[389] *Reworked Artifacts and Models of Raw Material Exploitation as Indicators for Settlement Duration on Middle Paleolithic Sites in the Highlands of Central Europe*

Short-term settlement of Middle Paleolithic hunters leaves a specific tool kit on an archaeological site. In spite of this well-known fact, in some cases, concerning the duration of stay of groups of Neanderthals, mere techno-typological analysis of inventories seems insufficient. Analysis of raw materials exploitation, combined with information about long use, or reworking of certain artifacts appears to be helpful. On most sites from the Middle Paleolithic era, archaeological data, concerning the subject of raw materials extraction shows, that it generally had a local character. Although this is most typical, sometimes the situation is different. On a range of sites, known from uplands of Hungary, Slovakia, and Poland, artifacts prepared of raw material transported from long distance outcrops can be found (sometimes they were brought to the site from the distance of more than 300 km). Such artifacts are usually reworked, showing traces of their long use and value for prehistoric people. In some cases, they also appear in the context of first settlement on a particular site, suggesting a migration. It can also be assumed, that there exists a link between the settlement duration and the knowledge about explored area, which can be observed in some inventories.

Cifarelli, Megan (Manhattanville College, New York)

[379] *The Materiality of Life and Death: Dress Ornaments and Shifting Identities at Hasanlu, Iran*

The site of Hasanlu, Iran, was destroyed thoroughly by a marauding army in approximately 800 BCE, leaving a hulk of smoking rubble that was a virtual tomb for the hundreds of residents and combatants who weren't able to escape its citadel. The excavations of Hasanlu, led by Robert H. Dyson of the University of Pennsylvania Museum, took place between 1956 and 1977, and uncovered a remarkable range of contexts containing personal ornaments within the relatively narrow historical horizon of Hasanlu Period IVb (ca 800–1050 BCE). From the bodies of fallen victims, to temple treasuries and elite residences, to a cemetery with nearly 100 burials, the artifacts relating to dress and adornment played a critical role in the construction and perennial renegotiation of identity for the men and women at Hasanlu. This paper examines shifts to dress practices at Hasanlu during this period, arguing that transformations to the regulatory schema by which objects and individuals are gendered are manifestations of changes to the way this community conceived of gender as a social category.

Cinquino, Michael [175] see Hayward, Michele

Ciolek-Torello, Richard (Statistical Research, Inc.), Jeffrey Altschul (Statistical Research, Inc. and NEXUS), John Olsen (University of Arizona), Ch. Amartuvshin (Mongolian Academy of Sciences Institute of History) and B. Gunchinsuren (Mongolian Academy of Sciences Institute of History)

[113] *Fortified Towns in a Nomadic Pastoral Landscape on the Mongolian Steppe: Bai Balik and the Northern Railways Archaeological Project* Mongolia is well-known for its history of nomadic pastoralism and Bronze and Early Iron Age burials and monuments. For a brief period in the eighth and ninth centuries, however, the Uygher and Khitan Khanates built large towns and urban centers. One of these, Bai Balik was established about 758 CE during the northward expansion of the Uyghur Empire, by the Uyghur khagan, Bayanchur Khan as a ceremonial and trading center in the fertile and strategically located Selenge Valley. This well-known site, which was tested by a Japanese archaeological team, was recently recorded as part of a

project conducted by the Mongolian International Heritage Team to provide recommendations on the routing of a proposed Northern Rail Link between Murun and Erdenet, in Northern Mongolia. Historical records, archaeological survey, and mapping are used to investigate the role centers such as Bai Balik may have played in the nomadic pastoral economy of the Mongolian Steppe. Specifically, we examine the size and layout of the town, the ethnic makeup and economic activities of the town's population, and the possible role of agriculture.

Cipolla, Craig (Royal Ontario Museum)

[334] *Deep Impacts of Mohegan Archaeology: Indigenous Knowledge and Its Influence on the Past*

There is no doubt that indigenous, collaborative, and community-based projects have made great strides in reshaping the ways in which archaeological research is conducted and carried out in North America. Comparatively speaking, however, reporting on collaborative projects often place less emphasis on the ways in which indigenous and hybridized versions of archaeology influence our interpretations of the past and penetrate archaeology at the level of theory. In this paper we attempt to fill this void, critically considering our collaborative work together in terms of deeper impacts that indigenous knowledge makes. We argue that our work together produces new and valuable perspectives on time and temporality, archaeological "data" in general, anthropocentrism, and colonial interaction and survivance. We discuss these insights in terms of several eighteenth- and nineteenth-century sites on the Mohegan Reservation in Uncasville, Connecticut.

[269] *Discussant*

Cisar, Amelia [345] see Munger, Tressa

Cissell, Madison (Morehead State University, Craft Academy), Carlos Peraza Lope (Centro INAH Yucatán) and Timothy Hare (Morehead State University)

[9] *Mapping and 3D Modeling of Mayapán's Monumental Center*

During our 2016 field season, we mapped and created 3D models of Mayapán's monumental center and several major architectural features. Located in the Northern Yucatán approximately 40 km south of Modern Mérida, Mexico, Mayapán was the largest ancient Maya political capital of the Postclassic Period and was one of the most densely nucleated of all Maya cities. It was a key center of political, religious, and economic activity. Mayapán's monumental zone is relatively small, but contains a dense collection of temples, colonnaded halls, palaces, altars, and addition structures. We used unmanned aerial vehicles (JAVs/drones) to carry photographic equipment to collect both vertical and oblique photos and videos of the consolidated architecture. The resulting images were processed in photogrammetric software to generate an orthorectified photo mosaic and several 3D models major architectural features. These products were integrated into a geographical information system (GIS) to facilitate analysis. In this poster, we outline the technology and data processing workflow used and display the resulting products.

Cissell, Madison [336] see Hare, Timothy

Claeys, Philippe [69] see Snoeck, Christophe

Clarenne, Valérian [40] see Coppe, Justin

Clark, Barbara

[206] *Discussant*

Clark, Bonnie (University of Denver)

[141] *Healing through Heritage: Collaborative Archaeology as Process*

Heritage is never static, rather it is a constantly evolving set of practices, beliefs, and tangible touchstones. Collaborative archaeology sits firmly in that thicket, whether through the data we uncover, the stakeholders we engage, or even the media attention we draw. The archaeology of Amache, the site of a World War II-era Japanese American incarceration camp, is an exemplary test case for how research intertwined in a contemporary community can recast our discipline's relationship to heritage. This paper explores the potentially radical shift from a focus on the results of archaeology to that of the practice of archaeology. Framed by critical heritage studies, especially Laurajane Smith's conceptualization of how heritage is a process, this presentation will highlight some ways archaeologists can enable or hinder engagement, especially at a site of civic injustice. At Amache, project success has been greatly enhanced though creating opportunities for intergenerational dialogue and exploration of suppressed histories. Also critical is embodied experience of a place sometimes only known through the silences around it.

[141] *Discussant*

[141] *Chair*

Clark, Caitlin [21] see Albert, Rebecca

Clark, Dylan (University of North Carolina at Asheville)

[329] *Sea Change: Maritime Maya Lifeways, Social Organization, and Dynamics at the Port of Isla Cerritos, Yucatán*

Mesoamerican archaeology typically approaches social, cultural, political, and economic dynamics from a center-periphery perspective, tracing the historical pulses of integration and disintegration through the lens of the urban centers of the social and cosmological landscape. While the coastal Maya may seem peripheral geographically, maritime communities were actually central integrative forces throughout their dynamic histories. They facilitated and motivated movements and interactions of people, goods, and ideas within and beyond cultural regions and simultaneously stimulated sociocultural change. In this paper, I shift the viewpoint from inland to the coast, focusing on recent household archaeology at the island port of Isla Cerritos, on the Gulf coast of central Yucatán. The study addresses the question of social organization and change within the small resident population, as well as the sociocultural and political relationships with contemporaneous coastal and inland sites—especially Chichén Itzá. Moving between scales of archaeological data, from a single artifact assemblage and house mounds, to settlement patterns at the levels of site and region, I examine what we know about social life at this port from 300 BCE to 1500 CE and what a coastal Maya case study adds to our consideration of the social-historical dynamics of the northern Maya lowlands.

Clark, Jeffery (Archaeology Southwest)**[303]** *Not Quite Coalesced: Salado Settlements in the Upper Gila*

Most fourteenth-century Salado settlements in the Upper Gila watershed are comprised of separate room blocks in both planned and ad hoc configurations. These spatial arrangements suggest that integration, and by extension coalescence, was never fully achieved despite occupation spans of more than a century. This poster examines ceramic and other material culture variability among room blocks within four settlements to identify social and cultural differences that persisted until depopulation in the early fifteenth century. Of particular interest is evidence for the co-residence of various immigrant and local groups who maintained deeply engrained traditions while closely interacting with each other on a daily basis.

[335] *Discussant***[303]** *Chair***Clark, Julia (American Center for Mongolian Studies)****[114]** *Shifting Mobility Strategies in Neolithic and Bronze Age Mongolia*

Mobility is a central part of the contemporary, traditional, historical and prehistorical economic strategies employed by hunters and pastoralists in Mongolia. While mobility is often contrasted with sedentism, there is much variation within the practice of "mobility" and how it is employed. Residential and logistical mobility are often used heuristics to discuss variations in mobility. A critical application of these terms to the archaeological record of Northern Mongolia illustrates their utility, and tracks potential shifts in the mobility strategies of prehistoric and early historic populations who were undergoing great changes in their economic practices as hunting decreased and herding increased in the Neolithic and Bronze Ages.

[114] *Chair***Clark, Melissa (Ohio State University)****[235]** *Interpreting the Archaeology of Pregnancy Loss*

The status of pregnancy loss as taboo in Western culture, as well as the poor preservation of fetal remains, contributes to the absence of pregnancy loss from the anthropological study of funerary practices. Furthermore, pregnancy loss is rarely viewed by society as a legitimate cause for bereavement and perhaps consequently, has been overlooked in the archaeological record. Additionally, grief associated with a miscarriage or stillbirth is often described as a novel phenomenon, while parental attitudes toward children in post-Medieval to modern Ireland historically have been characterized as detached and apathetic with little regard for the value of individual life. Moreover, it has been argued that pregnancy loss was regarded as insignificant. Archaeological, ethnographic, and biological evidence, however, suggest that Irish mothers likely mourned the loss of a fetus, and that grief for a lost pregnancy is not a modern phenomenon.

Clark, Terence (University of Saskatchewan)**[387]** *Beyond House Floors: The Logistics of Northwest Coast Plank-house Villages*

Household archaeology has a long and fruitful history in Northwest Coast archaeology. Excavation at numerous sites has provided detailed data on living surfaces and activity areas, but the greater dynamics of household and village organization remain elusive. This paper looks at important, but neglected functional constraints of plank-house villages, namely the need for firewood, potable water, and disposal of waste. These factors, which almost certainly informed on the construction and maintenance of villages while also acting as potential drains on their social cohesion, structured the archaeological record being studied.

[256] *Discussant***Clark, Tiffany****[129]** *The Production and Exchange of Chupadero Black-on-white Pottery and Its Relationship to Social Identity*

Produced between AD 1150 and 1550, Chupadero Black-on-white pottery is found throughout central and southern New Mexico, and adjacent parts of Texas, Arizona, and Chihuahua, Mexico. Despite its widespread distribution, chemical and mineralogical compositional data indicate that the pottery was manufactured in only two areas of central New Mexico—the Jumanos portion of the Salinas province and Sierra Blanca region. Distributional studies indicate that the Chupadero pottery produced in the two regions exhibits substantially different patterns of exchange. The majority of vessels produced in the Salinas province were used in the Jumanos pueblos, with smaller numbers going to their Manzanos neighbors. In contrast, compositional data indicate that pottery from Sierra Blanca production sources extensively circulated through interregional exchange networks. This paper explores the differing patterns of interregional exchange as they relate to the social identity of consuming populations. The findings of this study suggest that Jumanos and Sierra Blanca populations may have used this ceramic as a broad social marker to differentiate themselves from neighboring Pueblo groups to the north and west. The common usage of Chupadero pottery as a social referent suggests that populations in both regions endowed these vessels with similar cultural meanings and values.

Clarke, Anne [100] see Donahue, Randolph

Clarke, Mary (Boston University), Franco Rossi (Boston University), Boris Beltran and William Saturno**[323]** *Inequality and Gender in Spaces of Craft Production*

This paper explores questions of inequality and gender in the Classic Maya world by examining the spatial relationships between and within local sites of craft activity. Pulling from recent archaeological work at the Classic period site of Xultun, Guatemala, we present research on two contexts that were connected to the production and use of limestone and lime plaster. In presenting this work, we discuss the broader social implications of these spaces as they relate to class and gender through archaeological evidence discovered within and beyond zones of craft activity at Xultun. We draw on recent multi-scalar approaches to craft production implemented in other Mesoamerican contexts—spanning intrasite household workshops, distribution loci and final use contexts as well as broader macro-regional networks of trade and specialized production. We argue such analyses can foster a better understanding not only of operational sequences underpinning the production of limestone monuments and finished plaster objects at Xultun, but also of the social factors that contributed to the spatial arrangements of craft production and use in ancient Maya production contexts more broadly.

Clarkson, Persis B. [134] see Valenzuela, Daniela

Claunch, Skyler [11] see Fox, Jacqueline

Clayton, Sarah (University of Wisconsin-Madison)

[391] Handmade or Mass-Produced: Ritual Objects and the Making of Identity in the Teotihuacán Region

A hallmark of the material culture of Teotihuacán, the largest city of its time in Mesoamerica (ca. 1–600 CE), is the wide circulation of a variety of mass-produced goods, including objects used in household ritual. Items made from molds included masks, figurines, ceramic vessels, and decorative attachments to large incense burners, which are often found in domestic refuse and in ritual contexts such as burials. Although such artifacts appear alike, they were not uniformly distributed across the population, and variation in the selection and use of mass-produced objects was socially as well as economically significant. Handmade objects, such as the small incense burners called *candeleros*, were also key components of the material culture of household ritual. In this paper I explore patterns in the distribution and use of handcrafted and mass-produced objects that are encountered archaeologically as buried offerings. I consider the cultural significance of contrasting patterns among the urban neighborhoods of Teotihuacán and settlements beyond the city and discuss data resulting from current research at the site of Chicoloapan, in the southeastern Basin of Mexico.

Cleghorn, Naomi (University of Texas Arlington), Ximena Villagran (Museum of Archaeology and Ethnology/University of), Benjamin Schoville (University of Cape Town), Daniel Peart (Ohio State University) and Hannah Keller**[153] *Hearth Features at Knysna Eastern Heads Cave 1, Southern Coast of South Africa***

The Agulhas Bank Paleoscape (ABP), a broad coastal plain that is now a submerged continental shelf off the south coast of Africa, would have presented early modern humans with a variety of potential foraging options. A rich Middle Stone Age record documents the presence of early coastal foragers as well as terrestrial hunter-gatherers in the ABP. At Knysna Eastern Heads Cave 1, both strategies are represented in a sequence spanning the end of the Middle Stone Age (about 40 ka) through to the end of the Last Glacial Maximum (about 19 ka), and through the technological transition to the Early Later Stone Age. Use of the cave throughout this period produced a dense sequence of well-preserved hearth features showing evidence of advance preparation of surfaces and frequent reuse. Here we report on the morphology, distribution, dating, and associated finds related to these features. Through an analysis of hearths, we investigate the issue of continuity of site use by groups with differing foraging strategies.

Cleghorn, Naomi [152] see Sender, Rachel

Clem, Shimaine, Emily A. Schach (Arizona State University) and Jane E. Buikstra (Arizona State University)**[233] *The Gendering of Children at Chiribaya Alta***

At the site of Chiribaya Alta (AD 900–1350), located in the Osmore Valley of southern Peru, certain Chiribaya grave goods are associated with either adult males or females. For example, females are often buried with weaving tools, and males with musical instruments. It is not possible to estimate the biological sex of children from their skeletal remains. Therefore, children are often excluded from studies addressing gender identities. Here, we use grave goods known to be associated with sexed adult remains to explore the process through which children learn their gender at Chiribaya Alta. Ethnohistoric and ethnographic data indicates that children begin to learn their gendered roles at a young age. The burial goods in the graves of the children at Chiribaya Alta help us to examine at what age and the process through which children begin to learn their expected adult gender roles and identities.

Cobb, Charles (Florida Museum of Natural History)**[395] *Indigenous Appropriations of Spanish Metal Goods in Southeastern North America***

Broadly speaking, iron and copper-alloy objects of Spanish origin in southeastern North America seem to fall into three categories that variably dominate from one site to another: 1) essentially unaltered, 2) trade goods modified by Europeans to conform to Native American demand; and 3) assemblages that consist of both categories 1 and 2, but were reworked by Native Americans. This diversity was a complex product of the convergence of structure, agency, and serendipity. The timing and nature of Spanish expeditions and settlements shaped the accessibility and even the value attached to objects, while Indigenous appropriations of those goods reflected local responses to novelty and opportunity.

[81] *Discussant***Cobb, Allan and Linda Palit (Independent Researcher)****[386] *Leaving Their Mark on the Wall: Determining Sex in Ancient Maya Rock Art***

Handprints and stencils are ubiquitous elements in rock art throughout the world. Numerous well preserved examples have been noted in Maya caves. These elements provide a clue as to the sex of the person whose hand is recorded on the cave wall. Recent studies have shown that sex may be estimated with a high degree of accuracy using anthropometric hand measurements. Sex is estimated by applying a variety of mathematical models based on sexual dimorphism in hand dimensions to direct measurement from rock art elements. Measurements have been collected from hand-prints in a number of caves in Yucatán to provide a large database for this project. Sex determination from rock art elements may improve the understanding of gender roles of ancient Maya within the context of cave use.

Cobo, Jose M. [38] see Fort, Joaquim

Cochrane, Ethan (University of Auckland)**[180] *Selection-Driven Range Expansion Explains Lapita Colonization of Remote Oceania***

Archaeological explanations of colonization often focus on presumed human motivations. What drives humans when faced with the potentially risky and rewarding colonization of unoccupied island regions: curiosity, wanderlust, opportunity, escape? At best, human motivation is only a partial explanation for colonization and one that is difficult to evaluate with archaeological data. In contrast, archaeologically visible, population-scale patterns of human colonization are explicable by the natural and social environment, transmission and selection. This paper develops a range-expansion hypothesis from animal ecology and evolution to explain Lapita colonization of Remote Oceania. The hypothesis is tested with both archaeological data and simulation modeling.

Cockrell, Bryan [135] see Simmons, Scott

Coco, Emily**[283] *The Spatial Analysis of Debris from the Mound 34 Copper Workshop***

During the 2007–2009 excavations at Mound 34, Washington University students and Museum Society volunteers piece plotted each individual artifact associated with the copper workshop at this mound. This information allowed for an in-depth macroscopic analysis of the debris associated with this activity area. This analysis focused on the spatial analysis of the copper and other debris within the workshop. Distribution maps of the debris were

created to determine the relationships between the different types of debris (i.e., the copper in relation to bone) and the relationship between the debris and structure. The distribution patterns identified by this analysis, in addition to comparisons with experimental copper-working, have led to important spatial and temporal insights into how copper items were produced at this site and how the structure of the workshop itself was being utilized.

Codding, Brian (University of Utah)

[383] *Ecology, Territoriality, and the Emergence of Acorn and Maize Economies in Western North America*

Ethnographic populations throughout Western North America sometimes relied on strategies and institutions to protect resources, patches, and territories for exclusive use. But explaining why and identifying when these exclusionary practices emerged (and dissolved) in the past remains difficult. Based on predictions from ecological and evolutionary theory, individuals should only engage in territorial behavior when the benefits of exclusive use, such as subsistence gains, are worth the costs of exclusionary tactics. We hypothesize this is likely to be the case when relatively dense populations shift toward intensified economies focused on abundant, storable, but relatively low profitability resources. If this is true, then demographic and economic shifts should occur coincident with changes in settlement patterns reflecting population infilling and stable clustering around key resources patches. Drawing on theoretical models from behavioral ecology and statistical models examining spatially explicit time series data, here we evaluate this hypothesis using two case studies: the emergence of acorn economies in central California, and the onset of maize agriculture in the eastern Great Basin and Colorado Plateau. If supported, this theoretical approach could help explain the origins of social institutions governing property rights, and this methodological approach could help identify such cases throughout prehistory.

[383] *Chair*

Codding, Brian [193] see Haisley, Christopher

Coe, Marion (Center for the Study of the First Americans, Texas A&M University)

[60] *Wild Plant Fiber Processing and Technological Organization: Holocene Perishable Artifact Production in the Bonneville Basin*

Perishable artifact analysis in the Great Basin has often focused on whole or complete pieces to address questions regarding broad social groupings and environmental adaptation. In the Great Basin, past populations targeted distinct ecological zones to tend and gather wild plant species for the manufacture of perishable material culture, and by focusing on technological organization and the manufacturing process, there is great potential to better understand how these activities contributed to organizing smaller-scale social groupings, social interaction, and environmental interaction in fragmentary artifacts. This presentation will provide an analysis of early through late Holocene Bonneville Basin museum perishable assemblages, and the Bonneville Estates Rockshelter and Four Siblings Rockshelter collections at Texas A&M University, including basketry, cordage, netting, snares, manufacturing debris, and other miscellaneous artifacts. Focusing on the technological organization and the manufacturing process, from initial wild plant fiber processing to artifact construction of sites around the Bonneville Basin, this analysis yields unique interpretations of Great Basin social and environmental interaction.

Coffey, Grant [301] see Schleher, Kari

Cohen, David (Researcher) and Monika Therrien (Director, Fundacion Erigaie)

[36] *Precarious and Obsolete Infrastructure: Archaeology of Water Networks in Bogota*

Infrastructure is currently one of the critical studies in social sciences at the global level, having been promoted as one of the great promises of equality and accessibility, through good performance and penetration of public services among the population, as well as a tool that would contribute to strengthen the control, authority and visibility of the State. The case study of the calle real of Bogota, being one of the oldest and most important streets in the city, makes visible what became the most prolific container space for the generation and installation of public and individual services of all times. Although data exists on these services in the documentary sources, archaeological evidences allowed us to contrast what is written with the quality and conditions of the infrastructure finally executed, particularly that related to water management. From stratigraphic, archaeometric, technological and urban analysis of the materials used to build water systems and their location along almost 2 km of this street, emerged as topical domains of discussion the precariousness and obsolescence of water networks under different political regimes and economic systems in the provision and maintenance of this service in Bogota.

Cohen, Jenny, Quentin Mackie (University of Victoria) and Daryl Fedje (University of Victoria)

[49] *Kilgii Gwaay: An Early Holocene Archaeological Wet Site in the Modern Intertidal Zone of Haida Gwaii, British Columbia*

The Kilgii Gwaay site in southernmost Haida Gwaii, British Columbia, is an early maritime-focused archaeological site dating to a brief interval about 10,700 cal. BP. The site was occupied at a time when relative sea levels were a few meters below modern and rising rapidly, ultimately drowning the site by up to 18 m of ocean waters for almost 10 millennia. Tectonic uplift over the past 5,000 years has gradually raised the site, which is now exposed in the intertidal zone. The overall assemblage suggests a summer base camp of people fully fluent in marine and terrestrial resources. Abundant stone tools and organic remains were recovered from excavations. Water saturation and site taphonomy at the site have preserved plant remains and bone, highlighting the importance of these otherwise relatively poorly preserved perishable resources from this early period. Wood artifact technologies and other plant use were established before the large-scale arrival of western redcedar (*Thuja plicata*), a cultural keystone species for Haida in more recent times. We contextualize the archaeobotanical, faunal and lithic assemblages, and discuss the implications of this wet site, one of the earliest of its kind in the Americas, for the early occupation of the Northwest Coast.

Cohen, Anna (University of Washington)

[322] *Advertising the Empire: Purépecha Strategies in the Imperial Heartland at Angamuco, Michoacán*

Regime change is a social process that has occurred throughout human history and yet much is still unknown about how political developments shape local communities. This paper examines the impacts of the Late Postclassic (1350–1530 CE) Purépecha Empire on residents at Angamuco, an ancient city within the Lake Pátzcuaro Basin imperial heartland in Michoacán, Mexico. Imperial narratives in ethnohistoric texts emphasize that authorities controlled craft production, tribute, and social practices. Archaeologists have investigated these narratives within a social evolutionary framework that underscores an expanding and highly centralized Purépecha state and empire. Drawing upon material from excavation and survey of domestic and public ritual contexts, I evaluate whether the dominant top-down model of political economic consolidation has more explanatory power than alternative bottom-up models. Changes in the production and use of the ceramic artifacts, as well as differences in stone architecture, suggest that the Purépecha exploited existing resource systems, and that imperial changes are most visible in elite areas of Angamuco. The results of this study provide a foundational chronology of occupation at Angamuco and add to our knowledge of complexity and urban forms in western Mexico.

Cohen, Anna [118] see Solinis-Casparius, Rodrigo

Cojti-Ren, Iyaxel (Vanderbilt University)

[218] *The Emergence of the Kaqchikel Polity: Ethnogenesis in the Postclassic Guatemalan Highlands*

In this paper I will explore how the western Kaqchikel managed from being military auxiliaries to the K'iche' kingdom to become an independent and expansionist polity, and how this transition was reflected in the material culture of their two last settlements. I will use ethnohistorical documentation to inform how the western Kaqchikel conceived their auto determination, and how they reached it after they abandoned their first capital Chi Awar after breaking their political alliances with the K'iche' to start a new chapter of their sociopolitical life as an independent polity at Iximche. Archaeological data will be presented to corroborate ethnohistorical information regarding the Kaqchikel occupation of Chi Awar, the drastic abandonment of this site, and specially to discuss how the material culture let us know better about the lifestyle the Kaqchikel had at Chi Awar as an emerging polity but still under the dominance of the K'iche'. This research intends to be a diachronic study about the inception of a new political community in the highlands of Guatemala and to enrich the discussion about the Mesoamerica's political geography in late Postclassic Mesoamerica.

Colburn, Mona [61] see Styles, Bonnie

Colclasure, Cayla (University of Tennessee, Knoxville), Martin Walker (University of Tennessee, Knoxville) and David Anderson (University of Tennessee, Knoxville)

[241] *Defining the Local Experience: A Distributional Analysis of Late Prehistoric Activities at the Topper Site (38AL23)*

During the summers of 2015 and 2016, University of Tennessee, Knoxville field schools conducted excavations on the hillside at the Topper Site (38AL23), in Allendale, South Carolina. This work represents a shifting focus away from the Paleoindian period toward the dense Mississippian and Woodland assemblages present at the site. Maps constructed utilizing QGIS document the distribution of artifacts and the arrangement of identified features in the two excavation blocks and dispersed 1 × 1 m units. Evidence for habitation includes hearth features as well as linear and semicircular arrangements of postholes. The distributional analysis examines utilization of space within and without the structure and determines activity areas. These distributions were compared to similar datasets from other locations, including the Woodland occupation at the G.S. Lewis West site, located approximately 30 km north along the Savannah River. Site function and broader relationships to contemporary, local communities are considered. We discuss what aspects of daily life and household dynamics are reflected in our findings. This paper provides insights into intrasite activity patterning at Topper, local settlement variation in the Savannah River Valley, and contributes to our knowledge of the Woodland period on the Southeastern Atlantic Slope.

Cole, Emily [132] see Simpson, Bethany

Cole, Kasey (Dept. of Anthropology, California State University) and Frank Bayham (Department of Anthropology, California State University)

[251] *Artiodactyl Exploitation in Northeastern California during the Terminal Prehistoric/Protohistoric Time Periods: Evidence of Environmental Rebound?*

Artiodactyl representation in the archaeological record can be a particularly sensitive indicator of past human-environmental interactions due to their status as a high-ranking prey item. In this study we explore terminal prehistoric and protohistoric patterning of artiodactyl exploitation in the archaeofaunal record in northeastern California. Specifically, this study examines previously published zooarchaeological data derived from residential sites situated along the Pit River in conjunction with new data derived from the faunal analysis of the Lorenzen site (CA-MOD-250), a residential village occupation located north of the Pit River drainage in Little Hot Springs Valley, California. The examination and comparison of artiodactyl exploitation during this time period and in these nearby localities provides some evidence for environmental rebound within the region. Additionally, this study explores factors that might influence both temporal and spatial variation in this phenomenon as a whole.

Collard, Mark (Simon Fraser University), Ben Raffield (Simon Fraser University) and Neil Price (Uppsala University)

[15] *Religious Belief and Cooperation in Viking Societies*

It has become clear in recent years that it was not uncommon for Viking groups to be heterogeneous. Numerous studies carried out over the last 25 years indicate that, in the short term at least, sociocultural diversity has a negative impact on trust within communities, and that this leads to a reduction in the willingness of community members to support public projects. Thus, one issue raised by the discovery that many Viking groups were heterogeneous is how loyalty to the group was achieved. In the present paper, we seek to shed some light on this question. Recent work in the field known as the Cognitive Science of Religion suggests that certain religious beliefs can reduce selfishness and enhance within-group cooperation. Supernatural monitoring—wherein deities observe human thoughts and actions in order to identify and punish those who fail to act prosocially—is thought to be particularly important in this regard. With this in mind, we review archaeological data and written sources to address the question “did Norse gods engage in supernatural monitoring?” We show that there is reason to believe that the Norse gods were perceived to monitor human thoughts and actions and that this likely promoted a parochial form of prosociality.

Collard, Mark [77] see Carleton, William

Collins, Benjamin (University of Manitoba) and Christopher Ames (University of Victoria)

[146] *Preliminary Results from New Excavations of the Late Pleistocene Occupations at Grassridge Rockshelter, South Africa*

Grassridge Rockshelter sits at the base of the Stormberg Mountains in the northern part of the Eastern Cape, South Africa. This region has only been the focus of two previous major archaeological projects, with research at Grassridge last conducted in 1979 and identifying Holocene Later Stone Age and Late Pleistocene Middle Stone Age occupations. The Grassridge Archaeological and Paleoenvironmental Project (GAPP) renewed research at Grassridge in 2014. In this presentation, we summarize the results of the new excavations, with a focus on the Late Pleistocene occupation. Major findings include a rich lithic assemblage with abundant points and blades, frequent and overlapping burning features, ochre, fauna, and preserved plant remains. A radiocarbon date of 35,000 ± 2200 14C years BP places Grassridge's upper Late Pleistocene occupation during a period of region-wide behavioral and technological diversity in southern Africa. GAPP's ongoing research of Grassridge's rich Late Pleistocene archive looks to contribute to a better understanding of this diversity in relation to the paleoenvironmental, demographic, and social influences during this period.

Collins, Brennan [18] see Glover, Jeffrey B.

Collins, Renee (Northern Arizona University) and Rafael Guerra (University of New Mexico)**[298]** *In the Shadow of the Giant: Investigating the Rise and Fall of Settlement Groups Adjacent to Site Cores in the Belize Valley*

Located directly across the Belize River from Barton Ramie, the recently discovered site of Lower Dover has been the focus of intensive research by the BVAR Project since 2011. The major foci of these investigations are to determine the relationship between Lower Dover, Blackman Eddy and Baking Pot, and to ascertain the development of the site within the sociopolitical landscape of the Belize River Valley region. In an effort to address the latter research questions, excavations have focused on both the monumental architecture of the site core, and on plazuela groups in the immediate periphery of the site's epicenter. One of these peripheral settlements, designated as Group G, consists of five mounds that enclose a small plaza just north of the center's ball court. This paper presents preliminary results of our investigations on Group G, and compares the development of this settlement with that of the site center.

Collins, Ryan (Brandeis University)**[329]** *Monumental Recycling: The Inevitably Perilous Relationship between Shifting Integrative Strategies and Yaxuná's E-Group Plaza (900 BCE to 100 CE)*

Over four consecutive field seasons, the Proyecto de Interacción Política del Centro de Yucatán investigated the plaza and several buildings in Yaxuná's E-Group, granting new insight into the site's origins and development from a modest ceremonial complex into a monumental urban center. Excavations over the east-west centerline of the plaza generated data on several distinct commemorative events spanning 11 floor phases. Nonetheless, each of the observed traditions is fraught with continuities and disjunctures between phases that I argue marked distinct strategies for fixing identities, fostering community wide integration over generations. Furthermore, the shifts in commemorative traditions coincide with gradual developments in sociopolitical complexity and increased stratification apparent throughout Eastern Mesoamerica between 1000 BCE and 100 CE. Although the E-Group was a nexus where experiences, identities, and memories were repeatedly fixed, after 350 BCE commemorations and architectural campaigns became distanced. Though Yaxuná remained occupied, further constructions and visible activities in the E-Group came to a gradual halt, shifting the former politico-religious importance of the space to that of a resource for masonry stones. This paper will explore how monuments serve to foster social integration between groups as well as fractures.

[329] Chair**Colonese, Andre Carlo (University of York), Cecile Brugere (Stockholm Environment Institute, University of York), Rafael Brandi (Brandi & Bandeira Consultoria Cultural), Arkley Bandeira (Brandi & Bandeira Consultoria Cultural) and Alpina Begossi (Capesca/Lepac and CMU, UNICAMP, UNISANTA, FIFO)****[45]** *Shifting the Paradigm of Coastal Archaeology in Latin America*

How might knowledge of past fisheries contribute to the future sustainability of modern coastal societies? Small-scale coastal fisheries provide a crucial source of food and livelihood to millions of people living in South America. Such coastal economies are founded on long-established knowledge that is deeply rooted in the past. While marine conservation, dwindling fish stocks and environmental sustainability have driven the research agenda in recent years, government and international organizations are now emphasizing the pivotal role of local traditional knowledge for promoting sustainable development and poverty eradication in coastal areas of developing and developed countries. If traditional subsistence strategies are to be of value in promoting sustainable fisheries and coastal livelihoods in the future, a deeper understanding of their long-term history is required. We will present the results of a multidisciplinary research effort aimed at exploring and documenting the contribution of coastal archaeology to pressing issues in modern Latin America. We will demonstrate how coastal cultural heritage and traditional knowledge contribute to community livelihood and poverty mitigation in one of the poorest areas of Brazil. Coastal archaeology can effectively track the legacy of past fisheries to the socioeconomic and cultural profile of contemporary societies.

[45] Chair

Colonese, Andre Carlo [96] see Hendy, Jessica

Colten, Roger (Peabody Museum of Natural History, Yale University), Susan deFrance (University of Florida), Michelle LeFebvre (University of Florida) and Brian Worthington (National Park Service, Southeast Archeological Cen)**[340]** *Were Hutia Domesticated in the Caribbean?*

The Caribbean islands had limited endemic terrestrial fauna and they lacked any of the New World domesticated animals until fairly late in prehistory. Given the depauperate terrestrial fauna of these islands the early Native American inhabitants relied on marine resources and endemic rodents for a significant proportion of the animals in their diet. It has been argued that rodents from the family Capromyidae, various species of hutia, were managed and perhaps domesticated in the Caribbean. In this paper we review literature on the prehistoric management of hutia and present archaeological faunal data from Cuba dating to the preceramic era and faunal data from later time periods from the Bahamas.

Coltman, Jeremy (University of California, Riverside)**[119]** *Climbing the Home of the Rain Gods: Mountain Cults in Ancient Central Mexico*

According to Henry B. Nicholson, the rain deity Tlaloc enjoyed the most active and widespread cult in ancient Mexico. This assertion is surely correct, and is further evidenced from later ethnohistoric and ethnographic sources. Closely related to Tlaloc—and his earlier manifestations—were the Tepictoton, little directional mountain deities venerated during the veintenas of Tepeilhuitl and Atemoztli. In this paper we review Nicholson's original observations seen in the light of new discoveries and interpretations of the past 25 years. We will thus look at the significance and symbolism of mountain cults in ancient Central Mexico from the Classic period and onward, examining some of the regional and temporal variations of what was clearly a shared set of ideas and beliefs. Both Teotihuacán and Mexico-Tenochtitlan sit in the shadow of important mountains that had ritual significance. Most likely, the very position of these mountains had something to do with the settlement of these centers as part of rituals of foundation.

[119] Chair

Coltrain, Joan [290] see Lewis, Michael D.

Colvin, Matt [163] see Thompson, Victor

Cometa, Kaitlyn and Allen Denoyer (Archaeology Southwest)**[303]** *The Value and Availability of Quality Obsidian at Antelope Creek*

Antelope Creek is a part of the important larger obsidian source at Mule Creek in Southwestern New Mexico. Antelope Creek contains an abundance of both poor and good quality obsidian that appears to have developed from the same volcanic event. In this experiment, a large sample of Antelope Creek obsidian was collected and tested for quality through the process of flintknapping. Results indicate that knappers can readily tell a poor quality nodule from a good quality nodule from this source by the appearance of the cortex. The good quality, valuable obsidian nodules have a matte brown cortex whereas the cortex of the poor quality obsidian nodules appears polished and black. We also examine the formation processes and chemical makeup of these nodules that could have resulted in varying cortex properties as well as varying knapping quality and the ability to drive valuable flakes from a core.

Commendador, Amy S. (Idaho Museum of Natural History), John Dudgeon (Idaho State University), Rebecca Hazard (Idaho State University) and Julie Field (Ohio State University)

[123] *Multicomponent Analyses of Prehistoric Fijian Diet: Stable Isotopes of Bone Collagen and Carbonate*

Several studies have provided stable isotopic insights into prehistoric Fijian diet via carbon and nitrogen analyses of bone collagen, with recent reports suggesting a diet of predominantly C3 plants though with some individuals exhibiting significant input from lower trophic level marine resources. Here we add to these studies by incorporating both a larger sample size from several sites on Viti Levu and a combined analysis of isotope data obtained from human bone collagen and carbonate. The combined analyses of collagen and carbonate may provide a more accurate understanding of prehistoric subsistence, as collagen represents primarily protein intake while carbonates have been shown to record whole diet and may enhance our understanding of the incorporation of low protein sources. While bone carbonate data has the potential to clarify input from low protein sources, this matrix is more susceptible to diagenetic alteration. We also present ATR-FTIR analyses of all bone samples to understand potential diagenetic signatures and validate carbonate isotopic data. Lastly, prehistoric diet will be examined in light of a modern isotopic food web being developed for Viti Levu.

Commendador, Amy S. [123] see Dudgeon, John

Commendador, Amy S. [123] see Field, Julie

Commendador, Amy S. [123] see Franklin, Olivia

Compton, Mary (University of Western Ontario)

[258] *Making Meaning from 3D Models and 3D Prints: A Case Study Using Archaeological Objects from Southwestern Ontario*

3D technologies provide a powerful mechanism for documenting, sharing, and engaging with archaeological information. While the products of these tools (including 3D models and 3D prints) are often treated as neutral objects, they should be identified as mediated and interpretive entities. How people experience, perceive, and value these archaeological "copies" in relation to original archaeological material is still relatively unknown. This poster acted as a localized case study from Southwestern Ontario outlining the key themes that emerged from interviews with diverse archaeological constituents including local descendant (First Nations) community members, academic and CRM archaeologists, museologists, and members of the general public. The interviews were framed around a collection of both historical Euro-Canadian and Ontario First Nations artifacts as well as digital photographs, 3D models, and 3D prints of those artifacts. Along with a brief description of the various technologies used to make the representations and replicas, this poster synthesizes the key themes emerging from the interviews and discusses the implications of those results for the development of future artifact sharing protocols.

Comstock, Aaron (Ohio State University) and Robert Cook (Ohio State University)

[299] *Migration and Cultural Emplacement on the Mississippian Periphery: A Fort Ancient Example*

Recent excavations at the Turpin site (33HA19) in southwest Ohio, have reestablished the importance of population movement in cultural emplacement in this region. Although the predominant model for Fort Ancient evolution in the Middle Ohio Valley posits gradual village development and relatively late (post-AD 1400) Mississippian influence, work at Turpin and other sites in the lower Miami Valleys suggests that the movement of Mississippian people acted as a catalyst for change beginning around AD 1050–1100. The focus of this presentation is on results from recent excavation and analysis of assemblages from two wall trench structures. Chronological and material culture data suggest that early occupation (AD 1030–1200) of Turpin is consistent with Mississippian villages throughout the Midwest and Southeast. Later occupation (AD 1200–1275) at Turpin is more consistent with more "typical" Fort Ancient sites in the region. The largest implication of these findings is that Mississippian involvement was seminal in the development of Fort Ancient culture rather than epiphenomenal.

Conard, Nicholas (University of Tübingen)

[389] *Examining Sedimentation Rates, Find Densities, Raw Material Economies and Technological Solutions in Paleolithic Contexts*

This paper examines low density Paleolithic sites from several geological contexts within a diachronic framework. The case studies consider what unifying elements and differences exist in Lower, Middle and Upper Paleolithic contexts and addresses their causes with regard to the nature of sedimentation, raw material availability and technological needs. Where preservation permits links will be made between assemblages of lithic, faunal and botanical artifacts at the contexts studied to help interpret the functional importance of low density accumulations, which often, but not always, reflect brief and ephemeral occupations.

[165] *Discussant*

Conard, Nicholas [282] see Velliky, Elizabeth

Conesa, Francesc C. (Spanish National Research Council—Universitat Pompeu Fabra)

[57] *Looking for Green Grass in the Desert: Methods for Land-Cover Classification in Drylands*

In recent years, applications of Earth Observation for archaeology have been boosted by data acquisition and by the increased spatial and temporal resolution of new products (e.g., Sentinel-2, WorldView series, Pléiades mission). Nowadays, archaeologists are looking for ways to effectively merge multi-spatial and multi-temporal imagery, integrating spectral and contextual information as well. In arid lands, the lack of adequate data on long-term vegetation dynamics is hampering our capacity of understanding human-environment interactions. In this paper we present an ongoing research aimed at refine the land cover classification of the archaeological landscapes of Central Sahara and Gujarat (South Asia). Those areas where not subjected to major environmental changes throughout the late Holocene, and thus represent ideal case studies to apply remotely sensed based approaches. The

understanding of the land cover dynamics in arid lands is key to refine our reconstruction of past cultural trajectories. In doing this, we are exploring a set of different approaches in land-cover classification (e.g., spectral ratios, LDA, image segmentation and OBIA) in open-source platforms (i.e., R, OTB) in order to get automatic and accurate results from multiple datasets.

[57] *Chair*

Conesa, Francesc C. [57] see Biagetti, Stefano

Cong, Dexin (Institute of Archaeology, Chinese Academy of Social Sciences, Beijing, China)

[117] *Silk Road and Archaeology in Xinjiang: Insight from Adunqiaolu*

The "Silk Road" describes the cultural communication routes established in the Han and Tang Dynasties. The term, coined by German scholar Richthofen (李希霍芬) in the historic literature, has since spread globally. The Xinjiang Uygur Autonomous Region in China, located in the line of communication between East and West, was part of the Western Region in Chinese historic literature. Because of the unique climate conditions of Xinjiang, preservation of ancient remains is excellent, providing a rich array of materials for exploring ancient cultures of the Western Region. This study examines human remains from the Bronze Age site of Adunqiaolu through aDNA, stable isotopic, and paleobotanic analyses. In addition, the bioarchaeological and archaeological data have been combined with extensive historic literature to investigate ancient human behavior, cultural exchanges, and lifeways that culminated in the formation of the "Silk Road." This multidisciplinary approach applied to the complex history of Xinjiang from prehistoric to Bronze Age times facilitates a growing understanding of the Silk Road and the people of this vast trading and cultural exchange network.

Cong, Dexin [115] see Wang, Minghui

Conkey, Margaret (UC-Berkeley)

[172] *Field Walking and Walking the Field*

While we have gradually accepted that archaeological survey is as integral to our research as the overly-valued practice of excavation, the emotional dimensions of survey where one connects with the landscapes and with its occupants are hardly discussed, especially in the case of long-term surveys. What does a heart-centered survey project look like? How does the intimacy that comes from field walking inform the archaeology? As well, we are all participants in the field of archaeology, and everyone has a personal trajectory; we are walking the field over the years. Some of us have chosen to do this with as much collaboration as possible, as a way to bring more to the process, to recognize that walking (through) the field is a social, personal, emotional and intimate process that should be validated and endorsed. In this presentation, I will address both sides of "the field" from a heart-centered perspective drawing, on one hand, from my own field walking survey project in the French Midi-Pyrénées and, on the other hand, from the collaborative practices that have allowed me to walk through our disciplinary field.

[65] *Discussant*

Conlee, Christina (Texas State University)

[147] *Moderator*

Conlogue, Gerald [151] see Tarquinio, Daniella

Connaway, John [163] see Johnson, Jay

Connell, Samuel (Foothill College), Rachel Brody (Boston College), Andrew Bair (Columbia University), Lena Murphy (Mendocino College) and Valerie Watson (University of Wisconsin-La Crosse)

[282] *Castles in Communities Anthropology Settlement Survey: Preliminary data from 2015/2016 Field Seasons at Ballintober, Ireland*

An overview of project design and preliminary results from two field seasons of research aimed at expanding our understanding of settlement in later medieval Ireland. The field school program run by Foothill College at Ballintober Castle in Co. Roscommon has made remarkable progress 1) identifying possible phases of Anglo-Norman and subsequent Gaelic Irish castle construction and occupation, 2) utilizing different geophysical techniques to find a Deserted Village associated with the castle, and 3) building community heritage plans.

Connell, Samuel [220] see Boyd, Siobhan

Connuaghton, Sean [394] see Herbert, James

Conrad, Cyler N. (University of New Mexico)

[333] *From Hunting and Gathering to Farming in Northern Thailand*

Southeast Asia's prehistoric zooarchaeological record is peculiar: faunal assemblages are seemingly 'diverse,' and generally include a large number of mammalian/reptilian/avian and molluscan species, but often these assemblages lack telltale evidence for human consumption. Therefore, one of the primary challenges confronting zooarchaeologists in this region is identifying what taxa were actually exploited by prehistoric foragers and how these patterns changed over time. This paper investigates forager subsistence in northern Thailand over the past 12,000 years. Using new zooarchaeological evidence from Tham Phii Man (Spirit Cave), Tham Phaa Can (Steep Cliff Cave), Tham Sai (Banyan Valley Cave) and Non Nok Tha (Partridge Mound), I argue that prehistoric hunter-gatherers only exploited some species present in these faunal assemblages and that this pattern of exploitation shifts in the early to mid-Holocene. These new datasets show that the transition from hunting and gathering to farming in mainland Southeast Asia was complex and requires an explanation of in situ foraging adaptations to understand why it was successful.

[333] *Chair*

Conrad, Cyler N. [127] see Bowler, Victoria

Contreras, Daniel (Aix-Marseille Université)**[37]** *Downscaling in Archaeology: From digital forest to probable trees*

Integrating archaeological and paleoenvironmental data about the past is a long-standing archaeological goal. It is often central to basic archaeological interpretation, fundamental to addressing questions of human-environment interaction, and vital to realizing archaeology's potential contributions to studies of vulnerability, resilience, and sustainability in the face of climate change. However, such integration faces challenges of scale, resolution, and mechanism. Increasingly abundant digital data open the possibility of adoption of statistical downscaling approaches used in ecology and paleoclimatology, which offers one means of addressing these challenges. In this paper I use a case study in Provence (France) as an example of the downscaling of paleoclimate data to explore the human consequences of Holocene climate change, particularly through its impacts on agricultural potential. The promises and pitfalls of downscaling in archaeology, I argue, exemplify the potentials of digital data: downscaling enables generation of interpretive possibilities, but also risks reifying one of them by producing seductive results. At the same time, downscaling is so explicit in its probabilistic foundations that it is a useful epistemological metaphor for digital archaeological data more generally.

[112] *Discussant*

Contreras, Daniel [90] see Feathers, James

Conway, Meagan [207] see Ames, Nicholas

Conyers, Lawrence [350] see Monaco-Schlater, Joanna

Cook, Anita (Catholic University of America)**[65]** *Discussant***Cook, Katherine and Meghan Burchell (Memorial University of Newfoundland)****[18]** *Teaching Digital Archaeology as Public Anthropology: Models for Using Social Media and Technology to Move Beyond the Classroom*

Higher education pedagogy and university administration are pushing technologies as a way of increasing engagement and contact with students, rolling out digital learning environments and handheld devices aplenty. This shift has been critiqued as a fad but can it be harnessed to address the long-standing goals of public anthropology and calls to decolonize the classroom? Embracing multivocality, diversity, inclusivity and collaboration is complex, and opportunities to teach in a way that moves beyond simply lip service are rare. However, the tools to begin training students in public anthropology are often already at their fingertips—in fact, many of them are already doing it. By integrating technologies and social media thoughtfully and critically into curriculum, we can contribute to better understandings, approaches and skills for future generations of anthropologists. Digital literacy training as part of degree programs can also be harnessed in pursuit of increasing accountability, ethical practice, civic engagement, and global consciousness on the part of students and instructors alike to frame sustainable relationships outside of the classroom. Based on experiences teaching undergraduate and graduate students in North America and Europe, this presentation will share successes, failures, and lessons in digital public archaeology that our students have taught us.

[372] *Discussant***Cook, Robert (Ohio State University) and Mark Schurr (University of Notre Dame)****[341]** *Using Fluoride Analysis and Artifact Density to Examine Household Formation in Prehistoric Villages: A Fort Ancient Example*

Examining the formation histories of houses within prehistoric villages is difficult in cases with coarse resolution of radiocarbon dates and lack of stratigraphic relationships. Here we examine this problem by using two relative dating techniques, accumulation studies of artifacts and fluoride dating of animal bone, at the Guard site, an early (ca., AD 1000–1300) Fort Ancient village located in southeast Indiana. The sampling strategy involved excavating test units in all houses to assess the depositional history of the individual basins and to determine a relative sequence of house construction within the village. Results reveal much variation in artifact accumulation between houses, with houses containing more artifacts being hypothesized to be older structures that had been filled in with trash. Fluoride analysis was used to examine this hypothesis, producing generally consistent results. Vertical considerations revealed that stratigraphy was often reversed which is consistent with the interpretation that they were rapidly filled with trash. Horizontal considerations indicate that the initial construction age of houses with more trash were generally earlier than those with less trash.

Cook, Robert [299] see Comstock, Aaron

Cook Hale, Jessica (University of Georgia), Nathan Hale (University of Georgia) and Ervan Garrison (University of Georgia)**[199]** *The Tempest: Geoarchaeological Investigations into the Effects of a Hurricane on a Submerged Prehistoric Archaeological Site, Apalachee Bay, Florida, USA*

When Hurricane Hermine made landfall approximately 5 miles southeast of St. Mark's, Florida, on September 1, 2016, it passed directly over several known submerged prehistoric archaeological sites in Apalachee Bay. This was less than one month after we had completed geoarchaeological investigations at one of them, the Econfina Channel Site, 8Ta139. The passage of the hurricane has allowed us a unique opportunity to assess what, if any, effects the storm had on the site. This study is particularly relevant because the nature of preservation at submerged prehistoric sites varies depending on multiple factors, many of which cannot be properly constrained. In this case, we have sedimentological datasets from prior to the storm. These will be compared to sedimentological datasets collected after, as well as any other observed changes in site features, artifacts, or overall geomorphological context.

[199] *Chair***Cooley, Delaney (University of Oklahoma)****[343]** *A Comparison of the Lithic Assemblages from the Shavano Springs site (5MN40) and Christmas Rockshelter (5DT2), Western Colorado*

Archaeologists have long struggled to identify archaeological material diagnostic of prehistoric and protohistoric Ute occupation in the Rocky Mountains and surrounding areas. Despite continued efforts, researchers continue to rely principally on William Buckles's (1971) seminal work examining Ute cultural continuity on the Uncompahgre Plateau of western Colorado. My research expands on Buckles' 45 year-old dissertation by reexamining two excavated sites from his project: the open occupation Shavano Springs site (5MN40) and Christmas Rockshelter (5DT2). Together, the two sites chronologically encompass the Paleoindian period through historic times. I will compare the lithic procurement and production strategies through time

and between the two sites, for levels of comparable antiquity, to characterize the degree of continuity or lack thereof. My results identify aspects of lithic technology unique to prehistoric and protohistoric Ute and provide researchers with new tools for evaluating the cultural affiliation of prospective Ute sites.

Cooney, Gabriel (UCD School of Archaeology), Jenny Murray (Shetland Museum and Archives) and Will Megarry (Queen's University Belfast)
[216] *Powerful Objects: Traditional Beliefs about Neolithic Axes and Knives in Shetland*

In the Shetland islands off the north coast of Scotland there was major exploitation of a lithic source known as riebeckite felsite during the Neolithic period. This source provided the raw material for the majority of stone axes known from the archipelago and also for objects known as Shetland knives. At the source, North Roe, mainland Shetland intrusive dykes of felsite occur in granite. Integrated, multi-scalar survey and excavation by the North Roe Felsite Project has demonstrated that some of these were worked extensively. Objects from the quarry complex have been found right across the island group. Museum records and oral accounts indicate that traditionally felsite axes in particular were regarded as powerful objects, often deliberately incorporated into the walls of buildings and actively employed in practices to bring good luck to the family and farm. This paper will explore the basis for this active social role of felsite objects and raise the question of the extent of local knowledge of the quarry which was archaeologically identified within the last fifty years.

Cooney, Gabriel [376] see Megarry, Will

Cooper, Catherine G. (University of British Columbia), Angela Perri (Max Planck Institute for Evolutionary Anthropology), Jessica L. Burns (University of Utah), Jeremy M. Koster (University of Cincinnati) and Michael P. Richards (Simon Fraser University)
[156] *Dietary Variability through Isotopic Analysis of Modern Human Hair from Nicaragua: Exploring Significant Differences in Diet between and among Demographic Groups in a Single Population*

Carbon and nitrogen stable isotope analysis of modern human hair from Nicaragua was used to explore what constitutes significant differences in gross diet between and among demographic groups within the same population. Our results show that the absolute differences between isotopic central tendencies of demographic groups are small, but some are significant. Socioeconomic categories that were found to have significantly different isotopic signatures between or among groups included age groups ($\delta^{13}C$ X2 = 76.99, df = 4, p = 0.000 and $\delta^{15}N$ X2 = 86.85, df = 4, p = 0.000), locations ($\delta^{13}C$ Mann Whitney U = 5992.000, p = 0.000 and $\delta^{15}N$ Mann Whitney U = 8926.000, p = 0.021), and wealth (mean $\delta^{15}N$ Mann Whitney U = 122.000, p = 0.003); there were no significant differences in isotopic signature between sexes.

Cooper, H. Kory (Purdue University), Robert J. Speakman (University of Georgia), Antonio Simonetti (Notre Dame), Matthew Pike (Purdue University) and Garrett Hunt (Purdue University)
[4] *Native Copper Innovation in the North*

Native copper occurs in the Northwest Coast, western Subarctic, and Central Canadian Arctic and Subarctic. In all three regions there is archaeological evidence for its use by Hunter-Gatherers before the Contact Period. Since 2011, our project has been studying the innovation of native copper metallurgy in these three regions within a Behavioral Archaeology framework using data collected from: experimental archaeology, oral history, lead isotope analysis, research on museum collections using pXRF, government archaeological site databases, and gray literature. This project also has a community component, collaborating with the Native Alaskan and First Nations communities. Although the results of Pb isotope analysis of geological samples of copper from the Arctic and Subarctic are not encouraging, the large set of pXRF data suggests that this technique can be used to distinguish native copper from alloys such as brass and leaded materials and also relatively pure smelted copper. Additionally, this paper provides a brief overview of our results to date including a comparison of the use of copper by Hunter-Gatherers exhibiting differences in social complexity as well as thoughts on why and how copper innovation occurred in all three regions.

Cooper, Jago (British Museum)
[93] *Discussant*

Cooper, Jago [133] see Samson, Alice

Cootsona, Melanie (Barnard College) and Madeleine Strait (Barnard College)
[192] *The Animals of Pueblo Ritual: Faunal Analysis of a Kiva from Pot Creek Pueblo, New Mexico*

This poster reports on the analysis of the faunal remains from a D-shaped kiva in use during the late 1200s or early 1300s at Pot Creek Pueblo in the northern Rio Grande region of New Mexico. The kiva was decommissioned in a highly ceremonial manner with both human and animal interments, as well as a variety of additional animal offerings on the floor. Additional animal deposits in the fill of the kiva suggest the continued use of the space as a receptacle for offerings. Close analysis of these zooarchaeological remains thus provides a key means of exploring the ritual practices of Ancestral Pueblo communities in the Rio Grande during a period of active village aggregation and social transformation.

Copeland, Lauren (California State University, Los Angeles)
[11] *The Iconography of a Late Classic Polychrome Maya Vessel from Petén, Guatemala*

While elite Maya polychrome ceramics often contain images and inscriptions related to political actors, motifs on the majority of polychrome ceramics relate to important elements of ancient Maya cosmology. This poster analyzes the iconography on a Classic Maya polychrome vessel from Petén, Guatemala, donated to the San Bernardino County Museum. The central figure on the interior of the bowl is a deer and a supernatural figure is painted on the inside wall. Terrestrial motifs are found on both the interior and exterior, emphasizing the centrality of the animate Earth.

Copeland, Sandi (Los Alamos National Laboratory), Amanda White (Los Alamos National Laboratory), Samuel Loftin (Los Alamos National Laboratory), Leslie Hansen (Los Alamos National Laboratory) and Benjamin Sutter (Los Alamos National Laboratory)
[366] *Modeling Erosion Risks for Archaeological Sites in the American Southwest Using GIS and RUSLE (Revised Universal Soil Loss Equation)*

The greatest climate change related threat to archaeological sites in the American Southwest is soil erosion brought on by hotter temperatures, increasingly intense wildfires, bark beetle infestations, and other subsequent changes in habitats. At Los Alamos National Laboratory in northern New Mexico, we manage 38 square miles of canyons and mesas that contain more than 1,700 archaeological sites, most of which are affiliated with Ancestral Pueblo cultures. In order to identify and protect the sites at highest risk for erosion, we created a soil erosion model using a geographic information system (GIS) and the revised universal soil loss equation (RUSLE). The model combines GIS layers that reflect climate, soil types, land cover, and

LIDAR-based topography with a 2-m-square resolution. The model estimates tons of soil eroded per acre per year, but is best interpreted as a relative measure in this initial application. At Los Alamos National Laboratory, the model successfully identifies sites with threatening erosional issues, such as small gullies within the boundaries of mesa-top pueblo room blocks, and shows promise for use as a tool for comparing areas of greatest erosional concern across the Laboratory.

Coppe, Justin (Tracéolab-University of Liège), Veerle Rots (Tracéolab-University of Liège), Marc Pirlot (ABAL-Royal Military School of Belgium) and Valérien Clarenne (Royal Military School of Belgium)

[40] *The Ballistic Performance of Prehistoric Weapons: First Results of a Comparative Study*

Projectile points have recently taken a prominent position in debates on the complexity of Paleolithic human behavior. While the appearance of hunting weapons in the archaeological record was a central element in early discussions, the debate has shifted toward the appearance of specific projecting modes. Given that the organic propulsion tools (bow, spear-thrower) are only rarely preserved, energy has been invested in experiments to explore how the projecting mode can be identified based on the analysis of stone points. These experiments usually attempt to control selected parameters in projectile use (e.g., speed, target, angle of impact), but the ballistic parameters that are used are generally based on heterogeneous and not commonly reported studies. Little research has focused on the measurement of the complete ballistic performance of prehistoric weapons. We present the first results of a systematic ballistic study that quantifies and compares different modes of propulsion.

Corbett, Debra [194] see Funk, Caroline

Corbett, Jack (Portland State University) and Nelly Robles Garcia (National Institute of Anthropology and History)

[200] *Más Allá de la Arqueología*

Archaeological research frequently produces material elements we seek to safeguard for the benefit of future generations, a goal that requires organizational support and a mix of resources. When the research materials pass to the responsibility of communities or groups with limited preparation and resources for management of said materials, we encounter a serious disconnect between the accomplishments of research and the long-term viability of archaeological resources. In Mexico the long monopoly of the National Institute of Anthropology and History is being eroded as community museums or other entities seek more control over archaeological materials. Yet the organizational frameworks, resource base, and capacity for continuity of such entities remain in question. This paper explores the capacity for sustainable management of cultural heritage among communities in the Sierra Norte de Oaxaca. Using the region as an extended case study, this paper seeks to assess the principal challenges and prospects of heritage protection as archaeological research advances. Will we see a deepening of our knowledge at the possible cost of greater vulnerability to archaeological resources? How do we respond to community expectations of respect for their interests while protecting societal interest in heritage sustainability?

Corcoran Tadd, Noa (Harvard University)

[128] *Charki and Red Currant Jam: Provisioning Extractive Industries in Republican Highland Peru*

With the current boom in the archaeology of the colonial period in the central Andes, we risk losing sight of the potential for archaeological investigation of the colonial aftermath. Following important work further afield in the Southern Cone, I argue for the particular relevance archaeology could have in exploring trade liberalization, emancipation, and the new commodity booms of the nineteenth century. Drawing on the recent investigation of a series of Republican tambos (roadside inns) in the highlands of Palca (Tacna, modern-day Peru), the case study examines patterns of mobility and consumption as these sites were transformed by new extractive industries (primarily silver, copper, and sulfur) in the region. Tying together the growing British entrepreneurial presence and the resilience of 'traditional' forms of mobility and provisioning, these sites point toward a wider story of an emergent regional mining economy that both superseded previous circulations tied to the great silver mines of the altiplano and left a landscape of boom-and-bust development with uneasy resonances with the present.

[202] *Chair*

Cordero, Robin [332] see Dello-Russo, Robert

Cordova, Carlos

[121] *The Environmental Context of the Middle Pleistocene Occupation at the Shishan Marsh, Azraq, Jordan*

The Greater Azraq Oasis Area occupies a hyper-arid area of the Syro-Arabian Desert. Geomorphological and paleoecological evidence suggests that at times during the Pleistocene the region experienced moister conditions than at present. This particular study centers on the environment surrounding the Middle Pleistocene hominin occupation dated approximately 250,000 BP. Archaeological and archaeozoological remains from this occupation have provided significant information about the wide range of faunal groups and butchering strategies. Geoarchaeological and paleoecological (mainly plant microfossil remains) research provide an environmental context to this occupation, which existed in association with a fan-delta on the northeast shores of paleo-lake Azraq. The lake-delta dynamics provided a rich wetland environment. A local fault influenced the flow of water from springs and stream channels into the delta. The up-thrown block of the fault created an outcrop where the local Umm Rijamm Chert could be utilized. The sedimentary data and geomorphic evidence elsewhere in the basin suggests that conditions deteriorated toward the end of the occupation, as the lake receded and dried out and the fluvial systems ceased to flow into the occupation area. Eolian activity suggests the aridization that forced fauna and hominins out of this area.

[121] *Chair*

Cordova, Carlos [121] see Nowell, April

Cordova, Guillermo (Guillermo Cordova) and Benno Fiehring (INAH)

[94] *Avances en el estudio de la organización sociopolítica prehispánica en la región del Río Tumpaón, S.L.P., México*

El estudio de la organización política de la región de Tamtoc, tiene por objeto indagar en las relaciones que existieron entre los individuos, las formas en que ejercieron el poder político y la naturaleza y escala de su organización. Para realizar este propósito llevamos a cabo un programa de prospección arqueológica con el objeto de reconstruir los patrones de asentamientos y posible uso del antiguo paisaje. En esta ponencia presentamos los resultados de dos temporadas de trabajo en campo.

Córdova, James [306] see Sanders, Mariana

Coria, Melissa [214] see Demarte, Pete

Corl, Kristin (New Mexico State University), John Roney (University of Texas San Antonio), Mary Whisenhunt (University of Texas San Antonio) and Robert Hard (University of Texas San Antonio)

[303] *Settlement Patterns of Salado Period Occupations in the Duncan/York Valley on the Upper Gila River*

The Salado period occupation sites have become the focus of substantial discussion in the Southwest as it relates to broader regional migrations, population fluctuations as well as sociocultural changes. Unfortunately many of these important sites have suffered from decades of destruction and continued looting. Comparing early site notes from the Gila Pueblo and other early researchers in the Duncan/York Valley to the University of Texas at San Antonio Southwest field project survey notes, this area has been a target of these destructive processes. However, documentation of the remnants of sites can still offer valuable information about the character of the Salado occupation and the circumstances under which the Salado horizon becomes visible. While many of the material traits used to define Salado occupation such as architecture, burial traits, and whole ceramic vessels are the first to be destroyed, information related to a site's placement in space and material present can still provide important information.

Corl, Kristin [344] see Hard, Robert

Cormier, Aviva (Boston University) and Francisco Estrada-Belli (Tulane University)

[101] *Regional Diversity and Population Migration of the Classic Maya: Stable Isotope Analysis of Individuals from the Holmul Region, Guatemala*

Stable isotope analysis is a productive tool for understanding the migratory histories of past populations in various regions of the world, including the ancient Maya. This paper presents the strontium and oxygen isotopic ratio values of dental enamel samples as compared to the geographical location of burial to address questions of regional identity, population migration, and social complexity of the Maya at the archaeological site of Holmul and the nearby centers of La Suficaya, K'o, Cival, Hamontun, Barton Ramie, and Uaxactun. The results of 68 individuals are reported here, selected from the osteological remains excavated by the current Holmul Archaeological Project and early twentieth century excavations by the Peabody Museum of Archaeology and Ethnology at Harvard University. The biological profiles of the individuals (burial treatment, estimated age, biological sex, perimortem trauma, cultural modification, pathology, and/or dental health) are combined with stable isotope analyses to understand the geographical diversity and mobility patterns of the Classic Maya. The application of this methodology can serve to encourage scholars throughout the Maya region and the world to analyze dental enamel as an alternative to bone collagen, especially in situations of poor preservation of human remains and difficult excavation locales.

Cornejo, Luis [134] see Sepúlveda, Marcela

Cornell, Per [28] see Ling, Johan

Cornish, Travis [83] see Walling, Stanley

Coronado, Anabella (Universidad del Valle de Guatemala)

[246] *Chair*

Corrales, Francisco [360] see Herrera, Roberto

Correa, Daniel [62] see Silva, Rosicler

Cortegoso, Valeria [91] see Castro, Silvina

Corteletti, Rafael (University of São Paulo) and Paulo DeBlasis (University of São Paulo)

[45] *Bonin Site: A Circular Village on Southern Brazilian Highlands?*

Bonin site is one of many pit house villages located in Santa Catarina state, southern Brazilian highlands. It has been excavated since 2011. In this paper, we aim to present new data on pottery analysis, chronology, and spatial analysis which are suggesting a village plan organized in a circular shape. Dated from thirteenth to seventeenth centuries this village has 23 pit structures, many of them used as pit ovens, filled with basalt rocks and ceramic vessels. Microbotanical remains analysis reveals the consumption of manioc (*Manihot esculenta* Crantz), beans (*Phaseolus* sp.), and possibly yams (cf. *Dioscorea* sp.) in addition to maize (*Zea mays* L.) and squash (*Cucurbita* sp.). Macrobotanical and faunal remains recovered by flotation reveals the consumption of pinhão (*Araucaria angustifolia* nut), beans, *Arecaceae* nuts, as well fish, small mammals, and birds. The circular shape is easily identified in Jê villages located far north in Brazil, but it is a novel interpretation for ancient southern Jê settlements.

Cortés, Leticia [164] see Scattolin, María

Cortes-Rincon, Marisol (Humboldt State University), Erik Marinkovich (University of Texas at San Antonio), Cady Rutherford (University of Texas at San Antonio), Spencer Mitchell (Texas Tech University) and Kyle Ports (Texas Tech University)

[83] *Production and Intensification in Hinterland Communities*

This study investigates the nature and intensity of ancient Maya household economies in northwestern Belize. The primary focus will be centered on investigative ways in which settlement pattern data offers insight to understanding production systems in hinterland communities. The preliminary patterned relationship that emerged among settlement features and land resources allowed for the interpretation of land management strategies and production systems implemented in different environment zones of the study area. Geospatial analysis of raw material procurement and distribution will be examined through the use of a Geographic Information System (GIS). Furthermore, spatial distribution of cultural materials should provide insight into the regional and localized circulation of goods. Results of this study will demonstrate how a hinterland community stratified land resources and built its local landscape into a complex diversified production area specialized in the production of marketable commodities.

Cortes-Rincon, Marisol [101] see Marinkovich, Erik

Cortez, Carmen [162] see Winterhalder, Bruce

Cossin, Zev

[331] *Community and the Contours of Empire: The Hacienda System in the Northern Highlands of Ecuador*

Recent archaeological studies of Spanish colonialism have redirected scholarly attention both to the workings of imperialism and the multitude of ways in which marginalized populations navigated and remade the grids of power that constitute empire. A focus on the household and the materiality of everyday life has generated a rich body of evidence by which to tack between multiple scales of social life and foreground the material culture of daily life as constitutive elements in the making of social and political worlds. In Spanish America, the hacienda system was one means by which imperial logic took root. In this paper, I review preliminary archaeological investigations of the Hacienda Guachalá in the northern highlands of Ecuador, where excavations have begun to illuminate the domestic material realities of indigenous laborers and the lifeworlds they fashioned amid profound social and economic transformation over the long nineteenth century. Focusing not only on access to material goods but also to the ways in which such goods foreground collective obligations and identities suggests that the concept of “community” is key to understanding daily negotiations of empire by indigenous actors. Importantly, this approach emphasizes the enduring effects of imperial designs after the end of formal colonialism.

Cossin, Zev [220] see Boyd, Siobhan

Costa, Angelica (University of Central Florida), Lane Fargher (Centro de Investigación y de Estudios Avanzados de), Richard Blanton (Purdue University), Verence Y. Heredia Espinoza (Centro de Estudios Arqueológicos, El Colegio de Mi) and John K. Millhauser (North Carolina State University)

[215] *Crafting, Identity, and Power: A Comparative Analysis of Late Postclassic Facial Adornment Use in Central Mexico*

In prehispanic Mesoamerica, individuals from diverse regions and social classes deployed facial adornments, such as ear spools and lip plugs, to materialize concepts of identity. Specifically, recent archaeological research at the Late Postclassic (AD 1250–1521) city of Tlaxcallan provides new insights into the role of facial adornments in a highly collective society. Tracing material sources reveals the inter-workings of regional and local economic interactions and local sociopolitical institutions impeding on distribution. Similarly, various styles of decoration can also reflect the sharing of cultural ideas between different settlements and regions and how Tlaxcaltecs identified within their own communities in relation to status, age, and gender. By looking at the distribution of raw materials, finished goods, and styles, we document the degree to which facial adornments were restricted to certain statuses/classes, genders, and age groups and, thereby, shed light on the social encoding of these items. Such information can then be used to evaluate the interplay between the degree of social embeddedness and degree of collectivity. Thus, facial adornments have the potential to provide information of great significance in revealing how economic and social institutions impeded on the production, distribution, and consumption of facial adornments among states during the Postclassic.

Costello, Eugene (University of Notre Dame)

[207] *Cows, Wolves, and Witches: The Question of Marginality within Transhumant Communities of Western Ireland*

Small-scale transhumant movements were once quite common in Ireland, and continued in places like Conamara, Donegal and Achill Island up to the late nineteenth century and early twentieth century. Also known by the term “booleying,” these practices involved young people, usually girls, bringing dairy cows up to hill pastures for the summer so as to free up land at home for tillage and winter fodder. However, the seasonal landscapes and settlements which they visited have until recently been neglected by archaeologists. Moreover, a significant amount of unexplored oral tradition exists in the Irish language. Some of this contains highly symbolic stories about supernatural interactions at summer pastures. This paper uses archaeological survey to interrogate the folk material and ask what it says about the social position of young female herders in nineteenth-century Ireland. It discusses their interactions, firstly, with one another and, secondly, with senior male figures in the home settlements. Is it justifiable to describe the young women as inhabiting marginal land when their economic role was absolutely central? To what extent were hill pastures considered to be liminal or dangerous places? Does the field archaeology support the idea that summer settlements were organized differently to home settlements?

Costin, Cathy (California State University, Northridge)

[323] *Discussant*

Costin, Kirk (Mesa Community College) and Donna Nash (University of North Carolina Greensboro)

[232] *Ceramic Differences at the Household/Neighborhood Level at Cerro Mejía: Evidence of a Possible Multiethnic “Mitmaquna” Community on the Southern Frontier of the Wari Empire*

This poster will present the results of the analysis of household ceramic assemblages from the slopes of the secondary Wari center Cerro Mejía in the Moquegua Valley. The slopes of Cerro Mejía are divided into distinct domestic neighborhoods by fieldstone walls. Based on differences between these neighborhoods observed during excavations it has been hypothesized that this site was a multiethnic community similar to Inca mitmaquna with local inhabitants from throughout the region and possibly inhabitants from other locations in the Wari Empire. The analysis of ceramics from households in different neighborhoods appears to confirm the multiethnic nature of this community. Although there are some similarities across the site, the ceramic assemblages from each household suggest that ceramics were not centrally manufactured and distributed. Instead, the evidence suggests ceramics were manufacture at the household level. The assemblages were sufficiently different from each other to suggest that they were made not just by different individuals but by individuals who came from distinct ceramic manufacturing traditions. The goals of this poster are to clearly demonstrate the observed ceramic differences in detail and to discuss how these findings inform us about Wari imperial organization on the southern frontier of the empire.

Costopoulos, Andre (University of Alberta)

[38] *Can You Model My Valley? Particular People, Places, and Times in Archaeological Simulation*

Every archaeological modeler, whether generalist or particularist, eventually gets asked whether “their model” can help reconstruct a particular past. Could a general archaeological simulation engine be built that can be customized to answer specific questions about specific archaeological contexts, or is simulation a tool that must remain largely general and heuristic? I will argue both that it is useful to work toward a general archaeological simulation

engine, and that such an engine could help us understand what processes generated particular sets of archaeological remains, but that it won't help us reconstruct particular pasts. I will also discuss the difference between these levels of understanding.

Coughenour, Chance [83] see Walling, Stanley

Coughlan, Katelyn [259] see Sawyer, Elizabeth

Coumont, Marie-Pierre [85] see Boileau, Arianne

Countryman, James (University of Chicago) and Gregory Zaro (University of Maine)

[53] *Agrarian Landscapes of Coastal Croatia: A View from Nadin-Gradina*

Generalized models of Mediterranean agroecosystems often elide the specific historical and political contexts in which food production necessarily takes place. This paper presents new historical-ecological research currently underway at the multi-period settlement site of Nadin-Gradina near the Adriatic coast of southern Croatia, a typically "Mediterranean" landscape that has hosted a dynamic social-political history of repeated invasion, migration, and colonization by a variety of human actors. The Nadin-Gradina Archaeological Project is endeavoring to elucidate the complex life history of this settlement and local environmental impacts of urbanization from late prehistory to the modern era. Attempting to think beyond basic questions of "subsistence" and "adaptation," the research presented here asks how factors such as warfare and political destabilization were central in creating various configurations of land use and human-plant-animal relationships. A macrobotanical assemblage from our 2016 excavations is compared with other local datasets, including faunal remains, stable isotope data, and historical cartography, to develop hypotheses regarding historical continuity and variability in agropastoral practices. While broad historical continuities in the presence of economically important taxa are apparent at the regional level, our data begin to show marked diachronic variability the local level in usage of land and organization of urban-rural space.

Counts, Derek (University of Wisconsin-Milwaukee)

[312] *Discussant*

Counts, Derek [37] see Averett, Erin

Coupland, Gary (University of Toronto)

[176] *A History of Household Archaeology at Prince Rupert Harbour*

The practice of household archaeology has a long history in the Prince Rupert area, owing in large part to the remarkable preservation of sites in the region including the existence of house depression features on the ground surface of many village sites. Approaches to investigating these house features have shifted over the years as new theoretical paradigms have arisen to replace older ones. Issues of chronology and culture history dominated early investigations, but more recently questions pertaining to social history have come to the fore. This paper reviews the use of household archaeology in the Prince Rupert area from its beginnings to the present and argues that the continued investigation of households is essential to understanding aboriginal social history in the region.

Coupland, Gary [223] see Leclerc, Natasha

Coutros, Peter (Yale University) and Jessamy Doman (Yale University)

[146] *People and Paleoclimates at the Diallowali Site Complex: Changing Patterns along the Middle Senegal Valley throughout the First Millennium BC*

The first millennium BC was a time of considerable social, technological, and environmental change for the peoples of West Africa. Despite the growing number and distribution of archaeological projects throughout the region, very little is known about this critical period. Likewise, many of the climate models currently in use lack the sufficient temporal or spatial resolution needed to provide context for the variety of changes occurring at a localized level. Recent research at the Diallowali Site Complex along the Middle Senegal River Valley has provided a unique opportunity to investigate how first millennium BC social and environmental changes are linked. Combining stratigraphic excavations and large-scale, systematic survey, the Diallowali Archaeological Research Expedition (DARE) has compiled a detailed record of human habitation and climate change along the western margin of the Middle Senegal Valley. A multi-proxy approach to paleoclimate modeling and a detailed record of changing subsistence strategies and settlement patterns has provided a robust and localized dataset spanning the late second and first millenniums BC. This paper will utilize this new body of research to explore the dynamic relationship between the changing environment and the human communities that called it home.

Coutu, Ashley (University of Cape Town/University of York) and Judith Sealy (University of Cape Town)

[161] *The Roots of Global Trade in the Southern African Iron Age*

During the African Iron Age from AD 800 to 1200, overseas trade began to expand out of southern Africa across the Indian Ocean, which caused an increase in the export of raw materials such as ivory. Archaeological evidence of ivory working has been found on sites across southern Africa dating to this period, including KwaGandaGanda and K2 in South Africa, Kaitshaa and Bosutswe in Botswana and Ingombe Ilede in Zambia. It is unknown whether the raw ivory was obtained locally or traded in, whether certain sites were production centers, and which markets drove the demand for the manufacture of ivory bangles/bracelets. To this end, we explore the distribution and frequencies of ivory artifacts and working debris across these sites. We also report the results of carbon, nitrogen and strontium isotope analysis to understand the origins and procurement of the ivory alongside Zooarchaeology by Mass Spectrometry (ZooMS) analysis to identify the species of the ivory. Results indicate that the worked ivory derived from elephants and that at some sites, ivory was derived from several catchment areas, implying a degree of landscape/resource partitioning. These sites therefore yield the earliest evidence for the trade of ivory in southern Africa.

Covell, Kevin [169] see Egeland, Charles P.

Covert, Alexandra (Petrified Forest National Park)

[304] Following the Shell Trail: Analysis of Prehistoric Shell at Petrified Forest National Park

Shell jewelry at Petrified Forest National Park has been found from Basketmaker II through Pueblo IV. Since there are no local sources of marine shell, it is important to understand how trade routes from the Gulf of California and the Gulf of Mexico directly affected how shell was traded to this region. Shell recovered from archaeological contexts curated in the Petrified Forest National Park collections were typed according to class, genus, and species and were sourced to the Gulf of California or the Gulf of Mexico. The shell was analyzed by temporal components to see if any discernible consumer patterns occurred. This analysis was conducted to determine if shell use was dependent on shell type or procurement location and to determine variability in shell use over time. A literature review was conducted to determine possible trade routes from both the Gulf of California and the Gulf of Mexico to Petrified Forest National Park. Ultimately this project will enhance the understandings of shell use, procurement, trade networks, and temporal consumer patterns on the Colorado Plateau.

Covey, R. Alan (University of Texas at Austin) and Miriam Aráoz Silva (Professional Archaeologist)**[331] Empire in Ruins: Inca Urban Planning and the Colonial Occupation at Huánuco Pampa**

Located in the Andean highlands of northern Peru, the Inca administrative center at Huánuco Pampa served as a provincial capital, drawing thousands of tributary households into scripted encounters with imperial officials on festive occasions. Inca site planning created spaces for performing diverse identities and reinforcing relationships between local people and Inca elites. After an unsuccessful Spanish attempt to establish a town within the central plaza of the site, Huánuco Pampa faded to a peripheral status, serving as a remote way-station on a Colonial highland route. The disembedded location of Huánuco Pampa contributed to the Spanish failure to maintain a central element of Inca provincial administration. Nevertheless, more attention needs to be given to how the long-term trajectory of the Colonial Period occupation was influenced by its dependence on, and departure from, principles of Inca urban planning. This paper will present the results of new architectural research from the eastern part of the site (Zone II), discussing how the distribution of Inca construction aesthetics and open spaces relates to the Colonial contexts that Craig Morris excavated in that part of the site during the 1960s and 1970s.

Covey, R. Alan [331] see Quave, Kylie

Cowan, Maya (University of Victoria) and Vanessa Tallarico (University of Victoria)**[263] Cemetery Study at Emanu-El Jewish Cemetery in Victoria, British Columbia: A Look at the Potential Benefits of Simple, Shrouded Burials and the Use of Concrete Fills**

The goal of our research was to analyze the correlation between decomposition, and damage to memorial structures around the Emanu-el Jewish Cemetery in Victoria, British Columbia. We hypothesized that some concrete fill damage was due to casket decay after the fill was placed, causing it to sink or crack. We used damaged double plots with a single fill as evidence, because the side of the older burial had time to settle before the fill was poured over both plots. We found that damage was almost always on the side of the most recent burial, where the ground had not settled beforehand. Jewish custom dictates that memorials be placed one year after burial, and that all materials used in burial be completely biodegradable. In some Jewish traditions, bodies are shrouded for burial, rather than placed in the pine caskets used by many communities. Since a human body decomposes much faster than a casket, concrete fills could be used for a shrouded burial with less possibility of damage. Prior to our research, we were informed that Victoria's Jewish community has expressed interest in accessing more traditional burial customs. We offer our results to the community to consider in their future practice.

Cowley, Dave [250] see Mitchell, Juliette

Cox, Jim (Oklahoma Anthropological Society)**[150] Discussant****Cox, Kim and Carolyn Boyd (Shumla Archaeological Research and Education Center)****[126] The White Shaman Mural: The Story Behind the Book**

The prehistoric hunter-gatherers of the Lower Pecos Canyonlands created some of the most spectacular rock art of the ancient world. Perhaps the greatest of these masterpieces is the White Shaman mural. This presentation provides an introduction to our recently-published book *The White Shaman Mural: An Enduring Creation Narrative*, which is one of the most comprehensive analyses of a rock art mural ever attempted. Drawing on twenty-five years of archaeological research and analysis, as well as insights from ethnohistory and art history, we identified patterns in the imagery that equate in stunning detail to the mythologies of Uto-Aztecan-speaking peoples, including the ancient Nahua and present day Huichol. The identification of core Mesoamerican beliefs in Pecos River style rock art reveals that a shared ideological universe was already firmly established among foragers living in the Lower Pecos as long as 4,000 years ago.

Cox, Kim [126] see Boyd, Carolyn

Crabtree, Stefani (Washington State University) and Tim Kohler (Washington State University)**[38] Modeling Polity Growth among Ancestral Pueblo People in the Northern San Juan**

In this paper we present research on the development of village-spanning polities in the central Mesa Verde region. First, we explore the dynamics of modeling not only households, but also groups of households, and how the interaction between them influences the development of social strategies. Second, we examine how territoriality shapes group development; we allow our agents to track lineage, and for lineages to own land, which, when populations increase, creates conflicts over the most productive lands. We apply models for the development of conflict and warfare on top of the "Village" agent-based model to examine how territoriality and conflict interact, allowing matrilineal groups to subsume competing groups in a chain of dominance and subordination to create large village-spanning polities. Finally, we demonstrate the dynamics of polity formation in the central Mesa Verde by showing the construction and dissolution of polities through time, comparing new data compiled from the archaeological record with output from our simulation.

[268] Discussant

Craib, Alexander [92] see Jansen, Amelia

Craig, Douglas (Northland Research), David Abbott (Arizona State University), Hannah Zanotto (Northern Arizona University), Veronica Judd and Brent Kober (Northland Research)

[335] Measuring Household Inequality in Hohokam Society: An Analysis of Domestic Architecture at Pueblo Grande

Recent archaeological efforts to explain the emergence and persistence of social inequality have been hampered by a lack of information about how wealth was transmitted across generations and how it may have accumulated or diminished over time. Building on studies that have shown domestic architecture to be an excellent material expression of household wealth, we provide a method for reconstructing the amount of labor invested in house construction at Pueblo Grande, taking into account different architectural styles from different time periods. Our analysis found variability in construction costs that was probably related to wealth and status differences among households, which persisted over time. High-status households were distinguished architecturally by larger and, in some instances, more elaborate houses. The proximity of these households to the village central precinct, a locus of ceremonial expression, further suggests that ritual played a key role in creating and maintaining inequality in Hohokam society.

Craig, Lorena (University of Montana)**[374] Mapping Evolutionary Histories of Oceanic Mythology: Can Phylogenetic Methods Applied to Creation Myths Increase Our Understanding of Prehistoric Migrations?**

This study seeks to understand the means of dissemination of oral cultural traditions of Oceania across time and geographic space. I hypothesize evolutionary trees produced from analysis of creation myths provide a means to infer prehistoric migration routes. Additionally, creation myths and language have parallel evolutionary history and form a combined set of core cultural traditions. In order to test these hypotheses, creation myths, selected from the earliest recorded versions from Oceania, will be analyzed using quantitative methods from the biological sciences. Results from phylogenetic methods and other statistical analysis of datasets will demonstrate that in the case of language and creation myths, evolutionary processes of culture traditions can be intertwined. Moreover, by using data from other fields such as linguistic, genetics, archaeology, ethnology, and physical anthropology, the validity of using mythology as a proxy for migration can be measured. In a broader sense, phylogenetic studies, like this one, will provide new insights into evolutionary processes of sacred oral traditions and understanding of the evolutionary dynamics between multiple cultural traditions. Additionally, I propose this research will add to existing studies of prehistoric migration in Oceania, and provide a model for similar research in other regions.

Craig, Oliver [96] see Hendy, Jessica

Craig-Atkins, Elizabeth**[139] The Chronological and Liturgical Context of Charnel Practice in Medieval England: Manipulations of the Skeletonized Body at Rothwell Charnel Chapel, Northamptonshire**

The rare survival of a charnel chapel and the commingled remains of more than 2,500 individuals in houses at Holy Trinity Church, Rothwell, England, provides a unique opportunity to investigate the postmortem manipulation of human remains in the medieval period. The apparent paucity of charnel chapel sites in England has led to the dismissal of charneling as a marginal practice with little liturgical significance, a pragmatic solution to the need for storage of disturbed bones. Yet the evidence from Rothwell, and a further c. 60 lost or misunderstood charnel chapel sites our project has uncovered, suggest that human remains stored in subterranean chapels served an important role as a focus for intercessory prayer. Here, both the local faithful and pilgrims could pray for the souls of the dead while their physical remains provided a tangible focus for their devotion. This paper explores the chronology and significance of charneling in medieval England, presenting the first radiocarbon dating evidence for human remains obtained from a charnel chapel. It argues for the widespread and instrumental role of manipulated human remains in early Christian practices in England and reflects on how this role has changed over the last 700 years.

[139] Chair

Craig-Atkins, Elizabeth [139] see Hadley, Dawn

Crangle, Jennifer [139] see Craig-Atkins, Elizabeth

Crann, Carley (A.E. Lalonde AMS Laboratory)**[86] Radiocarbon Age of Consolidants and Adhesives used in Archaeological Conservation**

When radiocarbon dating archaeological material, it is paramount to understand how the object was conserved and which conservation products were used in order to determine: 1) the best location on the artifact to sample; 2) how to remove the consolidant physically and/or chemically, and; 3) whether or not the consolidant was successfully removed. The archaeologist usually knows the approximate age of the artifact given the context in which it was found so when the radiocarbon age is not as expected, it is possible the consolidant was not completely removed. However, without knowing the radiocarbon signature of the consolidant—this is purely speculation. Current, commonly used consolidants and adhesives cover both natural (animal and fish glues, tree resins, starches) and synthetic materials (acrylics, poly (vinyl acetates), poly (vinyl butyrals), polyethylene glycol, glycerol, cellulose ethers, cellulose esters, cyanoacrylates and soluble nylon). This paper will present data that indicate in which direction—young or old—conservation treatments may skew radiocarbon dates and the importance of knowing the conservation history of older samples and how these results should be interpreted. In addition, a case study on preserved carbonized residuals is presented.

[256] Discussant

Crann, Carley [227] see Martindale, Andrew

Crass, Barbara [387] see Krasinski, Kathryn

Crawford, Kristina (University of Nevada, Reno)**[21] Prehistoric Cooking with Rock and Rock Substitutes in the Sacramento Valley, California**

When populations increase, more resources need to be extracted from the land to satisfy their needs. When cooking, one way to increase yields is to change techniques to include rock heating elements. To test this, twenty sites from the Late Archaic Period (3000 to 150 BP) in the northern Sacramento Valley of California were examined. The results of the study indicated that there is an increase in rock heating elements and thermally altered rock in archaeological deposits through time. It was noticed during the study that at the same time that rock heating elements increase in frequency in the archaeological record in the Sacramento Valley, substitutes for rock, specifically clay cooking stones were also introduced into the record. To test the validity of clay as a substitute for rock, a series of experiments have been conducted to determine heating ability, fracture rates, and fuel use. The results of rock versus clay cooking abilities are presented here.

Crawford, Gary (University of Toronto)**[24]** *Hokkaido, Japan, as an Island System in East Asian Precolonial History*

Hokkaido, Japan, is an island separate from the East Asian mainland and Honshu yet closely linked culturally to the rest of the Japanese archipelago. Hokkaido was never isolated entirely from the East Asian mainland either. This paper reviews several key events that relate to Hokkaido as an island with a distinct cultural history. As the contemporary home of an indigenous population, the Ainu, Hokkaido has played, and can continue to play, an important role in our understanding of cultural trajectories in East Asia. Two cultures linked almost solely to Hokkaido as well as to Ainu development, the Epi-Jomon and Satsumon cultures, are examined from the perspective of how being situated on Hokkaido facilitated unique adaptations to and within the broader East Asian socioeconomic sphere. In particular, the cultural changes resulting from the incursion of a mainland form of agricultural society and economy to Japan beginning ca. 2800 BP resulted in a transformation of the cultural landscape throughout Japan except Hokkaido by ca. 2300–2000 BP. Hokkaido, being an island, participated in the transformation in a distinctive manner, first resisting change but ultimately participating in the transformation as evidenced by the formation of the Satsumon culture, the ancestors of the Ainu.

[78] *Discussant***Crawford, Katherine (University of Southampton)****[38]** *Visualizing the Invisible: How Can We Model Roman Religious Processions?*

Religious processions colored the ancient world, filling a city's streets with a multi-sensorial display of sounds and images. Although the presence of processional activity is acknowledged as a regular occurrence in the Roman world, our understanding of their movement patterns and their effect on the cityscape remains understudied. The record of processions was held primarily in the memories of those who experienced or took part in the festival, only manifesting within the archaeological record as a testament to their occurrence in the form of temples or monumental arches. The nuances of how a procession traversed a city's streets and its urban impact are not easily revealed. Applying a computer-based approach to the study of processional activity allows new questions to be asked of a well-recognized Roman ritual. This paper considers the role that processions played within the city of Ostia, Rome's ancient port. The application of a model-based methodology allows for critical analysis of a procession's movement patterns by studying processions as a dynamic event that engaged both with a city's inhabitants and the built environment. The use of computer models in combination with archaeological material offers new insight into ritual experiences within Ostia.

Crawford, Laura [53] see Weiland, Andrew

Creager, Brooke (University of Minnesota)**[282]** *Migration and Cultural Change: Effects of Migration on Ritual Practices in Early Medieval Britain and Colonial America*

A migration can have several different effects upon a native population as the groups interact: the decimation of one population either to famine, disease or war, the cultural integration of the two groups either forcefully or peacefully, or the continued separation of the two cultures through distance or social stratification. These effects are perhaps best understood archaeologically through an examination of the European and Native American interactions beginning in the sixteenth century and those results can illuminate the Anglo-Saxon and Britons' interactions in fifth- and sixth-century England. In Early Medieval Britain, there are few texts to aid the understanding of the fifth-century Anglo-Saxon migration. The Anglo-Saxon practices were likely appealing and socially advantageous, since they culturally dominated the landscape within a century, but the Britons, like the Native Americans, would have preserved aspects of their own traditions. The efforts of the Native Americans and Britons to maintain a cultural distinction can be observed through the analysis of ritual practices and materials within the European and Anglo-Saxon societies, respectively. Through the analysis of ritual practices of these two groups, this paper will explore cultural continuity and maintenance of traditional practices within the context of a transitioning cultural landscape.

Creel, Darrell [303] see Romero, Danielle

Creer, Sarah [79] see Cannon, Mike

Crema, Enrico (University of Cambridge) and Stephen Shennan (UCL)**[227]** *Detecting Spatially Local Deviations in Population Change Using Summed Probability Distribution of Radiocarbon Dates*

The increasing availability of large radiocarbon databases encompassing continental geographic scales (e.g., CARD, EUROEVOL, AustArch, etc.) is now opening new possibilities for evaluating spatial variation in prehistoric population. We have, for the first time, the opportunity to determine whether and when different geographic regions experienced distinct demographic patterns using an absolute chronological framework. This line of research is however hindered by spatially uneven sample sizes reflecting differences in regional archaeological practices. Furthermore, given that spatial resolution is intertwined with the sample representativeness, the choice of appropriate scale of analysis becomes a non-trivial issue. Existing solutions have overcome some of these problems (e.g., by using correction surfaces) but no methods have been devised to assess the statistical significance of the observed differences in the inferred population trajectories. Current cross-regional comparisons of SPDs are thus limited to qualitative accounts, with a considerable risk of failing to distinguish genuine differences from spurious ones arising from sampling error. Here we propose a new method that overcomes many of these problems. We test the robustness and applicability of our solution through two case studies (a simulated dataset and the EUROEVOL database) showing the limits and the potentials of our approach.

Crema, Enrico [57] see Biagetti, Stefano

Crespo Torres, Edwin [156] see Roman Buso, Gabriela

Criado-Boado, Felipe**[324]** *Materialization of Social Resistance: Trends on NW Iberia Late Prehistory and Protohistory and Beyond*

This paper deals with a so-called negative approach to social complexity and social development. Instead of understanding the arising of complex societies as a result of positive ontology, it focuses on the resistances, negations and the invisible that tried to avoid or at least to minimize social inequality and exploitation. The arising of complex societies could, alternatively, be conceived as the trend to resist social division and its generalization. The paper will show as the material traces of archaeological record and the different dimensions of materialization processes could reflect in certain

contexts communities' strategies against the social division. The paper will focus on the development of monumentality and iron metallurgy. While primarily based on archaeological evidence from Galicia (NW of Iberia Peninsula), looking at late prehistory dynamics from IV to I millennia BC, it will also deal with case studies from other parts of the world as South America and Central Africa.

[158] *Discussant*

Crider, Destiny (Luther College)

[120] *Examining Tula Region Ceramic Compositional Analysis*

Chemical characterization of ceramics using Neutron Activation Analysis (NAA) in Central Mexico has proven to be an important analytical approach for assessing exchange, especially between subregions within the Basin of Mexico and neighboring areas. Recent efforts based upon Epiclassic and Early Postclassic Period decorated ceramics have extended the sampling to the ceremonial centers and settlements of Tula Chico and Tula Grande, the resulting chemical analysis defined a more robust compositional group for the Tula region. Building upon these findings, the Tula Region Interaction and Migration Project (TRIMP) targets additional ceramics from Epiclassic centers within the Tula region for NAA analysis. Sampling targets distinctive pottery pastes and decorative styles across multiple sites in an effort to further establish the regional signature for Tula production, but also to test and revise previously proposed compositional groups within the Tula region. Findings address the larger goal of the project to examine interactions and exchange within the Tula region.

Crider, Destiny [120] see García Sánchez, Jorge

Cristiani, Emanuela [290] see Boric, Dusan

Cristóbal-Azkarate, Jurgi [193] see Lew-Levy, Sheina

Criswell, Janice [138] see Henrikson, Steve

Crocker, Andrew [11] see Kotsoglou, Anastasia

Crockford, Susan [46] see Stewart, Kathryn

Croes, Dale (Washington State University) and Ed Carriere (Suquamish Elder and Master Basketmaker)

[138] *Reawakening a 2,000-Year-Old Salish Sea Basketry Tradition and Sharing It around the World: Master Salish Basketmaker and Wet Site Archaeologist Explore 100 Generations of Cultural Knowledge*

Ed Carriere and I have been working with the U.W. Burke Museum to replicate 2,000-year-old waterlogged archaeological basketry found in the early 1960s from along the Snoqualmie River near Seattle. Ed learned old style split cedar limb/root clam basket making from his great-grandmother, Julia Jacobs, who raised him. Ed's goal has always been to go back as many generations in his family to master their work. As a wet site archaeologist specializing in ancient basketry on the Northwest Coast, I work from the other direction, deep-time, statistically linking ancient basketry styles from throughout the region to the present. I had a brilliant idea while reassessing the 2,000-year-old basketry collection from the Snoqualmie River site, asking Ed to try replicating these baskets that statistically linked through 100 generations from this site through 1,200-, 750-, and 500-year-old Salish Sea wet site basketry to his great-grandmother's old style in an approach we call generationally linked archaeology. Local Native weavers and anthropologists applaud this work and last summer we shared our work with the Indigenous Ainu on Hokkaido, Japan, and with archaeologists at the Wetland Archaeology Research Project (WARP) conference in Bradford, England, to a good response.

Cronin, Joseph (Harvard University), Anna Guengerich (Vanderbilt University) and Parker VanValkenburgh (Brown University)

[230] *Chacras in the Clouds: Documenting High-Altitude Agricultural Landscapes in the Tambillo Valley of Chachapoyas, Peru*

Here we present preliminary results from targeted prospection and an Unmanned Aerial Vehicle (UAV) flight over the relic agricultural landscapes of the Tambillo Valley in northeastern Peru. This work was carried out as part of the first phase of Proyecto Arqueológico Tambillo (PATA), a project investigating the organization of political landscapes in the montane forest region of Chachapoyas. Specifically, PATA aims to determine whether the densely-clustered Late Intermediate Period settlements at the confluence of the Atué and Tambillo rivers were politically autonomous, independent settlements or a single socially integrated—if geographically fragmented—urban system. The first stages of prospection during the 2016 season documented at least four relic agricultural landscapes featuring several different modes of landscape modification. We discuss the diversity of these landscape modifications as well as their distribution throughout the Tambillo area relative to Late Intermediate Period settlement. As the spatial organization and technical requirements of these field systems can inform reconstructions of social organization in the Tambillo plain, we present a 3D model and high-resolution orthoimage of terraced sink-holes at La Boveda. This partial model of La Boveda demonstrates the promise of UAV work for studying well-preserved, high-altitude agricultural landscapes in the region.

Crothers, George (University of Kentucky)

[286] *The Original (Affluent) Cooperative: Property Rights and the Foraging Mode of Production*

Property rights require fundamental forms of cooperation. On a global scale, foragers maintained open-access property regimes, in which no one is excluded from using resources. In the most basic form, foragers cooperate simply by avoiding conflict—agreeing to share. These conditions will hold as long as the cost of excluding others from a resource exceeds the benefits derived from that resource and because cooperation increases reproductive success under conditions of low population density—in other words, when resources are plentiful or when foragers radiate into uninhabited environments. However, within variable environments and dynamic populations, common property regimes emerge when the benefit from exclusive access to resources exceeds the cost of defining, monitoring, and enforcing rights to those resources. On a local scale, foragers created qualitatively new property institutions that required collective responses to achieve common goals. Archaeologically, how do we identify changing property-rights regimes in prehistory? The Green River, Kentucky, archaeological record suggests several proxy measures that can be used to assess the timing, pace, and spread of exclusive, communal property rights, including anthropogenic land management, development of new technologies, and domestication of indigenous plants.

Crothers, George [61] see Peres, Tanya

Croucher, Karina (University of Bradford, UK)

[139] *Living with the Dead: Plastered Skulls and 'Continuing Bonds'*

This paper considers the phenomenon of plastered skulls from the Neolithic of the Middle East, exploring a reinterpretation of evidence. Plastered skulls result from the burial and later retrieval of crania, onto which is sculpted a face using plaster. These were then used and displayed within household contexts. Rather than traditional interpretations which revolve around status and hierarchy or social cohesion, this paper suggests a reinterpretation based on the modern bereavement theory of "continuing bonds." This paper suggests that grief and mourning may be a more appropriate explanation for the phenomenon, and examines the role that contemporary theories of grief might play in the interpretation of (some) ancient funerary remains.

Crow, Kaitlin (New York University), George J. Micheletti (University of Central Florida) and Terry Powis (Kennesaw State University)

[9] *From the Known to the Unknown: Exposing a Middle Preclassic Maya Power Structure at Pacbitun, Belize*

The Middle Preclassic (900–300 BC) is known as a time for developing complexity in Maya society. The most perceptible evidence of this development is exhibited in the construction of the earliest forms of monumental architecture. However, for areas like the Belize River Valley, these structures are uncommon and poorly understood. Now, with the discovery of a large Middle Preclassic platform at the site of Pacbitun, we have the opportunity to increase our understanding of early monumental constructions that brought communities together and established power structures within Maya culture. Over the last few years, the Pacbitun Regional Archaeological Project (PRAP) has worked to uncover this large ceremonial structure dubbed El Quemado, which was found buried beneath Plaza A in the site core. Excavations of El Quemado continue to assess the structure's dimensions and orientation and search for its earliest architectural form. Our investigations have also begun to explore the use of the area around the temple to identify potential adjacent sub-plaza structures. This paper will summarize our research to date and our latest excavations of El Quemado and Plaza A to provide a new understanding of public ceremonialism during a critical developmental period of political and social structures at Pacbitun.

Crowell, Travis (Simon Fraser University), Dana Lepofsky (Simon Fraser University) and Daryl Fedje (University of Victoria)

[49] *Following the Shore: Refining Late Holocene Sea-Level Change through Settlement Histories on Northern Quadra Island, British Columbia*

For people who rely on the ocean, changes in sea-level can have a profound effect on daily lives, connections to place, and identity. When we study sea-level from a broader or regional scale, we do not require the time and space specificity that is necessary to examine the effect of highly local sea-level change in a particular time and place. Thus, the regional sea-level curves that have been well-refined and developed, may not answer (or allow us) to understand and appreciate what this change had on lived lives, particularly in cases where sea-level changed up to several meters in an instant. Our research will detail how human settlement histories, intimately connected to sea-level, can provide a window into the effect sea-level change has on a finer scale that is not currently provided by broader models. Using an intensive coring and dating program in Waiatt and Kanish Bays, Quadra Island, we propose to evaluate how settlements expanded shoreward as sea-levels fell during the Late Holocene. This research will also serve as a test for coring methodology, and whether it can efficiently provide enough accurate data to be used elsewhere.

Crowley, Brooke [152] see Hixon, Sean

Crowley, Erin (University of Minnesota)

[142] *Subsistence and Political Economy: Dairying and Change in Late Prehistoric Ireland*

Cattle played a critical role in the economic and sociopolitical structure of the Iron Age in Ireland, yet the nature of this relationship is not yet clear. The Irish Iron Age (~500 BC–AD 500) is characterized by scant settlement evidence yet with several large, complex, ceremonial centers. It has been difficult, therefore, to contextualize the nature of social change leading into the Early Medieval Period. The Early Medieval Period (~AD 500–1100) emerged with a fully-developed dairying economy, complex social structures, and social and political value placed on cattle and dairy products. Recently, however, increased archaeological work has uncovered more evidence of Iron Age settlement, agriculture, and industry. Therefore, we must ask, when did the dairying economy develop in Ireland and how did that shape the cultural landscape? This paper questions our traditional assumption that the dairying economy was as a particular feature of the Early Medieval Period and poses alternative ways of understanding the economy of late prehistoric Ireland. Considering the connection between subsistence and political economy, this paper assesses the potential effects of a dairying economy on regional social and political identity.

Crown, Patricia (University of New Mexico)

[130] *The Science and Performance of Ritual Drinking in Chaco Canyon*

Consumption of caffeinated drinks made with cacao and perhaps holly is well documented for Chaco Canyon. Less understood is the context of consumption. Evidence for cylinder vessel production, use, and termination particularly reveals aspects of drinking ritual, including frothing. New compositional analysis demonstrates how Chaco potters decorated pots with post-firing pigments on stucco, permitting repeated decoration and cleansing of drinking vessels. Changes in the sizes, shapes, and contexts of Chacoan drinking vessels reveal rapid shifts in how Chacoans drank caffeinated concoctions and in the associated ritual practice between around AD 900 and 1125.

Crowther, Alison [32] see Boivin, Nicole

Crumley, Carole (Department of Archaeology and Ancient History, Uppsala University)

[324] *Assembling Conceptual Tools to Examine the Moral and Political Structures of the Past*

As recent events demonstrate, power can manifest entirely outside the framework of state hierarchies and beyond their control. Beginning with the premise that tension between competition and cooperation exists in all human societies, we must explore the ways rules and norms permit or deny each, and how both interact with history and changing conditions to forge institutions. Today, new ways to stabilize societies and reduce conflict must be found. One of the most important conditions for reducing conflict is to ensure inclusive and equitable conditions for everyone, particularly as regards food and water security, personal and group safety, and a satisfying quality of life. The form of governance of such communities and polities goes by many names: anarchist, collective, communitarian, pear-shaped, and many others and dates back thousands of years. These very forms are a perennial moral compass (family, neighborhood, community-based action). They are not left behind in human evolution; on the contrary, they remain the fabric of peaceable, supportive daily life and can still gift the future.

[77] *Discussant*

Cruz, Patrick (University of Colorado) and Samuel Duwe (University of Oklahoma)**[34]** *Tewa History and the Archaeology of the Peoples*

According to tradition, soon after emergence into this world the Tewa were split into two peoples—the Summer and Winter—and were tasked with finding the “middle place,” or the location of their eventual historic villages. The Summer People traveled along the Jemez Mountains practicing agriculture, and the Winter People journeyed along the Sangre de Cristo Mountains eating wild game. On their travels southward the people stopped twelve times and these are represented as ancient villages. Eventually the Peoples came together at large sites in the heart of the Tewa homeland. The Tewa view the creation of their society as the amalgamation of disparate people. In light of what we know about the late prehistory in the Southwest—as a time of dramatic reorganization, coalescence, and transformation—is it possible that the Tewa are remembering the coming together of people with different identities, memories, and histories? In this paper we examine the various Pueblo settlements on both the east and west sides of the northern Rio Grande before the coalescence of Tewa society, and seek, through the lens of Tewa cosmogony, to understand the identities of the various peoples who eventually negotiated the Tewa world.

Cruz, Heleinna (Quinnipiac University), Jaime Ullinger (Quinnipiac University) and László Paja (University of Szeged)**[196]** *Bone Calcination of Different Age Groups in Cremations from Bronze Age Hungary*

Bronze Age Hungary saw the advancement of trade which may have been a cause of the movement from egalitarian societies to more complex societies with increasing social inequality. Social inequality between regions in Hungary may be reflected in variation among funeral customs. Excavations from Békés 103, a Bronze Age cemetery in southeastern Hungary, have uncovered 68 burials, most of which are cremations. This study focuses on color analysis (identified by Munsell Soil Color Charts) of the burned human bone from 11 cremation urns. Age may play a role in status differentiation, therefore subadults and adults were compared for level of calcination, indicating complete loss of the bone's organic matrix due to the pyre's high temperature. Preliminary results show a possible difference in calcination between subadult and adult cremations. Given that burials with greater calcination may indicate more energy being used in the maintenance of a funeral pyre; this suggests that age may play a role in mortuary behavior. These results may be helpful in understanding funerary customs of the Körös region when compared with the ceramic data associated with the burials.

Cruz Berrocal, Maria (Zukunftskolleg, Universitaet Konstanz)**[36]** *The Church of Todos los Santos and Its Associated Cemetery in the Spanish Colony of San Salvador, Heping Dao, Taiwan (Seventeenth Century)*

Archaeological excavations in the setting of the former Spanish colony of San Salvador, founded in 1626 in current Heping Dao, northern Taiwan, have uncovered remains of a European building that can be identified as the Convent or Church of Todos los Santos, founded while the Spanish colony was active and possibly preserved afterward under Dutch rule. Several burials have also been excavated, which constitutes a formal cemetery associated to the church. The human remains in the cemetery of Todos los Santos include both native and European individuals. This paper discusses the findings and their relevance in the context of the archaeology of early colonialism in Taiwan and the region, since this kind of remains have not often been discovered. This discussion will deal with the scope of European establishment in the region.

[36] *Chair*

Cruz-Palma, Jorge [13] see Acosta-Ochoa, Guillermo

Cucina, Andrea [140] see Chatters, James

Cuellar, Andrea (University of Lethbridge)**[220]** *Social Differentiation and Hierarchy at a Central Place in the Eastern Andes of Ecuador*

This paper focuses on the development of a central place in the Quijos Valley, Eastern Andes of Ecuador. Based on an intensive survey of the site complemented by small excavations, I offer a spatial, demographic, social, and economic characterization of this central place with the goal of discussing and contrasting views on the development of social differentiation, hierarchy, and centralized political authority in ancient chiefdoms. Contextualizing this in a body of regional settlement pattern information available for the Quijos Valley also permits the comparison of conclusions drawn from data corresponding to different scales of analysis for this case as well as for others in Northern South America.

Cuenot, Jean-François [131] see Nondédéo, Philippe

Cuevas, Mauricio (Universidad Veracruzana)**[10]** *La aplicación de esquemas de comunicación en las investigaciones de rutas terrestres: Un caso al Este de Los Tuxtlas*

El estudio de las rutas de comunicación nos permite tener un mayor conocimiento de las sociedades prehispánicas, aspectos como dinámicas de transporte, comercio, conexión entre sitios arqueológicos, aprovechamiento del terreno o inclusive creencias compartidas. La aplicación de la teoría de la comunicación puede ser clave para plantear trabajos en los cuales se busque reconstruir las rutas en regiones donde no se cuente con evidencias visibles de éstas. La propuesta teórico-metodológica que aquí se presenta utiliza un esquema de las teorías de la comunicación y se aplica para crear un modelo de reconstrucción de posibles rutas prehispánicas junto con herramientas y técnicas como los son sistemas de información geográfica, modelos digitales de elevación, comparación de rutas y veredas contemporáneas y evidencia arquitectónica prehispánica registrada durante las exploraciones hechas en campo por parte del Proyecto Arqueológico de Piedra Labrada Sierra de Santa Marta, Los Tuxtlas, Veracruz, (PiLaB).

Cui, Jianfeng, Guoxiang Liu and Runan Ni**[26]** *Roman Glass Beads Found in Hulunbir, Inner Mongolia, China*

In this study, we present some sandwich glass beads found in Hulunbir, Inner Mongolia, China. According to the chemical analysis, these beads are also soda-lime glass with very low Al, Mg and K contents. And the beads are transparent, which is due to the Mn²⁺ decoupling technique used. Compared with the data published, the beads were much likely from the area ruled by Roman Empire.

Cui, Jianfeng [26] see Chiou-Peng, TzeHuey

Cui, Jianxin (Shaanxi Normal University) and Hong Chang (Institute of Earth Environment, CAS, China)

[99] Culture Prosperity of Late Longshan on North Shaanxi and Its Environmental Background

The late Longshan culture of north Shaanxi was flourishing, while that of the southern Inner Mongolia was declined and migrated to the south. Meanwhile, in Guanzhong Basin, the culture was also declined to the bottom. In this paper, we aimed to know the possible climatic factors drove the occurrence of these culture phenomena. A compile of Holocene climate records related to these three regions were collected and analyzed. The following results can be drawn: after 4.4 Ka BP, the climate of Inner Mongolia was becoming colder and drier which could not support the agriculture subsistence again and the people therefore migrated to the north Shaanxi along the Yellow River. Second, a generally drier and cooler climate with intermittent warmer, wetter conditions developed in north Shaanxi during the mid-fourth millennium BC. This short warm and wet event (4.0–3.8/3.7Ka BP) attributed the prosperity of late longshan culture at this region. While the climate of the Guanzhong Basin and the North China Plain was warm-humid and extreme flooding events occurred frequently. The spatial distribution of culture was limited by the frequent floods and there was obvious decrease of the site numbers. In conclusion, people made diverse response strategies corresponding to different environmental background.

Cullen, Sara (University of Colorado Boulder)**[345] In Search of "False Alibates": A Quagmire in Chert Sourcing from Northeastern New Mexico**

Applications of elementally sensitive geochemical methods have made it possible for archaeologists to identify chert sources with more provenance accuracy than previously possible. Alibates dolomite from quarries in the Texas Panhandle is commonly identified in Southwest sites as evidence for trade with Southern Plains communities. However, regional archaeological research suggests the presence of an Alibates "look-alike" chert outcrop in northeastern New Mexico, near the Baldy Hill formation north of Folsom. This poster will examine the case study of Baldy Hill chert as it pertains to archaeological studies regarding lithic procurement and Plains-Pueblo interactions in far northeastern New Mexico and southeastern Colorado.

Culleton, Brendan [9] see Kennett, Douglas J.

Culley, Elisabeth (Arizona State University)**[210] A Comparison of "Scenes" in Parietal and Non-Parietal Upper Paleolithic Imagery: Formal Differences and Ontological Implications**

Upper Paleolithic cave art is well-known for its skilled execution, specifically the use of shading, relief, and perspective to render lifelike depictions of Pleistocene fauna. Cave art is equally well-known for a near absence of flora, humans, and scenes. In this regard, parietal imagery is distinct from "art mobilier," where these are more common. However, defining "scenes" as a graphic phenomenon can be problematic, and identifying them among superimposed and fragmented images more so. Definitions based on how scenes are perceived offer some guidance and include more imagery than previously recognized; frequencies allow the comparison of scenes from different contexts. This paper evaluates differences in the nature of scenes as depicted on rock walls and on objects in France from ~40–11 kya. Differences in the frequency, in the types and range of constituent elements, in the degree of detailing or conceptual ambiguity, and in the type and extent of audience engagement with scenes are all considered. Emphasis is placed on the potential social consequences of scenes from different contexts. Consequently, while exploratory and qualitative in nature, the analysis points to avenues through which ontological differences in the production, use, and sociocultural role of Upper Paleolithic imagery can be specified.

Cullon, Deidre (University of Victoria, Dept. of Anthropology PhD Cand.), Rhy McMillan (Pacific Centre for Isotopic and Geochemical Research) and Heather Pratt (Golder Associates)**[49] Archaeological Fish Traps on the Coast of British Columbia**

Fish traps are a ubiquitous fishing feature on the Northwest Coast, with thousands of features recorded at hundreds of sites. This fishing technology represents a use and modification of intertidal and riverine environments at an industrial scale, yet protocol and management practices ensured that fish populations flourished. As in other areas of the Northwest Coast, First Nations and archaeologists in British Columbia have documented fish traps, resulting in the registration of 822 fish "trap" or "weir" sites at the provincial Archaeology Branch. These represent more than 94% of all recorded fish traps sites in the province. Our review of this archaeological dataset is presented, revealing a wide distribution of fish traps, varying trap design, and differing modes of construction. Dating from as early as 4500 cal 14C years BP to the early twentieth century when they were banned, fish traps in British Columbia represent an innovation that was integral to those living on the Northwest Coast and they remain important to our understanding of late Holocene fish management practices.

Cullon, Deidre [47] see McMillan, Rhy

Culquichicón-Venegas, María José and Aleksa Alaica (University of Toronto)**[178] Social Dynamics of the Past through the Body of the Camelid: Utilizing Evidence from Late Moche Peru**

Assessing social dynamics in the past through archaeometry is more readily possible by constructing questions that more actively engage with issues beyond subsistence and technology. As archaeologists we are capable of reaching these higher-level interpretations of the past. In this paper, the use of camelid age profiles will bring insights into the kinds of value placed on the camelid body and the kinds of constraints and affordances that camelid herds would have placed on the Late Moche community of Huaca Colorada (AD 650–850). By considering the contribution of ethnographic accounts from herding communities of the Andean region, we are better equipped to interpret material correlates. Zooarchaeology and social archaeology can be better integrated through the goal of understanding how the actions and activities surrounding camelid herding were impacted by and influenced community organization and worldview. This paper will argue that the varied use of different aged camelids corresponds to specific value placed on the life stages of these animals. By considering camelids as active agents in the social dynamics of the past we are achieving a more complete picture of the exchanges that would have occurred within everyday and ceremonial contexts.

Cummins, Tom**[391] A Reconsideration of Mold-Made Ceramics in Coastal Ecuador: Chorrera and Jama Coaque**

Based on an examination of ceramic Chorrera, Jama Coaque and La Tolita figurines from the coast of Ecuador, this talk discusses the central role of the mold as both a forming technique and as a means to create a stable visual tradition from generation to generation. It will also suggest the impact on later traditions on the coast, such as the Moche tradition.

Cunnar, Geoffrey (WCRM), Ed Stoner (WCRM) and Tom Bullard (Desert Research Institute)**[140] Searching for the "Paleoarchaic Individual" and Unique Paleoarchaic "Production Grammar" in the Great Basin**

Archaeological investigations were conducted by Western Cultural Resource Management in the Fire Creek Archaeological District in the central Great Basin. We address the results of investigations at a Paleoarchaic site containing a buried soil with both an abundant stemmed point trajectory and a Levallois-like reduction method dating to the Younger Dryas. Employing agency theory and through an examination of depositional history, the chaîne

opérateur and spatial analyses, we argue that the artifacts located both on the surface and in the buried soil are indicative of activities conducted in a moment in time and not a palimpsest accretion. Components of the chaîne opératoire are discussed and the identity of the Paleoarchaic occupants is examined within the broader regional context of the Great Basin. Further the identification of ancient soils on Great Basin alluvial fans and the ramifications for future archaeological work in such contexts is addressed.

Cunnar, Geoffrey [376] see Stoner, Edward

Cunningham, Alastair [333] see Marwick, Ben

Cunningham, Jerimy (University of Lethbridge)
[314] *Discussant*

Cunningham-Smith, Petra (University of Florida), Ashley Sharpe (University of Florida), Elizabeth Olson (Northern Illinois University), Erin Thornton (Washington State University) and Kitty Emery (Florida Museum of Natural History at University of)
[5] *Old Dogs, New Tricks: Tracking Dog Management in the Ancient Maya World*

This study examines the management of dogs as a resource and status symbol in ancient Mesoamerican society. One of the few New World domesticated animals, dogs provided communities with a steady source of meat. Artistic and ethnohistorical accounts suggest that dogs may also have been selectively bred to emphasize particular body shapes and hair types, including even absence of hair. These different breeds are described as playing different roles, as participants in specific ceremonies, as hunters, as companions (in life and death), as healers, and as favored foods. To date, however, archaeological evidence verifying the iconographic and historic record has been sparse. This study reviews chronological and spatial evidence of dog remains in different archaeological contexts, using morphometric and stable isotopic data to gain an understanding of the types, uses, and movement of dogs and dog breeds. An abundance of dog remains in Preclassic period contexts in comparison to Classic contexts, as well as evidence of higher than expected breed and dietary diversity throughout the Classic period suggests that the role dogs played in social and subsistence practices across the region varied over time, and that intensive dog breeding was much more specialized than previously assumed.

Curet, L. Antonio (National Museum of the American Indian, Smithsonian Institution)
[289] *Island Hopper: Theodoor de Booy and Archaeology in the Caribbean*

Like many other regions, the colonial experience in the Caribbean included the arrival of foreign archaeologists, mostly from the United States or Europe representing museums, universities, or scientific academies forming what has been called "imperial science." The objects, specimens, and archival documentation gathered during their research were taken back to their countries and today form part of major collections in museums throughout the world. Theodoor deBooy of the Museum of the American Indian (MAI) was one these early foreign scholars working in the Caribbean. He collected thousands of objects and created a large photographic collection during at least 13 expeditions throughout the region. With the breadth of work he conducted, de Booy could easily be considered the leading specialist of Caribbean archaeology of his time. Unfortunately, despite his successful career, his role in Caribbean archaeology and the quality of the collections he obtained are greatly underestimated by scholars working in the region. This paper discusses the nature of de Booy's traveling and research throughout the Caribbean, from Cuba and Jamaica to Venezuela, and characterizes the collections he obtained in these endeavors. The impact of de Booy's projects, collections, and publications on the archaeology of the region will also be discussed.

Cureton, Travis [105] see Garraty, Christopher

Curran, Joseph (Cal State LA), David Raymond (Cal State LA) and Timothy Curran (Cal Poly Pomona)
[300] *The Impact of War Clubs: An Interdisciplinary Analysis of Conflict*

This research focuses on the transformation of conflict from its earliest modes to more intensified forms seen in complex societies. Specifically, the focus is on the transition of combat in band level societies to its institutionalization in tribal social structures. One of the challenges in archaeology is in recognizing steps in the evolution of violence in formative and less stratified societies. To achieve this end, the transition of conflict needs to be operationalized. This investigation analyzes the impact of specialized weaponry (i.e., clubs) indicative of the earliest signs of escalating warfare in California. Working with forensic scientists and biomechanical engineers, experiments with traditional war clubs from a number of tribal societies are conducted to derive quantifiable data on lethality. The analysis focuses on the reconstruction of weapons from historic accounts and museum specimens, tested using biomechanical engineering methods. The results of the test are related to the bioarchaeological record and specific case studies for blunt force trauma in California to connect the data to observations in the prehistoric past. This relation allows for the charting for the early development of conflict centered, social organizations.

Curran, Timothy [300] see Curran, Joseph

Currie, Elizabeth (Department of Archaeology, University of York, UK)

[222] *The Antiquity and Persistence of Traditional Health Beliefs and Practices in the Northern Andes*

This paper presents findings of a new European Community funded research project: "Indigenous Concepts of Health and Healing in Andean Populations." The study population is indigenous Quechua peoples in northern Andean Ecuador. The project examines ethnic Andeans' understanding of their world and how health, illness, and healing are understood within it. Current practices of traditional medicine (TM) have evolved within complex historical contexts into new forms which can reveal the nature of precolumbian and historical indigenous belief systems. They might demonstrate how beliefs and associated rituals and practices adapted and survived in social climates of persecution and repression. The project employs novel theoretical and methodological approaches, using a time-depth perspective and a framework of interdisciplinary methods integrating archaeological-historical, ethnographic and modern health sciences approaches. It will model how peoples survive and adapt their traditional belief systems in a context of alien cultural impacts and determine what survives of pre-European Amerindian systems of knowledge and medicine in indigenous Andean cultures now, and the continuing role, relevance and use of TM in present-day communities. This approach highlights a culturally sensitive approach to the conservation of Andean "intangible cultural heritage."

Curry, Gavin [305] see Fadem, Cynthia M.

Curtis, Matthew (UCLA Extension and UCLA Cotsen Institute of Archaeology)

[309] *Revisiting the Ancient Ona Culture of Eritrea: What Previous Research from the Asmara Plateau Might Offer for New Understandings of the First Millennium BCE in the Northern Horn of Africa*

Sustained archaeological research on the Asmara Plateau of Eritrea occurred between 1998 and 2003, producing important initial efforts in ceramic and lithic artifact typologies, subsistence reconstruction, and regional perspectives in landscape use and settlement patterns dating to the first millennium BCE. Researchers identified a distinct regional cultural expression termed the Ancient Ona Culture. This paper reviews the key qualities of the Ancient Ona Culture and argues that, while distinct in a number of aspects, the Ancient Ona Culture may be seen as a localized expression of a wider regional cultural expression in the highlands of the northern Horn. Given the cessation of international research in the Asmara Plateau since 2003, it is crucial to revisit insights from previous research in Eritrea, relating these to new understandings of the archaeology of the first millennium BCE from research conducted over the last two decades in Tigray Ethiopia. This paper outlines ideas for accomplishing such an endeavor.

Curtis, Matthew [21] see Arthur, John

Cush, Patricia and Richard Callaghan (University of Calgary)

[296] *Continuity and Evolution in the Taiwanese Sailing Raft*

The Taiwanese or Formosan sailing raft likely has considerable antiquity as well as geographic distribution on the coasts of China, Taiwan, Vietnam, and possibly as far south as the Coromandel Coast of India. The Taiwanese version is the most studied and may have the longest continuous evolution into the twentieth century. These seagoing craft were initially constructed from bamboo, equipped with lug sails, and steered using center boards in a very sophisticated manner. Analysis of their performance characteristics shows that they had considerable maneuverability, which along with the shallow draft allowed them to function well in seas with numerous sandbanks, reefs, and shoals. A great many of these vessels were registered for fishing in Taiwan in the mid-twentieth century. With the demise of the giant bamboos on Taiwan during the latter part of the twentieth century and the introduction of new technologies, the sailing rafts evolved but still retained some of their traditional elements. Along with a discussion of the history and performance of the sailing raft we present excerpts from an interview with the last of the craftsmen building the rafts at the beginning of the twenty-first century.

Cushman, David

[255] *Discussant*

Cuthbertson, Cory [100] see Hoggard, Christian

Cuthbertson, Cory (Centre for the Archaeology of Human Origins, University of Southampton) and Christian Hoggard (Centre for the Archaeology of Human Origins, University)

[287] *Stones, Shapes and Speech: Interpreting the Origins of Language from Lithic Variation with Geometric Morphometrics*

Results from a recent experiment demonstrate that morphological standardization is an indicator of complex cultural transmission and cognition. A novel methodology integrating geometric morphometrics and Multiple Factor Analysis was employed to assess global shape variance in four experimental hand ax assemblages made by novice knappers trained under four different simulated social learning environments (emulation, imitation, silent teaching and verbal teaching). The higher the fidelity of their learning environment, the lower the morphological variability the assemblages exhibited. High fidelity social learning methods require theory of mind (the ability to think about thoughts), which is correlated with specific linguistic traits that scaffold its development. Therefore archaeological assemblages that exhibit high levels of standardization might only be possible when transmitted through high fidelity cultural transmission, in communities that operated with a theory of mind and linguistic skills. One hundred and four hand axes had 2D outline coordinate data taken for their planar, lateral, and superior view. A Multiple Factor Analysis then observed the three concatenated datasets. Hand axes in the low fidelity group (emulation) demonstrated the largest range of variation, while the high fidelity groups (teaching) demonstrated the lowest range of variation. The methods were also able to successfully discriminate between the four groups based on their shape variance.

Cutright-Smith, Elisabeth (Shasta-Trinity National Forest)

[255] *Discussant*

Cutts, Russell [153] see Miller, Catherine

Cvinar, Amanda (Los Alamos National Laboratory, Adams State University)

[122] *Using the NHL Framework to Advance the Development of Applied Archaeology*

In 2016, the National Park Service celebrated its centennial anniversary thus reminding the public that places of historical significance matter to our national cognizance. Using the National Historic Landmark designation as a means for public education, this paper draws upon my master's thesis project, which focuses on building a bridge among CRM, research, and public education at the national level. It serves as a model for how graduate-level, archaeological training contributes to traditional archaeological knowledge, public awareness of the past, and CRM compliance requirements. The Mortandad Cavate Complex and associated Sandia Pueblo compose a site complex located within the boundary of Los Alamos National Laboratory, a Department of Energy managed facility located in Northern New Mexico. This site complex exhibits an exceptional level of preservation and integrity. It is affiliated with the traditions of the Pueblo de San Ildefonso and represents a place of special cultural and traditional value. It is one of four Ancestral Pueblo cultural properties that the Department of Energy plans to nominate as National Historic Landmarks. The relationship among compliance regulations, public education, the traditions of Pueblo de San Ildefonso, and archaeological knowledge of the site serves as a model for the development of applied archaeology.

Cybulski, Jerome [176] see Malhi, Ripan

Cyphers, Ann [10] see Arieta Baizabal, Virginia

Czermak, Andrea [30] see Fernández-Crespo, Teresa

Dagneau, Charles [178] see Loewen, Brad

Dahlstedt, Allisen (Arizona State University) and Jane E. Buikstra (Arizona State University)

[143] *A Bioarchaeological Survey of Skeletal Tuberculosis in Prehistoric Southern Peru*

Recent studies of precolumbian *Mycobacterium tuberculosis* complex (MTC) genomes identify pinnipeds as a source of human tuberculosis in South America (Bos et al. 2014). These results raise questions regarding the timing of this zoonotic transfer and the subsequent human host adaptation and dissemination of *Mycobacterium tuberculosis*. Here we present a survey of skeletal tuberculosis throughout the Osmore Drainage of southern Peru, where the pinniped to human “jump” had occurred by ~AD 1000. This sample includes individuals interred within coastal and inland sites occupied between 385 BC and AD 1475. We explore patterning of disease across age at death and sex, as well as changes in skeletal expressions across time and space. We then address the hypothesis that *M. tuberculosis* manifested similar skeletal expressions in humans living in precolumbian South America as it did in Europe prior to antibiotic treatment. The results of this study have implications within the fields of bioarchaeology and genomics for understanding the origin and spread of skeletal tuberculosis in the Americas.

Dai, Xiangming

[99] *Shimao: The Prehistoric Pioneer of Rising States in Northern China*

In ancient China, a number of ethnic groups and polities rose and declined in northern China. The competition and wars between these frontier polities and Central-Plain dynasties occurred frequently in Chinese history. A series of new archaeological discoveries in recent years have revealed that Shimao was the first state-level society emerging in northern China. The Shimao social group was mainly distributed in the Ordos region, where the social complexity experienced a leaping development in late prehistory, and this social evolutionary trajectory is very different from the Central Plain. The rising of the Shimao state started a new model of social development for the following history in northern China. This paper will discuss the background and process of the rise of the Shimao state, and compare some similar phenomena in history.

Dakovic, Gligor (Belgrade University/University of Pittsburgh), Bonnie A. B. Blackwell (Williams College, Williamstown, MA), Dušan Mihailovic (Department of Archaeology, Belgrade University), Mirjana Rokсандić (University of Winnipeg) and Anne R. Skinner (Williams College, Williamstown, MA)

[181] *ESR Dating Ungulate Tooth Enamel from the Mousterian Layers at Pešturina, Serbia*

In southern Serbia, Pešturina contains three Mousterian layers, with late Pleistocene faunas. The site overlooks a tributary to the Nišava River southwest of Niš near the Sičeva Gorge. In all three sedimentological layers, the large mammalian faunas suggest a mixed environment with temperate forest, rocky cliffs, and steppe within walking distance from the cave. Fragmentation patterns and butchering marks plus the lithic tools indicate that some faunal remains were human kills. A depositional hiatus occurred between Layers 4 and 3. From 14 ungulate teeth from the Mousterian layers, 50 enamel subsamples were independently ESR dated. With < 0.1 ppm U in the enamel, and 1.0–3.5 ppm dentinal U, the ESR ages do not depend on the U uptake rates used for the calculations. Nor does any potential Rn loss introduce any uncertainty. To assess the external dose rates, bulk sediment samples and individual mineralogically distinct components were analyzed by NAA, then volumetrically averaged, while time-averaged cosmic dose rates were calculated using the ramped box method. At least two teeth had been reworked, likely associated with the erosion event that removed part of Layer 4 before the deposition of Layer 3. ESR ages correlated with Marine (Oxygen) Isotope Stages (MIS) 3–6.

d'Alpoim Guedes, Jade (Washington State University) and Kyle Bocinsky (Crow Canyon Archaeological Center)

[27] *Modeling the Spread of Crops across Eurasia*

Understanding the routes and the timing of the spread of western Eurasia domesticates to Asia and of Asian domesticates to Europe and the Near East has become an increasing focus of research. To date, however, we have had little understanding of the types of constraints that farmers may have faced as they moved these domesticates into the challenging environments of Central Asia. The spread of many of these domesticates also took place during a time of marked climatic change. Although it has been hypothesized that these climatic changes may have impacted the nature and the manner of the spread in East Asia, a dynamic model of how crop niches changed throughout time has not yet been applied to Eurasia. This paper describes the creation of a multimillennial thermal model that complements Naomi Miller's pioneering work on outlining how patterns of rainfall limited the spread of millets.

[177] *Chair*

d'Alpoim Guedes, Jade [177] see Habiyaemye, Cedric

d'Alpoim Guedes, Jade [177] see Hanson, Sydney

Dalpra, Cody

[304] *Landscape Importance in Northern Arizona: An Application of Ethnographic Voices and Quantitative Viewshed Analysis*

The importance of landscapes has long been discussed in archaeology, yet this is an often overlooked line of evidence. Landscapes often have a primary role in Native American oral histories and stories. Humans in general have a tendency to attach strong social meanings to visually prominent landforms. Such meanings are embedded within cultural landscapes as networks of natural and constructed places are perceived and made meaningful by communities. The Colorado Plateau of Northern Arizona features a vast landscape of mesa, canyons, and mountains that allows for an ideal test for incorporating these ideals into archaeological interpretation. Petrified Forest National Park (PEFO) near Holbrook, Arizona, allows for such comparisons with its extensive site database. This research focuses on applying the importance of these ethnographic meaningful landscapes from Puebloan groups to documented sites within PEFO. By examining sites of variable size representing both sides of the Pueblo III to Pueblo IV transition in relation to the landscape, a clearer picture of how landscapes are vital to archaeological interpretation emerges. Three case studies demonstrate how viewshed analysis allows for a qualitative and quantitative measure of connection to the landscape as described by Hopi, Zuni, and Navajo ethnography.

Dalton, Jordan and Nathaly Damián Domínguez (Licensed Peruvian Archaeologist)

[232] *Inca Presence at Las Huacas, Chíncha Valley*

When the Spanish arrived to the coast of Peru they heard stories of the wealthy Chíncha Kingdom and the privileged position that they enjoyed within the Inca Empire. Previous archaeological and ethnohistorical research has concluded that at the Chíncha Kingdom's capital of La Centinela, the Inca rulers set up their authority alongside the local lord, and that they left him in charge of ruling the rest of the valley. This poster will present recent research conducted at the site of Las Huacas, a 60-hectare site located 10 km away from La Centinela in the prime agricultural fields of the valley.

Based on architectural features and preliminary ceramic analysis this poster will argue that the Inca intervened in activities at Las Huacas. It will then explore what this new evidence on the Chincha case adds to understanding the specific type of indirect rule that the Inca set-up in the Chincha Valley. Furthermore, it will interpret the function of Las Huacas within the Chincha Valley and the Inca Empire as a whole. Excavations this past summer encountered large quantities of botanics and artifacts from diverse types of craft production, leading to the interpretation that structure N1 at Las Huacas was a multifunctional structure.

Damgaard, Peter de Barros (Center for GeoGenetics, University of Copenhagen), Jeremy Choin (Center for GeoGenetics, University of Copenhagen), Andrzej Weber (Department of Anthropology, University of Alberta), Martin Sikora (Center for GeoGenetics, University of Copenhagen) and Eske Willerslev (Center for GeoGenetics, University of Copenhagen)

[330] *Ancient Genomics of Neolithic to Bronze Age Baikal Hunter-Gatherers*

Genome-wide data from hunter-gatherer populations of the Upper Paleolithic to Neolithic has provided unprecedented insight into the human evolutionary and demographic trajectory. However such datasets have hitherto been largely confined to Western Eurasia. The sole representative of Inner Asian past populations post-dating the split between paleolithic Europeans and Asians, as well as paleolithic Siberians and East Asians, are the Mal'ta and Afontova Gora individuals, the Ancient North East Asian (ANE) branch, clouding the dating of the population split, and subsequent admixture events, between ANE and East Asian hunter-gatherers. Our genome data (~1X) reveal that Baikal Hunter-Gatherers (BHG) are an uncharacterized genetically homogeneous branch of Inner Asian hunter-gatherers, displaying highest shared genetic drift with present-day East Asians. Targeted sampling strategies coupled to excellent biomolecule preservation has permitted the generation of an advantageous sample size dataset (n = 31), rendering possible to estimate allele frequencies within these groups, thereby optimizing population tests. BHG model as an excellent proxy for an Inner Asian source population admixing into the late Bronze Age Andronovo groups, becoming Iron Age steppe nomads. With genomes allowing for kinship analyses, pathogen detection and strontium ratios, coupled to archaeological interpretative approaches we extend possible means to elucidate behavioral processes and cultural transformation.

Damián Domínguez, Nathaly [232] see Dalton, Jordan

Damick, Alison (Columbia University)

[74] *Leaving the Blanks Unfilled: A Case Study in Productive Ambiguity from Early Bronze Age Lebanon*

An oft-heard sentiment in prehistoric archaeology, particularly for contexts without traditionally visible indicators of gender (i.e., bodies or identifiable representations of bodies), is that “the evidence just isn’t there” to productively introduce intersectional gender research. This is partly due to the trend-sensitivity of archaeology, which often draws from other disciplines to supplement its own scope. Intersectionality is used in the same way, as archaeologists attempt to reframe their practice and interpretation with intersectional approaches derived from critical theory. Disrupting preconceived assumptions about identity categories is undoubtedly imperative and powerful; this paper, however, interrogates whether we might see archaeology as itself offering important tools for this process, and what opportunities those tools present for broadening intersectional thinking. Perhaps in cases where the “evidence” seems to be “missing,” we can rather see invitations to think otherwise about the constitution of evidentiary categories. What happens when, instead of seeking markers of what a body is, we instead interrogate the “absences” through which embodied identities are continuously in production? Rather than stressing its limitations, this paper investigates what is introduced by ambiguous and contradictory evidence, by examining the (sometimes “absent”) archaeological evidence for changing social differentiation in Early Bronze Age Lebanon.

Damitio, William (Washington State University) and Shannon Tushingham (Washington State University)

[194] *Pipes and Smoking in Precontact Pacific Northwest North America*

Smoking has been practiced by native peoples throughout the inland Pacific Northwest—and especially along the Columbia and Fraser River systems—for several millennia. This is evinced by the presence of stone pipes and pipe fragments in sites across the region. This poster presents the spatial and chronological distribution of archaeological smoking pipes throughout the inland Pacific Northwest based on literature and database searches, with a particular focus on those collections held or formerly held by the Washington State University Museum of Anthropology. In addition, the results of chemical residue analyses determining the material smoked in a number of pipes and pipe fragments from sites spanning the region will be reviewed, including the results of new testing by the authors. The research, developed in collaboration with indigenous communities in the USA and Canada, sheds light on the practice of smoking in the past and addresses questions relating to pipe form and distribution and the traditional use and management of smoke plants throughout the Pacific Northwest.

Damm, Jacob (UCLA—Cotsen Institute)

[240] *Consumption Preferences at the Collapse of Empire: The Case of New Kingdom Jaffa*

The site of Tel Yafo (modern Jaffa, Israel) provides unique insight into the tenure of the Egyptian New Kingdom empire in the Levant (ca. sixteenth–eleventh centuries BCE). As attested to in both ancient documents and by the presence of Egyptian monumental architecture, Jaffa functioned as an important imperial center. As the empire waned, Jaffa persisted as one of the last Egyptian holdings in the region. Recent excavations by the Jaffa Cultural Heritage Project (JCHP) have opened this final period to scrutiny by uncovering a series of narrowly dated occupation and destruction levels within the city’s gateway. Through close examination of the ceramic data generated by these excavations, it is possible to detect both gradual and punctuated shifts in the character of the assemblage wherein there is a diachronic decrease in the consumption of imported and locally produced Egyptian ceramics. When considered contextually, these shifts correlate with violent episodes at the site, culminating in the complete disappearance of Egyptian-style forms from the material record. Indeed, the C14-derived absolute chronology of each phase allows for the assessment of consumption preferences in both functional and symbolic ceramic categories at an almost generational level as individuals negotiated the end of Egyptian imperial control.

Dan, Anca [221] see Schlotzhauer, Udo

D’Andrea, A. Catherine (Simon Fraser University)

[171] *Historical Ecology: An Approach to the Investigation of Ancient Human-Environmental Interactions in the Horn of Africa*

Recent archaeological survey, excavation, ethnoarchaeological and paleoenvironmental research conducted in northeastern Tigray by the Eastern Tigray Archaeological Project (ETAP) has produced new insights into the Pre-Aksumite and Aksumite periods (>800 BCE–CE 700). The principal ETAP excavations thus far include the Pre-Aksumite site of Mezber (1600 BCE–1CE) and Ona Adi (c. early first millennium CE) which was inhabited during the Pre-Aksumite to Aksumite transition. Both sites were occupied during times of widely ranging cultural developments. This paper will provide the archaeological and paleoenvironmental context for a new ETAP interdisciplinary partnership which is investigating what role, if any, environment and human-environmental interaction had in the 1) origins of social complexity during the Pre-Aksumite period; and 2) the Pre-Aksumite to Aksumite

transition. Archaeological, paleoenvironmental and traditional knowledge studies are being integrated within a framework of historical ecology. By coupling environmental and archaeological records for more than one time period and polity with traditional agricultural knowledge, we are investigating alternate pathways of societal interactions with the environment.

[171] *Chair*

D'Andrea, A. Catherine [171] see Terwilliger, Valery

Daneels, Annick J. E. (IIA-UNAM Mexico)

[217] *Palaces at La Joya, Classic Period Central Veracruz: Architectural and Ideological Evidence*

La Joya was the capital of a very small state during the first millennium AD in South Central Veracruz. This region is rarely associated with major political power, though obviously it was of high prestige in the Mesoamerican world in terms of the distribution of the paraphernalia associated with the ballgame ritual. Two contemporary monumental platforms at the site can be interpreted as palaces, with administrative, residential, ritual, and service areas, one possibly housing a political and the other a religious ruler. Besides architectural layout, evidence rests on the urban setting, the monumentality and quality of construction, the presence of a sumptuary burial in a commemorative pyramid, the recurrence of sacrificial deposits for building consecration, and a large termination sacrifice that may be interpreted as a lineage extermination act.

[320] *Discussant*

Daniel, I. Randolph [364] see Hill, Kristina

Daniels, Megan (University of Puget Sound), Justin Leidwanger (Stanford University), Elizabeth Greene (Brock University) and Numan Tuna (Middle East Technical University)

[240] *A Finer View of Regional Sociopolitical and Economic Change in the Southeast Aegean: Ceramic Production along the Datça Peninsula*

Situated along the dramatic Datça Peninsula in southwest Anatolia, the port-town of Burgaz provides a flourishing landscape of ceramic production and valuable case study for investigating the intersection of local dynamics and larger Mediterranean social, political, and economic shifts. During the Archaic and Classical periods Burgaz developed into a thriving commercial and cultural center by virtue of its proximity to fertile land and centrality within the Gulf of Hisarönü. From the mid-fourth century, while the focus of civic life shifted westward to the expanded urban center of (New) Knidos, Burgaz transformed into a local agricultural and industrial nucleus connected to Knidos and beyond into the increasingly cosmopolitan early Hellenistic world. This paper presents the results of comparative visual, chemical, and mineralogical analyses of ceramics from Burgaz and several smaller settlements and workshops around the peninsula, arguing for expanding and export-oriented production from the fourth century onward. Analyses of the transport jars and other pottery suggest that local settlements had now integrated into a regional economy and tied their fortunes to the larger export market at Knidos. Such abrupt and fundamental changes in livelihoods across Datça shed light on how local communities responded to new realities of the Mediterranean-wide network.

Darwent, John (University of California, Davis), Genevieve LeMoine (Peary-MacMillan Arctic Museum and Arctic Studi), Hans Lange (Nunatta Katersugaasivia Allagaateqarfialu, Greenla) and Christyann M. Darwent (University of California, Davis)

[144] *lita before the Fall: Mitigation of a Unique Stratified Site in the High Arctic of Greenland*

lita (Etah), which sits on the north shore of Foulke Fjord in northwestern Greenland, in many ways could serve as a poster child for climate-change–driven destruction of coastal sites. Sitting on an alluvial fan at the base of a steep-sloped kame deposit, the site has rich historic and late prehistoric occupations visible on its surface. But more uniquely for the high Arctic, there are also 1,000 years of continuous human use locked in stratigraphically sequenced buried soils, starting with the Late Dorset, followed by the Thule and the Inughuit, and topped by debris from Euroamerican historic exploration groups. It is clear that the draw to this area for all these groups, directly or indirectly, is a large little auk colony located further east in Foulke Fjord. Unfortunately, active erosion is now undercutting these deposits and they are falling into the fjord. Based on historic photos, this process began less than 100 years ago, with the most likely agent at play being decreased summer ice. Here we discuss results of NSF-funded mitigative excavations undertaken at lita in 2016 to recover as much information as possible about this unique site before its demise.

Darwent, Christyann M. (University of California, Davis) and Jeremy Foin (Bureau of Reclamation, Mid-Pacific Region)

[319] *Gendered Differences in the Consumption and Discard of Food in Arctic Alaska*

Cape Espenberg, Alaska, provides a unique opportunity to directly compare two Thule-period (ca. AD 1400–1450) houses built at virtually the same time on the same beach ridge only one m apart. The tunnels of these houses are identically built; however, their interior construction, use of space, and artifact types and manufacturing debris strongly suggest that one house was a traditional domestic structure and the other was a men's house. Ringed seal, the dietary staple across the Arctic, dominates the domestic house (90%), but not the men's house (50%). Rather the men's house is comprised of 30% fish remains (primarily small, saffron cod), which make up less than 1% of the fauna recovered from the domestic house. In addition, there is a distinct pattern of discard in the men's house, with all fish recovered from the tunnel. In Arctic cultures, women are responsible for the distribution of food, even in a men's house. However, our understanding of this men's sphere is poorly known outside the ethnographic record. This analysis provides the first detailed study of a men's house using zooarchaeology as a proxy for gendered use of space.

Darwent, Christyann M. [144] see Darwent, John

Davidson, Iain (IDHA Partners, Australia)

[210] *Scenes and Non-Scenes in Rock Art: Are There Things We Can Learn about Cognitive Evolution from the Differences*

Analysis of rock art in several regions shows great variability in the presence or absence of combinations of individual images that can be considered as scenes in our graphic traditions. This presentation will consider examples from Australia, Europe, and North America to show that the differences in the way people represented the world are significant about how they related to the world.

[210] *Chair*

Davidson, Matthew (University of Kentucky)

[264] *Terminal Prehistoric and Protohistoric Hide Processing in the Central Ohio Valley: Synthesizing Microwear and Metric Data to Evaluate Endscraper Function and Use Intensity*

As "beachheads of empire," sixteenth- to seventeenth-century European colonies in eastern North America vigorously pursued trade relations with Natives to secure raw materials for export to an emerging global market. Exchanges of furs and hides, slaves, and other commodities stimulated economic activity throughout eastern North America. Production of hides for exchange was widespread among native groups located on colonial peripheries. To contrast, relatively little research has evaluated the degree to which production for exchange penetrated the continental interior. This paper combines endscraper microwear and metric data from the Fort Ancient Hardin Site in the central Ohio Valley. These data confirm that uniface endscrapers—widely employed in the protohistoric southeast—were used primarily for hide processing, while biface endscrapers—uncommon in the protohistoric southeast—were used to work harder materials. Comparison of Terminal Prehistoric (AD 1400–1500) and Protohistoric (AD 1535–1635) tool assemblages does not strongly support the hypothesis that hide processing intensified over time. Several possible scenarios are proposed to examine this finding. This study also provides useful baseline information about endscraper function and use intensity that can be used to evaluate and compare hide processing at other sites in the Ohio Valley and beyond.

Davies, Benjamin (University of Auckland)

[38] *Using the Archaeological Record to Better Understand Models: An Australian Case Study*

In Australia's desert regions, different conceptual models are sometimes used to explain patterning in late Holocene surface deposits. Among these patterns are distributions of radiocarbon determinations, which have been concurrently explained as generated by intermittent occupation by hypermobile foragers, or growing semi-resident populations of broad-spectrum hunter-gatherers. This paper shows how models connected to the language and logic of record formation can help resolve competing archaeological interpretations. We constructed an agent-based model to explore how cultural and sedimentary deposition and erosion can combine to form patterns in a record of heat-retainer hearths visible on the surface. Initial results suggest that explanations invoking population dynamics or geomorphic processes have the capacity to produce qualitatively similar outcomes. A second chronometric proxy, optically-stimulated luminescence dates on hearth stones, was then used to assess expectations derived from the model based on how the process forms the pattern. These show patterning consistent with geomorphic model expectations to the exclusion of models invoking population dynamics. These findings have implications for interpreting Australian prehistory, contrasting with regional narratives of intensification, while also demonstrating how the formational approach applied here allows the archaeological record to inform back on model mechanics, presenting opportunities for models to be reassessed and reused.

[112] *Discussant*

[38] *Chair*

Davies, Benjamin [38] see Ladefoged, Thegn

Davies, Gavin (University of Kentucky)

[218] *Controlling the Flow: Interregional Interaction, Community Prosperity, and Politics at the Highland/Pacific Frontier of Lake Atitlan, Guatemala*

Lake Atitlan sits within the Sierra Madre mountain chain which represents the physical divide between the Guatemalan highlands and the Pacific lowlands. It was thus ideally situated to act as a hub for cultural and economic exchanges between these two contrasting ecological zones. The three imposing volcanoes that line its southern shore, however, severely limited options for travel between these areas and commerce and settlement thus concentrated around obvious natural corridors such as those near San Lucas Toliman and Santiago Atitlan. Archaeological and ethnohistorical evidence nevertheless indicates that communities in the western half of the basin made use of several alternative routes to the coast, some of which continued to appear on maps into the twentieth century. These lesser-known routes enabled the Preclassic and Classic communities of this area to establish independent ties to centers like Chocoma and Palo Gordo, and to act as middlemen for exchanges originating to the north and east. During the Middle Classic (c. 400–600 AD), however, many of the centers connected to this network were abandoned and the elites of Chukmuk began to be buried with Teotihuacán-style vessels, signaling dramatic changes in the political and economic organization of the lake.

[218] *Chair*

Davis, Caitlin (Independent Researcher)

[7] *Flower and Song: Exploring Literacy in Postclassic Mesoamerica*

The Postclassic codices of the Maya, Mixtec, and Nahuatl peoples have often been separated based on preconceived notions of literacy and language, with the Maya codices receiving an epigraphic approach while the Nahuatl and Mixtec receive an art historical approach. This division is largely arbitrary and based on Western assumptions of the nature of writing and its form, privileging scripts which lean toward the alphabetic as more advanced. Within these codices, the linguistic practice of difrasismo serves as a fundamental organizing principle. Difrasismo is a form of metaphorical speech which manipulates opposing elements in order to convey more abstract concepts. The codices feature extensive use of similar difrasismo represented in overlapping pictorial and phonetic means, demonstrating a continuity in the underlying principles governing metaphorical language and writing itself. This study challenges the division between pictorial and phonetic scripts which underscores much epigraphic research, and promotes a more holistic and cross-cultural view of Mesoamerican literacy.

Davis, Dylan (Binghamton University) and Carl Lipo (Binghamton University)

[302] *The Benefits of Short-Wave Infrared Imagery for Archaeological Landscape Analysis: A Case Study from Easter Island, Chile*

The use of multispectral imagery is particularly effective for studying the archaeological record of Rapa Nui (Easter Island, Chile) due to the lack of vegetation and the fact that record is composed of surface distributions of rock features. Flaws (2010) has demonstrated that WorldView-2 multispectral imagery that includes the NIR band can be used to identify "lithic mulch gardens," a key component of prehistoric Rapa Nui subsistence strategies. Recently, the availability of WorldView-3 satellite imagery data offers researchers access to short-wave infrared (SWIR) bands, which provide significant additional information about moisture content and mineral composition. Unfortunately, this imagery is currently only available at a much lower spatial resolution than NIR images. Here, we evaluate whether or not this new source of SWIR imagery can be used for measuring "lithic mulch garden" features despite its significant resolution difference. Comparing the results of Flaws (2010) analysis of with the results obtained using maximum likelihood classification analysis of SWIR WorldView-3 imagery we found markedly similar classification accuracy, despite having a significantly lower spatial resolution. This result suggests that SWIR may provide a new tool for researchers interested in questions of prehistoric land use that will become increasingly powerful as greater spatial resolutions become available.

Davis, Jeffrey (Northern Arizona University), Julie Hoggarth (Baylor University) and Jaime Awe (Northern Arizona University)

[321] *Artifactual Composition of Terminal Deposits from the Classic Maya site of Baking Pot, Belize*

Throughout the Maya Lowlands, archaeologists have identified Terminal Classic deposits associated with the final activities in ceremonial spaces. These features include concentrations of cultural material deposited in the corners of plazas and courtyards. At the site of Baking Pot, Belize, the Belize Valley Archaeological Reconnaissance (BVAR) project has identified several of these terminal deposits. This presentation will shed light on the types of

artifacts being deposited during these final events to answer questions related to the nature of abandonment activities. From this information, we aim to identify the cultural significance of ritual deposition of cultural materials, how distinct combinations of artifact classes can yield information on human behavior, and how the terminal deposits at Baking Pot offer additional information to learn about abandonment activity in the Maya Lowlands. We will present the preliminary artifact inventories associated with terminal deposits in the form of a proportional distributions of artifacts found in each deposit at the site of Baking Pot, Belize. These methods allow for direct comparisons between deposits at Baking Pot, with those at sites in the Belize River Valley, and with others in the Maya Lowlands.

Davis, Kaitlyn E. (University of Colorado, Boulder) and Scott G. Ortman (University of Colorado, Boulder)

[277] *Artifact-Based Measures for Scaling Research in the Rio Grande Pueblos*

Initial applications of settlement scaling theory focused on measures derived from the built environment, such as house density and settled area. Although this is appropriate, the theory actually focuses on the role of social networks in socioeconomic rates, and thus connects to a variety of artifact-based measures of such rates. In this paper, we develop these connections using data from the Rio Grande Pueblos of New Mexico. We first compare pueblo room areas to show that socioeconomic outputs increased with settlement population. Then, we examine ratios of decorated pottery to cooking pottery to show that consumption rates of decorated vessels increased in the same manner. Finally, we use the ratio of chipped stone debris to cooking pottery to measure investment in production of stone tools, finding an increased efficiency in their production and use. We argue that this pattern derives from an expansion in the division of labor that accompanies group size. By extending the scaling framework to artifact-based measures like these, our results show that there is a connection between social networks and artifact accumulation rates in ancient societies. This suggests the scaling framework is useful for understanding a wide array of measures obtainable from the archaeological record.

Davis, Lauren (Ben-Gurion University), Omry Barzilai (Israel Antiques Authority) and Ofer Marder (Ben-Gurion University of the Negev)

[338] *The Aurignacian Lithic Industry from Area E*

Area E of Manot Cave, Western Galilee, is found at the top of the western talus, close to the apparent natural opening of the cave, which was blocked approximately 30 kya. The area appears to be the natural end of the living surfaces, with the main living area possibly being closer to the natural entrance. Area E is composed of two sedimentological Units; Unit 1, which is composed of topsoil and Unit 2, which contains the archaeological layers. Unit 2 in area E is divided into nine archaeological layers, I–IX, with possible additional subdivisions. These layers represent living surfaces. The living surfaces usually appear together with breccia, within which we find a large amount of faunal remains, flint, bone tools, decorated items and hearths. Layers I–III, appear to be composed of a post-Aurignacian tradition with small twisted bladelets, dofour bladelets, end scrapers and burins with very few faunal remains. The excavated Layers IV–IX are comparatively richer in faunal material and are characterized by Aurignacian tools flint tools including blades, carinated and nosed scrapers, flat scrapers, carinated burins and some dofour bladelets.

Davis, Loren (Oregon State University)

[226] *Searching for the First Americans along Oregon's Ancient Coast: New Methods and Upcoming Research*

To date, efforts to search for and investigate Pleistocene-aged sites along the Northwest Coast have been largely limited to subaerial landforms and deposits. Beginning in 2017, the search for early coastal sites will extend onto Oregon's outer continental shelf. These search efforts will be supported by the use of a GIS-based model that makes predictions about the foraging potential of reconstructed late Pleistocene-aged coastal landscapes. We review the modeling methodology and how reconstructed physical and human ecological aspects of Oregon's coastal landscape may have changed from the LGM to 12,000 cal BP. We also discuss upcoming fieldwork activities and goals for the search, identification, and recovery of archaeological evidence from Oregon's ancient submerged terrestrial landscapes.

[110] *Discussant*

Davis, Marni [18] see Glover, Jeffrey B.

Davis, Mary A. (UW-Madison)

[269] *Moderator*

[269] *Discussant*

Davis, R. P. Stephen, Jr. (University of North Carolina)

[336] *Documenting Archaeological Contexts with 3D Photography*

Photography has long been one of the best tools archaeologists have for creating a visual record of excavations and contexts in the field. In recent years a variety of new techniques, from laser scanning to photogrammetry, have been developed and employed throughout the world that now allow archaeologists to create a three-dimensional photographic record. This paper explores one such technique—structure from motion—that has been used for mapping and to document excavated contexts at the late precontact Wall site in North Carolina. Structure from motion permits the construction of highly detailed, georeferenced, photo-realistic models using affordable software and field photographs taken with an ordinary digital camera common to all archaeological projects. Such models are much more than simply three-dimensional representations of the real world; they contain dense geospatial data that can be easily extracted and used in a variety of analytically useful ways.

Dawei, Tao (Department of Archaeology, Zhengzhou University)

[117] *Starch Grain Analysis of Human Dental Calculus from Guanzhuang Site, Henan Province*

This research aims to investigate the human foodstuffs and lifestyle during the Western and Eastern Zhou Dynasties in the core area of the Central Plains using starch grain analysis of human dental calculus. Plant microfossils, starch grains and phytoliths, which were found in most of calculus samples from Guanzhuang site, were from millets, bread wheat, rice, adzuki, tubers, and acorns. Diversity of starch grains and phytoliths in morphological characteristics extracted from dental calculus indicates that a variety of starchy plants, including crops and gathered plants were consumed by the Guanzhuang inhabitants. Millets were dominant in the human diet of the Guanzhuang site; and bread wheat was of secondary importance. Combined with the macrobotanical evidences from Guanzhuang and other neighboring sites, the traditional millet agricultural system still existed in the core area of the Central Plains while the multiple cropping system had emerged in this region. In the meantime, the importance of bread wheat increased in the agricultural system and the change in the cropping system from millet-dominant to bread wheat-dominant come up during the Western and Eastern Zhou Dynasties.

Dawson, Emily (University of Texas at Austin), Alexandria Mitchem (University of Pennsylvania), Fabian Toro (University of Pennsylvania) and Chantel White (University of Pennsylvania)

[261] Daily Life in a Classical Port City: Archaeobotanical Evidence from Northern Greece

Recent excavations at Molyvoti, a large fourth-century BC settlement on the northern Aegean coast, have uncovered a residential neighborhood of homes and roadways laid out on a Hippodamian grid system. Thousands of carbonized plant remains have been identified from excavated domestic contexts including house floors, hearths, and abandoned wells. Macrobotanical results indicate that residents' diets relied heavily on cereals such as barley and free-threshing wheat. Cereal processing activities at the site are evidenced by specimens of ground grain and bread fragments from a stone-and-plaster hearth feature. Along with grapes, hazelnut, and fig, the well-preserved contents of an abandoned well contained hundreds of charred conglomerations identified as probable food residues. The macrobotanical record at the site is complicated by the presence of sheep dung associated with courtyard floors, raising important questions about potential fuel sources and the multiple uses of courtyard-kitchen spaces. These results contribute to a growing picture of local and regional economies in Classical northern Greece through the lens of residents' food choices and routine food preparation activities.

Dawson, Tom, Elinor Graham (SCAPE) and Joanna Hambly (University of St Andrews)**[224] Community Action at Sites Threatened by Natural Processes**

Around the world, thousands of archaeological sites are threatened by coastal processes. Although many countries have successfully implemented schemes to address threats from development, this is not the case for sites at risk from natural processes. Without developers to fund mitigation projects, the scale of the problem appears enormous, and it is difficult for individual agencies to commit to preserving, or even recording, everything at risk. Systems are needed to update information and prioritize action to channel resources toward the most vulnerable areas. In Scotland, a program of national coastal survey was followed by a desk-based prioritization project. However, the dynamic nature of the coast means that networks are needed to monitor change and report new discoveries. A citizen-science approach was adopted that recognized the wealth of knowledge and interest in heritage within local communities. The Scotland's Coastal Heritage at Risk Project (SCHARP) works with a volunteer network to update records of prioritized sites. The information contributed by citizen archaeologists allows reevaluation of priority sites and provides a more accurate picture of the scale of the threat to heritage. This paper examines SCHARP and lessons learned through running a project that channels community archaeology into solving a national problem.

Dawson, Tom [224] see Rivera-Collazo, Isabel

Day, Peter (University of Sheffield)**[132] Refugees, Tradition, and the State: Malleable Materials and Plastic Practices in Ceramic Production on Lesbos, Greece**

Lesbos (Mytilini) in the Eastern Aegean has been prominent on our TV screens during the human migration toward Europe. The last major population movement in the area, around 100 years ago, comprised the Greek-speaking Christian Orthodox, including several potters, forced out of Asia Minor. Some of these craftspeople came from Canakkale, in present day Turkey, working in the tradition of sometimes bizarre glazed wares. They settled on an island with a large number of active workshops producing utilitarian pottery, notably water jars, but including cooking vessels. Several generations later, the present study of individual potters, their products, practices and motivations builds on rich ethnographic study on the island by a variety of scholars. It examines different narratives, involving individual potters in relation to the modern Greek state, placing value on "tradition" and "authenticity." The idea promoted by heritage organizations of "tradition" as static and something to be preserved contrasts with the economic reality of life as a potter. The tensions highlighted by terminologies of inclusion or exclusion, whether that be potters versus ceramicists, craft versus art, reveal a fluidity of materials, practice and identity in which the 'foreign' becomes incorporated and, in some cases, becomes the paradigm of tradition.

De Alba, Jennifer [231] see Buehlman-Barbeau, Savanna

De Anda Rogel, Michelle Marlene (Proyecto Templo Mayor) and Fernando Carrizosa Montfort (Proyecto Templo Mayor)**[225] Representations of Fauna in Mural Paintings of Tenochtitlan**

The accelerated process of deterioration of the murals from the religious buildings of Tenochtitlan has threatened their long-term conservation. This has impeded different activities including the creation of the project for the graphic documentation of the polychromy in the Mexica capital. It was specifically developed to recover and store, as an accurate witness, all the motives of the paintings, as well as its architectural context. Over the course of 20 years, the development of this methodology has combined different registering processes, including direct copies over the decorated facades, the chromatic restitution of each mural, the use of topographic surveying, high-definition photography, and vectorial models of the six buildings that still have paintings. One of the greatest discoveries that this methodology produced was the identification of some traces almost unseen by naked eye due to the poor state of conservation. This paper presents the two neo-Teotihuacán buildings known as "Red Temples" (Templo Rojo Norte and Templo Rojo Sur) where we identified some faunistic motives. Simultaneously, the analysis between the Teotihuacán paintings style in relation with the one from the Mexicas.

de Barros, Philip (Palomar College)**[161] Using Ethnoarchaeology to Interpret Archaeological Blacksmithing Sites in Togo, West Africa**

A 2013 study of the ethnoarchaeology of the blacksmithing village of Upper Bidjomambe in the ironworking region of Bassar in northern Togo provided invaluable data to help archaeologists interpret archaeological smithing sites. Oral traditions document the village's occupation from ca. 1870 to 1970 when it was abandoned leaving it virtually intact with little disturbance or tool recycling. An 80-plus-year-old informant formerly from Upper Bidjomambe, who was a stone hammerman for a traditional three-man smithing team, provided invaluable ethnoarchaeological data linked to a GPS-based site map that documents partially standing house ruins; forging locations based on in situ anvils and stone hammers; stone outcrops used to process iron blooms (likumanjool); and slag trash deposits near residences or in larger smithing dumps. These data points and their spatial interrelationships were used to interpret two eighteenth–nineteenth century archaeological smithing sites associated with the present-day, former smithing villages of Bitchabe and Bidjobebe. These archaeological sites have been impacted by hoe agriculture, tool recycling, and school and/or road construction. The partial reconstruction and interpretation of these sites using the Bidjomambe data is evaluated as to its degree of success.

de Carteret, Alyce (Brown University) and Sarah Newman (James Madison University)**[125] Sharing Wares and Waging Wars: The Politics of Ceramic Exchange at the Classic Maya Site of El Zotz, Guatemala**

The Classic Maya city of El Zotz, relatively small compared to its neighbors, is situated geographically, and at times politically, between El Perú-Waka' to the west and Tikal to the east. The archaeological site occupies an elevated position within the Buenavista Valley, a southwest to northeast corridor running for some 32 km to the north of the Lake Petén Itza region. The valley connects the northeast and northwest Petén, from Chetumal Bay to the Bay of Campeche, placing the site in a strategic position along major trade routes in the region. Research by the El Zotz Archaeological Project (2006—present) demonstrates that the city's fortunes and misfortunes were heavily influenced by political developments (both collaborative and antagonistic) in the surrounding region. Yet, even as the geopolitical landscape became increasingly fractured during the course of the Classic period, ceramic evidence

suggests that El Zotz maintained connections with its neighbors in the Western Petén. This paper will evaluate the ceramics of El Zotz from a regional perspective, bringing to light the politics of ceramic exchange for this Classic Maya city.

De Jesús Pérez, Pablo Fernando

[137] *Un complejo arqueológico en las márgenes del río Tehuantepec en la Sierra Sur de Oaxaca: El caso de Ladchixila*

El presente estudio trata sobre trabajos realizados en la Sierra Sur de Oaxaca, localizado en los márgenes del río Tehuantepec, región en donde se establecieron grupos humanos dedicados a la caza, pesca, recolección de frutos y agricultura, con recursos naturales que fueron explotados, haciendo posible su establecimiento permanente, dejando plasmada su historia a través de elementos arquitectónicos, que para el año de 2015 fueron explorados arqueológicamente. El desarrollo de esta investigación se enfoca de manera específica sobre la Zona Arqueológica en el paraje el "Llano," correspondiente a la jurisdicción de Ladchixila y donde se tratarán temas sobre la distribución espacial de los edificios, la función de elementos arqueológicos y arquitectónicos que se localizaron alrededor de la acrópolis, así como terrazas localizadas en laderas y conjuntos habitacionales que fueron excavados, detectándose contextos funerarios con ofrendas asociadas. Las labores de exploración durante varios meses de trabajo en esta Zona Arqueológica, arrojaron información importante sobre los estilos arquitectónicos identificados, así como la temporalidad relativa (a través de la cerámica y lítica), y posible filiación cultural con los Valles Centrales de Oaxaca.

De La Torre Salas, Natalie and Isabel Rivera-Collazo (University of California San Diego)

[370] *Switching Perspectives: Ethnographic Analysis of Community Viewpoints Regarding In Situ Preservation of Archaeological Sites*

The varied definitions of cultural heritage imply that archaeological sites and their landscapes are important for the shaping of local cultural identities. Nonetheless, many of these definitions are unclear about the relationship that communities can have with archaeological sites. Using place attachment theory and a knowledge-centered approach, I explore the cultural and historical knowledge that people have regarding their cultural heritage, their general perception of archaeology, their attachment to archaeological sites, and their opinion regarding "in situ" preservation of heritage. The community of Los Indios in Santa Isabel, Puerto Rico, presents an ideal case study to evaluate these issues given that it has a very long history of occupation and is located on top of a large archaeological site. In this presentation I show how, through the use of ethnographic data, it is possible to evaluate and understand the motivations and interests of residents regarding the definitions, and preservation of cultural heritage. Knowing which elements limit or facilitate participation of residents toward the preservation of archaeological sites is an undervalued variable that affects local knowledge shaping local identities, cultural knowledge, and understanding of what it is cultural heritage; and should be incorporated into long-term site management plans and regulations.

De Lucia, Kristin (Colgate University)

[267] *Style, Memory, and the Production of History: Aztec Black-on-Orange Pottery in Xaltocan, Mexico*

This paper will explore shifting patterns in ceramic consumption and stylistic design during the Postclassic period (AD 900–1350) at the site of Xaltocan in the Basin of Mexico. Xaltocan is the only site in the northern Basin of Mexico associated with a large percentage of early Black-on-Orange pottery. This same pottery is rare at contemporaneous sites located a few kilometers away. Because Black-on-Orange ceramics were used by elites and commoners alike, and also cross-cut various ethnic and linguistic groups, there would have been multiple potentialities and entanglements associated with stylistic shifts in pottery. I argue that rather than self-driven or inevitable processes, shifts in the style and consumption of Black on Orange pottery represented explicit ideological statements about the creation of difference and identity. Similarly, I argue that periods of stasis in stylistic design, as well as boundaries in pottery use, were actively maintained rather than a consequence of non-interaction. Although this paper focuses primarily on stylistic traditions within the Basin of Mexico, it may help us to understand styles more broadly as active processes linked to ritual and identity, while also involved in the construction of power and the production of history.

[267] *Chair*

De Pol Holz, Ricardo [143] see Santoro, Calogero M.

de Rioja, Víctor L. [38] see Fort, Joaquim

De Smedt, Philippe (Ghent University)

[336] *Ephemeral Features and Evolving Landscapes: Understanding Mankind's (in-)Visibility in the Archaeo-Geophysical Record.*

Geophysical prospection methods are coming of age as a standard part of the archaeological tool kit. Archaeologists, especially in Europe, are increasingly reliant on geophysical data in both developer-led and research archaeology. More recently, archaeological geophysics is bridging the gap between site and landscape through motorized survey strategies. This upscaling particularly highlights a number of methodological difficulties inherent to geophysical prospecting. A first follows its noninvasive character as, by approaching the subsurface from top to bottom, any geophysical result reflects a palimpsest stacking the most recent to the most ancient land-use traces within one dataset. Secondly, while the range of geophysical methods is diverse, each method's potential correlates strongly to the targeted geological context. Lastly, the ephemeral nature of specific types of archaeology warrants caution in implementing these methods. Settlement traces of hunter-gatherer societies, for instance, often remain invisible to geophysical prospecting and, in general, prehistoric archaeology is the most evasive in geophysical datasets. Here, archaeological 'invisibility' in geophysical datasets will be addressed, while discussing the influence of recent land use and geology on the interpretive potential of such data. Additionally, a basic framework relevant to archaeologists working with geophysical prospection data will be set out, illustrated through different case studies.

De Smedt, Philippe [87] see Delefortrie, Samuël

de Smet, Timothy

[87] *Integration of Multiple Geophysical Datasets to Classify Archaeological Responses*

North American archaeologists are increasing using multiple near-surface geophysical techniques at archaeological sites to locate features of interest. Examining different physical properties in the subsurface has greatly improved archaeological interpretations; however, these data are often examined in a subjective site specific fashion (notable exceptions are the pioneering work of Kvamme and Ernenwein). This research seeks to quantitatively integrate magnetic gradiometry, frequency-domain electromagnetic-induction (magnetic susceptibility and apparent conductivity), and ground-penetrating radar data from the Magnolia Valley site, Rutherford County, Tennessee. Moreover, this research examines the effects of novel processing techniques (including reduction-to-the-pole, attribute analysis, and Hilbert transform) on the correlation structure of the data in order to improve subsequent classification via supervised and unsupervised learning. A short term goal of these data, or information, fusion techniques is the ability to statistically predict archaeological geophysical responses based upon geophysics and limited archaeological testing. The long-term goal of this research program is

the stewardship and preservation of the archaeological record, where archaeogeophysics can be used as a standalone method to answer fundamental anthropological research questions about human behavior, social organization, and cultural change through time—without costly and destructive excavation.

De Tomassi, Mirko

[369] *El Culto de los Antepasados en Conjuntos Domésticos en el Valle de Copán, Honduras y las Implicaciones Sociales que influyen en las Prácticas Funerarias*

La presente ponencia trata de analizar las prácticas funerarias que se llevaban a cabo en distintos conjuntos domésticos excavados en el territorio dominado por la ciudad de Copán durante el Clásico Tardío. En la sociedad maya, las relaciones consanguíneas con los antepasados cobraban mucha importancia para el mantenimiento del poder. Las unidades sociales que se fundan en los lazos de parentesco implican desigualdad en la participación en el poder, definida con base en la proximidad al ancestro común. Las evidencias arqueológicas procedentes de casas de distintas partes del área maya demuestran la existencia de este culto en ámbito doméstico y que este jugaba un papel importante en la construcción y el mantenimiento de la unidad doméstica. Por ejemplo, en los distintos patios que formaban el conjunto doméstico 9N-8, en Copán, convivía gente de distintos niveles sociales, etnias, sexo y edades. Las distintas maneras en que se llevaban a cabo las prácticas funerarias estaban influenciadas por la heterogeneidad que caracterizaba el conjunto doméstico. La pregunta que esta investigación pretende contribuir a contestar es cómo funcionaba este mecanismo en un conjunto doméstico heterogéneo, en donde convivían distintas familias que con mucha probabilidad no compartían un antepasado común.

de Voogt, Alex [219] see Dupras, Tosha

Deal, Michael (Memorial University of Newfoundland), John Campbell (Memorial University of Newfoundland) and Bryn Tapper (Memorial University of Newfoundland)

[52] *A New Approach to Precontact Archaeological Research on the Annapolis River System, Nova Scotia, Canada*

Boswell (BfDf-08) is the first archaeological site to be excavated along the Annapolis River, in north-central Nova Scotia. Previously, less than 50 sites had been recorded in the 2,130 km² watershed, and only a few of these were tested. Therefore, Boswell is the baseline for our understanding of precontact occupation for this entire drainage system. Thus far, the site has revealed a cultural sequence beginning with the Transitional Archaic (ca. 4100–2700 BP), followed by Middle and Late Woodland (ca. 2500–1500 BP) occupations. Work at the site since 2011 has included paleoethnobotanical and zooarchaeological analyses and a paleoenvironmental reconstruction. Subsistence activities at the site included fishing, hunting of beaver and birds, and the collection of edible berries and nuts. The deeply stratified sediments at the site give an indication as to why so few sites and private collections have been recorded. Based on the Bowell excavations, the authors recommend a new approach for future archaeological work in this understudied part of the province.

[52] *Chair*

Dean, S. D. [160] see Franklin, Jay

deBeaubien, Domonique [365] see Mahoney, Maureen

DeBlasis, Paulo [45] see Corteletti, Rafael

DeBoer, Warren (Queens College CUNY)

[270] *Discussant*

Debono Spiteri, Cynthianne [173] see Rageot, Maxime

DeCorse, Christopher (Syracuse University)

[128] *Discussant*

Déderix, Sylviane [130] see Dungan, Katherine

Dedrick, Maia (University of North Carolina at Chapel Hill), Adolfo I. Batun-Alpuche (Universidad de Oriente) and Patricia McAnany (University of North Carolina at Chapel Hill)

[36] *Imperfect Beeswax Production in the Land of Honey—Yucatán, Mexico*

Spanish encomenderos and friars demanded beeswax from their subjects in Yucatán, Mexico, during the early Colonial period. This wax was harvested from beehives infrequently used for wax production in prehispanic times—instead the focus throughout the long history of beekeeping in the region was on honey. In fact, indigenous honeybees, from the genus *Melipona*, make an impure wax in low quantities, which would have made candle production difficult. These candles were important for Catholic ceremonies and the process of conversion. This paper considered evidence of beehive production from a Colonial house situated within one small community in Yucatán, Mexico, and connect the local histories of honey and wax production to the complicated trajectory of Spanish conquest in the region. It is considered that the nature of local wax ecology and production as well as the quantities of wax demanded from communities based on historical tax records, comparing this information to tribute records from other regions in which people experienced early Spanish colonialism.

[291] *Discussant*

Dedrick, Maia [280] see Batun-Alpuche, Adolfo I.

deFrance, Susan (University of Florida)

[238] *The Political Ecology of Camelid Pastoralism by Wari and Tiwanaku Colonists in the Moquegua Valley, Peru*

The Moquegua Valley in southern Peru was the locale where the rival early imperial states of Wari and Tiwanaku established provincial colonial centers. Both Wari and Tiwanaku colonists concentrated their settlements in the low to mid-sierra elevations of the valley, elevations that are not modern zones of camelid husbandry. The political ecology of imperial settlement at this elevation fostered the development of local systems of camelid pastoralism that were significant economic components for both groups of colonists. Camelids were used for dietary and ritual uses as well as for transport and trade. The osteological, morphological, pathological, and isotopic evidence from camelid remains from a range of sites associated with both Wari and Tiwanaku settlements indicate that local production and breeding of camelids were significant components of the livelihoods of colonists regardless of cultural affiliation. This ability to rear camelids in this setting and to create economic ties with communities at higher elevations attests to the significant political ability of these early empires to alter their local settings in order to sustain these animals and to create viable economic and cultural systems.

[331] *Discussant*

deFrance, Susan [284] see LeFebvre, Michelle

Dega, Michael (Scientific Consultant Services, Inc.) and David Perzinski (Scientific Consultant Services, Inc.)

[123] *Garapan and San Roque: Case Studies from Saipan, CNMI*

This paper takes site data from two recently excavated locales on Saipan and discusses the archaeology, physical anthropology, and bioarchaeology of the sites. The goal is to frame these within larger questions of origins, changes in the island's demography through time, and to assess several migration models for settlement of Saipan and the Northern Marianas.

Dega, Michael [123] see Dudgeon, John

Dega, Michael [123] see Franklin, Olivia

DeGiorgio, Michael [176] see Malhi, Ripan

Deibel, Corinne (Earlham College), Michael Deibel (Earlham College), Jiqiao Shi (Carnegie Mellon University), Johnathon Hornak (Earlham College) and Hannah Munro (Earlham College)

[99] *Characterization of Neolithic Jade Objects from Shimao and Xinhua, Shaanxi Province, China, Using Handheld Portable Techniques*

Fifty jade objects from the Late Longshan period, excavated from the Shimao (25) and Xinhua (25) Neolithic sites, were characterized mineral groups using handheld X-ray fluorescence (hhXRF) and handheld specular reflectance Fourier transform infrared spectroscopy (hhFTIR). The objects were found to belong to three types of minerals. Twenty-two objects found in Shimao (88%) are nephrite (19 tremolites and 3 actinolites), two are calcite and one antigorite. From Xinhua, 9 objects (36%) are nephrite (tremolites), 14 are antigorites, one is calcite, and one chlorite. The higher percentage of nephrite jades found in Shimao confirms its high status and affluence. The minerals were classified into subgroups using HHXRF. All Shimao nephrites, and all but one from Xinhua, are D-type nephrites. Only one Xinhua nephrite is an S-type nephrite. Based on R* values, the D-type nephrites were divided into four groups. The largest group (R*: 0.980 to 0.995) includes 8 nephrites from Xinhua and 14 nephrites from Shimao, indicating possible common geological origins. The Xinhua antigorites were classified into three groupings based on Ni, Cr and Al content. These results can be used to build a database of jade objects from the Late Longshan culture to help establish the origin of undocumented jades.

Deibel, Michael (Earlham College), Corinne Deibel (Earlham College), Ye Wa (UCLA) and Liping Yang (Shaanxi Provincial Institute of Archaeology)

[279] *Analysis of Ancient Chinese Pottery Utilizing X-ray Fluorescence and Diffuse Reflectance Infrared Fourier Transform Spectroscopy*

Field studies were performed at the Yanggouzhai Neolithic site near Xi'an, China, using an Olympus Delta Premium portable XRF spectrometer and an Agilent ExoScan FTIR spectrometer. 932 ceramic sherds collected from nine locations across the site were selected and classified based on color (red, tan and brown), decorations (painted, rope impression—cord or thread, and plain), and time period (Miaodigou and Banpo IV). Each sherd was broken, so that the analysis could be performed on a clean edge to minimize surface contamination. Although ceramics have much more complex matrices than most lithic samples, distinct patterns could be observed in several preliminary PCA (Principal Components Analysis) tests. In the main moat (G8-1), an apparent change in clay composition was observed from earlier layers to later layers. Three main clay composition groupings were found in many locations. Differences in clay compositions were also observed in sherds fired at different temperatures (FTIR-assigned firing temperature). One location (402) was clearly different in clay composition from all the others. Additionally, these data seem consistent with a more homogeneous clay composition in the Banpo IV period than in the earlier Miaodigou period.

Deibel, Michael [99] see Deibel, Corinne

Deiter, Karissa (Vanderbilt University), Sara L. Juengst (University of North Carolina at Charlotte), Manuel Mamani (National University of Saint Augustine) and Antonio Villaseñor-Marchal

[75] *Mortuary Analysis of Juvenile Burials in the Sacristy of a Spanish Colonial Reducción in the Southern Highlands of Peru*

Mortuary practices at Spanish colonial sites in Latin America varied in terms of burial location, style of burial, and associated grave goods. Understanding burial practices is one way to investigate shifting identities, conversion to Catholicism, and the degree of control over and involvement of priests in daily life at colonial sites. The mortuary practices at the reducción (planned colonial town) of Santa Cruz de Tuti (today known as Mawchu Llacta, Colca Valley, Peru) reveal nuanced insights into colonial life for the living through their treatment of the dead. Focusing on body orientation, associated grave items, and the demographic profile of this burial population, we present mortuary data from 21 child burials in the sacristy at Mawchu Llacta. The exclusively juvenile demographic profile of the burial population in the sacristy likely reflects its liminal status just outside the sacred space of the church nave, but in nearest proximity to it (and the main altar). We also make comparisons between the mortuary practices seen here, the mortuary practices in nearby prehispanic mortuary complexes, and direct historical antecedents, such as at Malata, an early colonial Franciscan doctrinal settlement that was resettled to Mawchu Llacta.

Deiter, Karissa [75] see Juengst, Sara L.

Del Castillo Bernal, Florencia [286] see Barcelo, Juan

Delaere, Christophe (Université libre de Bruxelles)

[199] *Underwater Archaeology in Lake Titicaca, Bolivia: Use of the Littoral Zone in the Tiwanaku Period (AD 500–1150)*

Since 2014, the project of underwater archaeology in Lake Titicaca (ULB), gives priority to the study of the Yampupata strait between the Island of the Sun and the Copacabana Peninsula. This research strategy was chosen because of different elements: First of all, the Island is a homogenous insular territory whose affordable dimensions (14,3 km²) allow underwater activities. Secondly, one of the main characteristics of this territory is its dense, complex and continuous occupation which has been recorded by Archaeology. Human occupation of the Island of the Sun dates back especially to the (pre)Tiwanaku period (AD 300–1150), followed by the ideological reappropriation implemented by the Incas (AD 1430–1532). Finally, this insular area involves navigation and the use of the littoral zone (transit point; Westerdahl, 1992:6). The access area to the Island of the Sun was located and excavated in 2014 (Puncu). The departure area for the island, in the continent, was located and excavated in 2016 (Ok'e Supu). In total, for an excavation area of 120 m² (30 test pits), more than 6000 fragments of artifacts were recorded in their stratigraphic context. We propose to show a far-reaching dialogue between the scientific results from both port areas.

DeLance, Lisa (University of California, Riverside)

[357] *The Complexity of Trash: Reframing Construction Fill*

Mesoamerican archaeologists have traditionally, although not exclusively, viewed artifacts found in the context of construction fill as trash and devoid of primary contextual information, a view that has limited the questions that archaeologists are able to ask of these materials. This paper posits an alternative interpretation to the meaning of material culture used in construction fill, utilizing evidence from Formative period construction fill found at the site of Cahal Pech, Cayo, Belize. Specifically, this presentation illustrates the possibility of the deliberate and agentic placement of specific types of material culture into the context of construction fill as a deeply meaningful act of community building that places both kin groups and individuals at the center of construction episodes.

[357] *Chair*

Delefortrie, Samuël (Ghent University), Philippe De Smedt (Ghent University), Mark Gillings (University of Leicester), Martin Green and Joshua Pollard (University of Southampton)

[87] *Mining and Interpreting Archaeo-Geophysical Data through Excavation: A Case from Prehistoric Knowlton (Dorset, UK).*

Identified by aerial photography, the presence of a presumed prehistoric long-barrow and ring ditch called for detailed investigation by targeted excavation. Located in Dorset (UK), the features are presumed part of a larger ritual environment of which the 'Knowlton Circles,' a complex of Neolithic and Bronze Age monuments, are best known. To aid in planning excavations and add to subsequent interpretation, detailed geophysical prospection, in the form of multi-receiver electromagnetic induction survey, preceded invasive fieldwork. Alongside fine-tuning the excavation layout, the geophysical data were calibrated through recording physical soil properties of the excavated surfaces, and validated archaeologically by comparison to the excavation results. Alongside evaluating of the survey methodology, the geophysical and excavation data were combined into an iterative interpretation procedure. This entailed joining both datasets on a physical and archaeological level to create a reference point which would not only allow improving future surveys, but enable better understanding of the 3D morphology of detected features, their level of preservation and geological context prior to excavation. While exemplified through a single case study, this presentation aims to show how considering geophysical prospection an inherent part of the excavation process, can help construct a more robust framework for subsequent archaeological interpretation.

Delgado, Florencio [270] see Astudillo, Fernando J.

Delgado Espinoza, Florencio [384] see Stahl, Peter W.

Delgado Ku, Miguel [9] see Vermillion, Rebekah

Dello-Russo, Robert, Banks Leonard (UNM Office of Contract Archeology) and Robin Cordero (UNM Office of Contract Archeology)

[332] *Analytical Challenges Posed by the Early Holocene/Late Paleoindian Activity Areas at the Water Canyon Site, West-Central New Mexico: How Do We Know What We Think We Know?*

Accuracy in the identification of Late Pleistocene-Early Holocene open activity areas and the subsequent inference of human behavior requires that non-behavioral causes for differential spatial patterning be considered before approaching the question of how patterning reflects human activities. Such challenges in the interpretation of behavioral patterning are exemplified at the Water Canyon Paleoindian site. In this paper, we initially describe the lithic and bone assemblages recovered from the Late Paleoindian component (ca. 9600 cal BP) at Locus 1, a suspected Bison antiquus processing area. We then map out any apparent spatial patterns in the assemblages and examine how postdepositional geomorphic and taphonomic processes may have biased these patterns and the chronology of the deposits. Once potential biases are identified, we then move on to more securely infer various activities. Thus, not only is the recognition of these biases critical to the subsequent functional interpretations at Locus 1, it is instrumental in helping us design future investigations there and at other activity areas across the site.

Delpiano, Davide [169] see Peresani, Marco

Delsol, Nicolas (University of Florida)

[292] *The Columbian Exchange in Mesoamerica: Early Colonial Documents and Zooarchaeology in Guatemala*

At the end of the fifteenth and the beginning of the sixteenth century, the massive introduction of new animal species in the Americas put an unprecedented stress on both the environment and Native American societies. Although archaeological animal remains are often used to inform discussions on American-European transculturation in other areas, few such studies have been done in southern Mesoamerica. This talk will use historical sources and published zooarchaeological data to provide a first overview of the human-animal relationship during the first century of Spanish colonization in the Maya world. Primary data will be drawn from historical accounts from the former capital of the Audiencia, Santiago de Guatemala, and comparative zooarchaeological data from the period across Mesoamerica. During the early colonization, the trade of cattle hides and other animal products that can be traced archaeologically, was a significant source of riches for the European colonists. Santiago was also an important regional center and meeting place for the exchange of ideas between many ethnic groups including Spaniards, Mexican auxiliaries, Mayans and eventually, African slaves. The aim of this talk is to emphasize the relevance of further zooarchaeological research for informing us about this period of rapid cultural and environmental change.

Demarest, Arthur (Vanderbilt University), Carlos Alvarado (Universidad del Valle de Guatemala) and Tomás Barrientos (Universidad del Valle de Guatemala)

[182] *Investigations at San Andres Semetabaj and the Problematics of Middle to Late Preclassic Highland Archaeology*

The site of San Andres Semetabaj, Guatemala, located on the northern edge of Lake Atitlan, is central, geographically and chronologically, to major theoretical and culture-historical controversies and problems of Preclassic highland archaeology. The size, nature, and importance of the site have been underestimated, in part due to limited available information based only on smaller preliminary seasons and a looted tomb and also due to the assumption by many that the very large structures there were Late Preclassic and/or Late Classic. Now a larger long term project there has begun and is completing its first season. Preliminary results confirm that the epicenter structures, including temples of 8 to 11 m in height, were Middle Preclassic with only a few mounds, one large, dating to the Early Classic, but after a clear hiatus. The investigation also reveals the large scale of the site and has identified related small centers. The nature, dating, and location of Semetabaj make it central to interpretation of Middle Preclassic highland and coastal exchange systems. It also falls fortuitously directly into the ongoing controversy on Middle Preclassic chronology. The Semetabaj Regional Archaeological Project will provide evidence and analyses that address these current issues of Preclassic highland archaeology.

[214] *Discussant*

Demarest, Arthur [125] see O'Mansky, Matt

Demarte, Pete (Trent University), Samantha Walker (Trent University), Dan Savage (Trent University) and Melissa Coria (Trent University)**[214] *Weathering the Tropics: The Problem of Archaeological Data Collection and Understanding Settlement Systems, Socio-Ecological Dynamics, Human-Thing Entanglements, and the Resiliency of Tropical Societies***

The settlement sub-project of the Socio-Ecological Entanglement in Tropical Societies (SETS) investigations was executed by engaging a variety of data collection methods in order to assess the development and overall organization of settlements of support populations in a sample of preindustrial tropical societies from South and Southeast Asia, and Mesoamerica. This presentation explores the diverse types, character, and quality of the data employed in the study, and underscores how, when combined within a broader comparative study, the strengths and weaknesses of the various regional datasets can be productively evened out to provide a general understanding of settlement patterns in the preindustrial tropics. Specific attention is paid to the methods utilized in the examination of the dispersed urban settlements characteristic of tropical environments, while also providing a comparison of the utility of each method of archaeological data collection. Data proximity and ground-truthing are argued to be crucial tools that should be used in conjunction with extensive literature reviews, ground surveys, and extant GIS datasets (including lidar) in efforts to examine the complex socio-ecological relationships, human-thing entanglements, resiliency of support populations, individual settlement nodes, and larger political formations.

Demski, Leo (University of Nevada, Reno)**[103] *The Luxury Of Cold: The Natural Ice Industry In Boca, California: 1868–1927***

Before the invention of refrigeration and electrically produced ice, naturally harvested ice was an important seasonal commodity for food storage and heat regulation. In 1852, Boston ice was shipped to San Francisco and sold as a luxury. High demand soon led entrepreneurs to look for closer sources of ice, first in Russian controlled Alaska, and then in the Californian Sierra Nevada Mountains along the newly-completed transcontinental railroad line. The railroad transported ice to customers, utilizing it to ship perishable food items over long distances in refrigerated cars. The town of Boca, in the eastern Sierra, dominated the Californian ice market from the late 1860s–late 1920s, due to its extremely cold and dry conditions, purity of water, and proximity to the railroad. This presentation will discuss the archaeology taking place at Boca, as well as attempting to situate the Sierra ice industry in the broader context of economic and industrial development of the late nineteenth- to early twentieth-century West.

DeMuth, R. Carl (Indiana University Bloomington), Tim Goddard (Adams State University), Joshua J. Wells (Indiana University Southbend), Eric Kansa (Open Context) and Kelsey Noack Myers (Indiana University Bloomington)**[18] *Digital Archaeological Data in All the Classrooms: Case Studies Using the Digital Index of North American Archaeology (DINAA) for Teaching Digital Methods in Graduate and Undergraduate Curricula***

This paper presents case studies in developing information literacy about archaeological methods and heritage resources, involving use of the Digital Index of North American Archaeology (DINAA) in graduate and undergraduate programs at Adams State University and Indiana University. DINAA is a linked open data hub which uses archaeological site definitions as a core from which to explore further information, including excavation and collections data, scholarly publications, and related information from other scientific databases. These examples highlight DINAA's potential for teaching digital archaeological methods, including critical thinking skills about information design, data representation, and reuse strategies. Courses discussed involve heritage management practice and theory, definitions of culture areas and history, and introduction to archaeological science. Perennially critical issues in teaching digital archaeological methods are (1) providing students with primary data or large volumes of data for hands on learning and (2) providing them with affordable software solutions; addressing these issues provides graduating students with important skills for contemporary workplaces that require navigation of diverse datasets and software, often with limited financial resources. DINAA's open data and open-source commitments democratize the educational process for students, and simultaneously provide an avenue for educators to introduce real world data into the classroom. DeMuth, R. Carl [195] see Wiley, Taylor

Deneault, Zoë [263] see Heizer, Melanie

Dennett, Carrie (University of Calgary) and Lorelei Platz (University of Costa Rica)**[156] *Materializing Ritual: Sorcery, Transformation, and Divination in Greater Nicoya***

Themes involving spiritual transformation have long been noted in the material culture of precolumbian Greater Nicoya, with standardized ritual imagery appearing in local Sapoa period (AD 800–1250) ceramic type-classes such as Papagayo and Pataky Polychromes. A recent iconographic reevaluation suggests that at least some varieties from these "independent types" were designed to work together, to complement one another in both ritual messaging and formal function. Here we focus explicitly on the relationship between Pataky Polychrome, Pataky variety, effigy head vessels and Papagayo Polychrome, Alfredo variety, bowls. Together, this unique "set" appears to portray a sorcerer in the act of spiritual—and arguably entheogen-induced—transformation. The bowl likely served a dual-purpose role in the presentation of the entheogen at consumption and as a 'substance receptacle' (divinatory "vomit-catcher") for the sorcerer's subsequent purge.

Dennison, Meagan (University of Tennessee, Knoxville)**[127] *Ancient Dogs of the Tennessee River Valley***

Skeletal remains of domestic dogs, particularly dog burials, are common from prehistoric archaeological sites in the Southeastern United States. Efforts to describe these ancient canines have traditionally focused on body size and cranial morphology, however, more recently paleopathology has played a key role in understanding ancient canine lifeways and the interactions between humans and domestic dogs. Mortuary analysis can also bolster interpretations of life histories and dogs' roles within human society. This paper describes the mortuary contexts and paleopathology for nearly 50

archaeological dog skeletons from two sections of the Tennessee River Valley—the Western Valley and the Ridge and Valley physiographic provinces. Dogs from the Western Valley date between 7000 and ca. 3500 years BP. and are associated with foraging cultural groups, while dogs from the Ridge and Valley are much later, dating between 900 AD, and 1500 AD and are associated with subsistence systems centered on maize agriculture. The social relationship between dogs and people manifests skeletally in traumatic fractures and/or metabolic diseases, as well as in the way dogs are treated in death. Differences in burial treatment and paleopathology between these two cultural groups indicate that dog lifeways changed within the context of anthropogenic cultural change.

Denoyer, Allen [303] see Cometa, Kaitlyn

Denton, David (Cree Nation Government)

[216] *Wapushukamikw: Sacred Site and Lithic Quarry in Subarctic Quebec*

Traditionally, Wapushukamikw (“house of the hare”) was a sacred site for Cree and closely related Northern Algonquian people in subarctic Quebec. Its use as a place of prayer was noted in the early eighteenth century CE by Jesuit missionaries, and some elements of this tradition have continued to modern times. Wapushukamikw, known by archaeologists as the Colline Blanche, was also an important lithic source in subarctic Quebec, used for some 6,000 years. Artifacts of Mistassini quartzite from this source have been found in sites throughout a wide area of subarctic Quebec and well beyond, into the St. Lawrence River Valley and parts of New England. In areas furthest removed from the source, it is often found as offerings in burials. This paper brings together information concerning Wapushukamikw as part of the Cree/Northern Algonquian cultural landscape and suggests a close relationship between the spiritual power of the site and the typically white stone from the quarry, known to Crees as wiinwaapsk (“fat stone”).

DePace, Monique and Kathleen McSweeney (University of Edinburgh, Graduate Officer)

[290] *Diet and Dentition on the Black Sea: An Examination of Dental Health and Dietary Reconstruction at Medieval Mesambria*

Dental health and dietary habits from the Bulgarian town of Mesambria have never been investigated for the medieval period. The town has its roots in Mediterranean culture, however, in the Early Byzantine and Medieval periods in Bulgaria, the Slavic Bulgars were vying for power and territory, and Mesambria became caught between the dying Byzantine Empire and the new Bulgarian state. The Bulgars brought with them a different diet, with a preference for millet, meat, and cheeses over the Mediterranean staples of wheat, oil, and wine. Human remains from the Mesambrian Old Town and Necropolis were compared to investigate the dental health of individuals living in medieval Mesambria. Supplementary isotopic analyses from twelve individuals from the Old Town were used in dietary reconstruction, and to support the dental health findings. Possible differences in age, sex, time period, and class between the Necropolis and the Old Town populations were investigated. Numerous significant differences were noted in the frequency of affected teeth between sexes, age groups and between the two populations. Isotopic data suggests that there were slight dietary differences between males and females, and $\delta^{15}\text{N}$ values indicated that individuals buried in the Old Town had elevated marine consumption.

Deppen, Jacob (University of Washington)

[166] *Connected through Things: Connectivity in Iron Age Mallorca*

This presentation examines connectivity in the Late Iron Age on the island of Mallorca. While most case studies of connectivity in the western Mediterranean involve the movement of people and/or the construction of new settlements by nonlocal people, there is little evidence that this occurred in Mallorca. However, there is still abundant evidence that indigenous Iron Age Mallorcans were increasingly connected to the broader Mediterranean and that nonlocal goods were being consumed throughout the island. Mallorca, then, seems to have been a place where connectivity and consumption of nonlocal goods were negotiated on decidedly local terms. This presentation will outline what we know about the consumption of nonlocal goods in Mallorca during the Iron Age while also examining how the absence of nonlocal individuals impacts how we think about studies of connectivity and contact between groups.

Deppen, Jacob [118] see Hunt, David

Depret-Guillaume, Patrick (University of Virginia)

[303] *God's Empire: Ritual, Repression, and Resistance on the Rio Grande, 1300–1848*

This interdisciplinary project evaluates the relationship between Spanish and indigenous religious practices and their respective political objectives in protohistoric and colonial New Mexico. Beginning with a discussion of the emergence of a new religious idiom in the Pueblo world during the fourteenth century CE, I investigate the entanglement of political and economic forces with religion up to the conquest of the region by Anglo-Americans in the mid-1840s. In doing so, I highlight the myriad connections between what contemporary society, in the interests of sublimating the violence of ideological struggle, has sought to separate: the sacred and the secular. I demonstrate that in New Mexico, religion never operated in a vacuum, nor was this desired; rather, it was intentionally mobilized as a tool of political and economic action. To that end, I employ archival/ethnohistoric, archaeological, and ethnographic sources to deconstruct the categories of “religion,” “politics,” “economics,” and “society” themselves.

Der, Lindsay (Stanford University)

[73] *From Goddesses to Zoomorphs: Figuring Out Figurines at Çatalhöyük*

The infamous seated goddess, flanked by two leopards, is perhaps the most sensationalized figurine to have been unearthed at Çatalhöyük, prompting narratives of prehistoric cults and religion. Yet research conducted since its discovery by James Mellaart has shown that zoomorphic, rather than anthropomorphic, types are predominant in the figurine assemblage. In this paper, I trace the history of changing recording systems, analytical methodologies, and interpretations of figurines at Çatalhöyük. These new approaches have not only reconfigured our understanding of ritual and symbolism, but also revealed spatial and temporal continuity and variation across the settlement. In particular, research carried out on the figurines in the last five years, has illuminated the emphatic role of animals in the everyday lives and experiences of the Neolithic residents of the site. The figurines, along with other animal materializations, can thus reveal new insights into the complexion of human-animal relations and ontological geographies at Çatalhöyük. Furthermore, these studies help to contextualize the site within broader patterns of phenomena related to symbolism, ritual, and social change at the origins of agriculture in the Middle East.

[73] *Chair*

Derr, Kelly (Historical Research Associates, Inc.), Colin Grier and Adam Price

[194] *Changing Ecologies and Altered Landscapes: A 13,500-Year Paleoeological Record from Galiano Island, British Columbia*

A high-resolution lake sediment core recovered from Shaw's Bog on Galiano Island provides a window into the paleoecology of the island and region back to the Late Pleistocene. The extensive time depth represented offers an opportunity to evaluate ecology and climate prior to the known arrival of

people in the southern Gulf Islands. It also provides a mechanism to measure impacts on the local ecology following the establishment of major, long-term village locations such as Dionisio Point and Montague Harbor in the later Holocene. Using fossil pollen, charcoal, and phytoliths identified in the core, we compare natural and potentially anthropogenic changes in the local and regional ecology and fire regimes of Galiano Island. Changes in charcoal frequency and morphology demonstrate shifts in fire frequency and fire regimes during the Holocene, and these are evaluated with respect to variability in the pollen and phytolith record. These paleoecological data, coupled with archaeological evidence for long-term landscape construction at nearby village sites, suggest that Salish peoples engaged a complex and dynamic landscape that both sustained and reflected increasingly place-based lifeways in the southern Gulf Islands.

Deryck, Sean, Russell Cutts (University of Georgia, Koobi Fora Field School), David R. Braun (George Washington University, Koobi Fora Field Sch) and J.W.K. Harris (Rutgers University, Koobi Fora Field School)

[154] *Ongoing Excavations at FxJj20Main-Extension-0, Koobi Fora, Kenya*

Original excavation of FxJj20 sites in Koobi Fora, Kenya revealed nine oxidized patches described as combustion features associated with artifacts. Here we describe new excavations at a nearby new locality described as FxJj20Main-Ext-0. This excavation extends previous work in order to explore potential combustion features with newer techniques. Three squares adjacent to a reddened feature yielded 18 bones and 33 stone artifacts. All bone was fragmented. Most stone artifacts were basalt. Nearest neighbor analysis showed nonrandom clustering on both the horizontal and vertical planes with minimal evidence of postdepositional disturbance.

Des Lauriers, Matthew (California State University, Northridge)

[393] *Inheritance, Innovation, and Interaction: The Motivations for and Consequences of Social Interaction in the Context of Initial Settlement*

While providing a general outline of several initial settlement strategies pursued across the Americas, I argue that social networks between the small-scale communities involved would be established rapidly upon arrival. Certainly, the events of initial contact and process of network formation would have occurred within a sub-generational time frame. The flow of material goods, genes, and information between members of the small-scale pioneering communities is essential to the survival of initial populations and their continued expansion. As they moved into a new landscape, the establishment of these conduits would have been high on the priority lists of the early colonists leading us to ask several questions. Do the varied Terminal Pleistocene technological assemblages of the Americas indicate the existence of widespread and distinct cultural traditions? Are the expansive geographic areas of North and South America encompassed by some of these traditions commensurate with interaction systems? Finally, does the increasingly regionalized material culture in the millennia after ~8000 BP indicate a reduction in the geographic scope of networks or a more complex change in the role of interaction among Archaic populations?

Desilets, Michael [302] see Toney, Joshua

Desrochers, Marie (University of Central Arkansas), Marvin Rowe (Conservation Laboratory of the Museum of New Mexico), Sally Cole (Fort Lewis College Department of Anthropology) and Karen Steelman (Shumla Archaeological Research & Education Center)

[392] *Lead and Zinc Pigmented Mural Paints: Lowry Pueblo Great House, Southwest Colorado*

We used numerous techniques to study the white step pattern murals of Lowry Pueblo Kivas A and B: visual analysis, portable X-ray fluorescence, scanning electron microscopy with an energy dispersive X-ray spectrometer, and powder X-ray diffraction. Elemental analyses identified lead and zinc in the shiny bright white paint layer and calcium in the dull white paint layer. X-ray diffraction confirmed zinc oxide and lead sulfate pigment minerals in the shiny, bright white paint layer, whereas calcium carbonate was identified as the pigment for the dull white paint layers. Radiocarbon dating places mural production at 1020–1185 cal AD, consistent with occupation at Lowry Pueblo Great House. Because this underlying shiny, white paint layer is from an earlier painting event than the dull white, the lead paint layer could not be due to a modern addition. Selection of this lead and zinc pigment by kiva decorators produced a desirable paint finish; however, lead ore processing and paint manufacture likely had negative health implications.

Desrosiers, Dianne [394] see O'Boyle, Robert

Devio, Jessica (Washington State University)

[173] *Interpreting Maya Economic Activity Using Paleoethnobotany*

Paleoethnobotany is a subfield of archaeology that requires an extensive knowledge of archaeology and botany. Because highly specialized skills are required, presenting data can be difficult. Botanical data must be conveyed in a way that is understood by fellow archaeologists while adhering to standards of botanists. Conveying this information becomes even more difficult when we begin to combine micro and macro botanical methods. Botanical datasets can contribute to a wide range of topics that enhance our understanding of precolumbian societies. This paper focuses on the contribution that paleoethnobotany can make to our understanding of ancient economies. I focus not only on the subsistence economy, but the contributions to our understanding of economic production, distribution, and consumption on a broader scale. I present a case study from the site of Xunantunich in Belize. Thousands of small unifacial bladelets associated with Late Classic Maya households were discovered at the site and were initially interpreted as crafting tools. A sample of 38 previously washed bladelets and 62 unwashed artifacts yielded starch from several plant species. The results suggest that at least one household at Xunantunich engaged in plant processing activities that exceed that of normal household production activities.

Devlin, Joanne

[79] *Beyond the Basin: Forensic Archaeology in Tennessee*

As professors at Hamilton College, G. Tom Jones and Charlotte Beck taught their students how to engage in research and how to be effective instructors in the classroom. I have used these lessons to build a career in forensic anthropology. My long-term research at the Forensic Anthropology Center at the University of Tennessee has centered on establishing techniques to best examine burned bones and also on the application of geophysical methods to locate clandestine graves. This research has led to improved means for handling, identifying, and recovering burned bone while the geophysical work on experimental graves has demonstrated the utility and reliability of ground-penetrating radar in forensic investigations. Importantly, this work has significantly contributed to the development of training programs for students and Law enforcement personnel. The success of my forensic work is directly attributable to the influence of Tom and Charlotte and their dedication to students and anthropological science.

DeVore, William [185] see Dye, David

DeVos, James [227] see Kintigh, Keith

Dewan, Eve (Brown University)

[247] *Repatriation in Rhode Island: NAGPRA in Practice at a New England Museum*

Located within a city park in Providence, Rhode Island, the Roger Williams Park Museum of Natural History has been a popular scientific and cultural institution since it was founded in the late nineteenth century. Only about 1% of the Museum's quarter million pieces are currently on display. Included in this vast collection are approximately 25,000 archaeological and ethnographic objects from around the world, a number that was higher prior to the passage of NAGPRA in 1990. Since this pivotal legislation was introduced over two decades ago, the Museum has worked on numerous claims for the repatriation of cultural property and ancestral remains, with varying degrees of success. Using the Roger Williams Park Museum as an institutional case study leads to a more concrete understanding of how NAGPRA affects museum realities, as well as what ethical and practical challenges arise from it. Three cases in particular highlight the law's impact and the inner workings of the Museum's changing relationships with Indigenous peoples and their material culture in southern New England, throughout the United States, and across the globe.

Dewar, Robert [32] see Douglass, Kristina

DeWitt, Regina [121] see Nowell, April

DeWitte, Sharon (University of South Carolina)

[235] *Sex Differences in Pre- vs. Post-Black Death Trends in Developmental Stress Markers*

Previous research revealed trends in periosteal new bone formation in medieval London that are consistent with improvements in health following the Black Death (c. 1347–1351). However, periosteal lesions can occur in response to a wide variety of factors at any age, so it remains unclear how the epidemic affected patterns of physiological stress specifically among subadults. To further our understanding of changes in physiological stress before and after the Black Death, this study examines sex-based variation in temporal trends in two developmental stress markers: linear enamel hypoplasia (LEH) and short tibia length (a proxy for stature). The samples (n = 879) are from medieval London cemeteries and dated to an Early Pre-Black Death (AD 1000–1200), Late Pre-Black Death (AD 1200–1250), or Post-Black Death (AD 1350–1540) period. The results of Chi-square and t-tests indicate that before the Black Death, males experienced an increase in LEH frequency and a decline in stature, but these did not change among females. The results also indicate declines in LEH and increases in stature for males but decreases in stature for females after the epidemic. These patterns might reflect sex differences in physiological buffering during childhood or unequal access to resources after the Black Death.

DeYoung, Jessica [126] see Steelman, Karen

Dhody, Anna [14] see Mower, Courtney

Diệp, Hoàng [113] see Kelley, Eric

Diaz, Alejandra (University of British Columbia), Anna Marie Prentiss (University of Montana), Rebecca Macdonald (University of British Columbia), Olaf Nehlich (University of British Columbia) and Michael P. Richards (Simon Fraser University)

[50] *Diet and Mobility on the Canadian Plateau: Isotopic Analysis of Domestic Dogs and Other Fauna from the Bridge River Site*

This study reports on carbon, nitrogen, and sulfur isotope analyses of dog remains and other fauna from the Bridge River site in the Mid-Fraser region of the Canadian Plateau. We discuss these results in relation to dietary variability and resource mobility through time and in the relationships between dogs and humans. While dogs are not a direct proxy for humans in dietary isotope studies, their diets are influenced by human dietary practices, and therefore indicative of human subsistence strategies and activities. Similarly, evidence of dog mobility reflects the spatial interactions between human groups and resources. Dietary results demonstrate that while salmon played an important part of dog diet at Bridge River, variability occurs across age groups and culture periods. Mobility of dogs and potential differences in origin through time is also indicated.

Diaz, Diana (California State University, Northridge)

[98] *Engaging the History of the San Fernando Valley: Collections and "Synergy" at CSUN*

Perceptions of southern California's San Fernando Valley have long pertained to its relationship to adjacent Los Angeles, with the region over time characterized as either agricultural hinterland or faceless suburbia. Such stereotypes overlook the numerous historical associations and resources of the region, in the process subverting the identities and "communitas" of valley residents. In 2016 courses taught in the Department of Anthropology at California State University-Northridge (CSUN) have been collaboratively designed to create "synergy" associated with the San Fernando Valley in regard to history, space, and place. A particular focus has been archaeological resources from numerous valley localities curated at CSUN, including artifacts from Mission San Fernando, Rey de Hispana, and numerous nineteenth-century "adobes." These collections have never been synthesized, so evaluation in classroom laboratory settings offers the opportunity to engage local history and to involve students in the process. The results have expanded perceptions of the value of archaeological resources, the importance of local history, and the critical need for community engagement.

Díaz, Mauricio [71] see Barrios, Edy

Díaz-Andreu, Margarita [360] see Vargas, Amilcar

Dibble, Harold [40] see Leader, George

Dickson, Antony [100] see Donahue, Randolph

Diederichs, Shanna (Crow Canyon Archaeological Center)

[266] *A Frontier in Bloom: Social Implications of Architectural Diversity and Conformity during the Colonization of the San Juan Region of the Northern Southwest*

Behavioral conformity and, its inverse, behavioral diversity are social adaptations wielded by small scale agricultural societies faced with change. By the sixth and seventh centuries AD, the Basketmaker III period, long standing conflicts in the San Juan region of the northern Southwest had abated and new territories opened to agricultural colonization. Frontier colonization is by nature a contentious process that usually results in violence, displacement, and the reinforcement of factions. In contrast, the San Juan Region saw an unprecedented period of peace and integration during colonization. This study demonstrates how Basketmaker III populations mitigated conflict by signaling solidarity and common identity in the Frontier through architectural conformity at community centers while allowing for architectural variation and expression at single family farmsteads. These practices, in turn, may have set the stage for the development of kinship and non-kinship based institutions in the Ancestral Pueblo world.

Diederichs, Shanna [89] see Wurster, Bethany

Diego Luna, Laura (Posgrado en Estudios Mesoamericanos UNAM)

[200] *Reconocimiento arqueológico de la cuenca alta del Río Grande (Sierra Juárez) de Oaxaca: Método y avances de la investigación*

La Sierra Juárez es una región montañosa ubicada al noreste de los Valles Centrales de Oaxaca. Pese a ser adyacente a ésta, hasta el momento, las investigaciones arqueológicas se habían enfocado en pocos sitios. En esta ponencia se expone el diseño de la investigación regional actualmente en curso: las preguntas; el método, el cual puede emplearse en otras zonas montañosas con características topográficas similares, y que integra la interpretación de la geofoma y de ortofotos digitales, al tiempo que se apoya en los GIS para la planeación del reconocimiento y procesamiento de los datos; así como la manera en que se efectuaron dichos reconocimientos y algunos resultados preliminares.

Diego Luna, Laura [217] see Spores, Ronald

Diehl, Robert (University of Colorado Denver)

[152] *Toward an Interpretive Framework for Burnt Ostrich Eggshell: An Experimental Study*

Ostrich eggs have been a valuable resource for Sub-Saharan populations for thousands of years, offering a rich nutritional source as well as a means of transporting water. While burned ostrich eggshell (OES) fragments are common at sites, it is difficult to determine whether they were subsistence refuse or the disposed remnants of canteens. Current tools for analyzing OES burning conditions involve expensive and time consuming isotopic analysis or scanning electron microscopy. This research aims to develop an interpretive framework for differentiating cooked OES from that burned through disposal or natural circumstances based on easily observed and measured criteria. This will be achieved through burning experiments with the intention of distinguishing shells heated while the egg was whole or in fragments as well as surface or subsurface burnings. This poster will present data regarding patterns of coloration, surface morphologies, and physical properties. This research will have implications for site interpretation in terms of seasonality, subsistence strategies, mobility, and paleoenvironmental reconstruction.

Dieter, Karissa [75] see Casanova Vasquez, Erick

Diez Barroso Repizo, Alberto (Instituto Nacional de Antropología e Historia)

[353] *Cultural Practices and Trade Routes in the Sierra Norte of Puebla during the Middle Formative. Archaeology of the Teteles De Avila Region*

The first systematic excavations at the archaeological site of "Teteles de Avila Castillo," in the northeastern regional province of Puebla, Mexico, in 2015, resulted in the identification of elements and cultural practices that allow us to locate this settlement in an early chronological period for this region. Additionally we can understand the relationship between the central highlands of Mesoamerica and the northern Gulf of Mexico, previous to the Teotihuacán upswing.

Diez-Martin, Fernando [305] see Mercader Florin, Julio

Dillehay, Tom

[382] *Where the Land Meets the Sea: Preceramic Complexities on the North Coast of Peru*

Interdisciplinary investigation of the large coastal mounds of Huaca Prieta and Paredones and their associated domestic settlements represent Preceramic human occupation as far back as ~14,000 cal BP. Research at these sites has documented a long Preceramic sequence from the activities of the first maritime/terrestrial foragers from the late Pleistocene to early Holocene to the construction of the mounds and the introduction and development of agriculture and monumentality from the middle to late Holocene. The community of sites in the study area emerges as innovative, complex and ritualized, with long distance contacts in several areas of the Central Andes. As yet this early community has no known antecedents in the wider Andean region. The social and ontological complexity of the sites is discussed and related to later societies.

[134] *Discussant*

Dillehay, Tom [382] see Goodbred, Steven

Dillian, Carolyn (Coastal Carolina University)

[394] *Discussant*

Dillmann, Philippe [323] see Hendrickson, Mitch

Dillon, Katherine (Binghamton University)

[260] *A Depositional Analysis of Pit Features at the Pocumtuck Fort*

Subsurface features are a basic unit of archaeological analysis, yet there is surprising little standardization in their identification, classification and analysis. In the northeastern region of the United States most archaeologists rely on simplistic pit feature typologies. I argue that studying features by

deposit rather than as whole units allows for a clearer understanding of separate cultural depositions as indexes of specific past practices. The pit feature assemblage at Area D (19FR415), a mid-seventeenth-century Pocumtuck site in Deerfield, Massachusetts, demonstrates the potential for depositional analyses of pit features. I identify the range of past human practices manifested in these features through a systematic sorting of deposits based on 24 recorded attributes, which measure and describe deposit morphology, soils, and content.

Dilores, Kurt (Louisiana State University) and Heather McKillop (Louisiana State University)

[281] *Analysis of Marine Sediment to Explain Sea Level Rise in Paynes Creek National Park, Belize*

Archaeological research in Paynes Creek National Park, Belize provides insight into environmental changes over time. Sea level rise has affected coastal Maya settlements during both the Classic and Postclassic Periods. Marine sediment samples from five submerged Classic Period Maya sites were exported under permit to the Archaeology lab at Louisiana State University where the samples were analyzed using loss-on ignition and microscopic sorting. The results from loss-on ignition as well as microscopic sorting of these marine sediment samples will be presented. Loss-on ignition was used to determine the percent organic matter in each of the marine sediment samples. Microscopic sorting showed the composition of the marine sediment. A high percent of organic matter in conjunction with red mangrove (*R. mangle*) roots is indicative of mangrove peat. Mangrove peat is an indicator of actual sea level rise because *R. mangle* has been shown to keep pace with the rise of sea level. The research presented in addition to material cultural remains contributes to our understanding of the Maya as well as the effect of global climate change on coastal Maya communities.

Dimoula, Anastasia [250] see Garcia, Arnau

DiNapoli, Robert J. (University of Oregon)

[180] *Reevaluating the Precolumbian Colonization of the Caribbean Using Chronometric Hygiene and Bayesian Modeling*

The timing and pattern of initial human arrival to the Caribbean islands is discontinuous and anomalous, especially considering their proximity to both mainland areas and adjacent islands. With the exception of Trinidad, which was probably colonized ca. 8000 BP—but was connected to mainland South America during the late Pleistocene/early Holocene (and remains close to Venezuela)—some of the Antilles appear to have been colonized quite early ca. 7000–6000 BP, while others were settled centuries or even millennia after nearby land masses. In addition, some islands have no documented precolumbian settlements, which is curious given the generally small area and intervisibility of most islands. To better examine the pattern of prehistoric settlement in the Caribbean, we have compiled the largest database of radiocarbon dates currently available that consists of almost 2,000 dates. Using a strict chronometric hygiene protocol and a series of Bayesian models, we compare refined colonization estimates for more than 20 islands with several hypotheses that address prehistoric population dispersals in the region. In addition, our results highlight the need for improved radiocarbon dating protocols to help refine chronologies and provide more robust interpretations of island colonization.

[180] *Chair*

DiNapoli, Robert J. [302] see Lipo, Carl

Dine, Harper and Traci Ardren (Department of Anthropology, University of Miami)

[329] *Famine Foods and Food Security in Ancient and Modern Yaxuna*

Food as an object of study can reveal relationships between biological necessity, culture, and oppression. The 1996 World Summit on Food Security declared that “food should not be used as an instrument for political and economic pressure,” yet archaeology shows myriad ways in which food access was manipulated in the past, and the ramifications of those manipulations. In the Maya area, prestige foods have tended to be the focus of analysis. In this paper, we emphasize the importance of the archaeological study of foods of low social status, including those referred to as famine foods. Through a survey of rejoylladas and house gardens in the modern village of Yaxunah, and a review of the literature on Maya agriculture in times of hardship, we present a working list of the most efficient “famine foods” in Maya history, an analysis of the potential stigmas tied to those foods, and a portrait of the changing nature of food security insurance. We tie these observations to modern attitudes toward low status or poverty foods held by Yucatec Maya speakers in Yaxunah. We aim to illuminate the history of Maya food-insecure households and local efforts to integrate new foods during times of social disintegration.

Dine, Harper [329] see Wesp, Julie K.

DiSantis Humphreys, Clarissa [122] see Humphreys, Stephen

Diserens, Kasey (University of Pennsylvania)

[280] *The Cycle of the Living Dead: Ruins, Loss, and Preservation in Tihosuco, Quintana Roo*

Why does the threat of loss strike fear into our hearts as heritage professionals and archaeologists? Why do we not understand the loss of cultural practices as part and parcel of being human, and accept that loss is not the opposite of heritage, but in fact and integral part of it? We need to transform the discourse surrounding loss, embracing it as an integral part of culture rather than avoiding it. This paper will demonstrate how such threats impact the decision making processes surrounding historic structures and ruins in Tihosuco, Quintana Roo. It seeks to challenge the prevailing notion in the heritage preservation field that our work necessitates freezing the past in perpetuity at a given point, or only allows for sanctioned changes. This fear of loss and failure to allow for adaptation can create a cycle of “living dead” within heritage assets: aging architectural and archaeological resources that are not being used to their full potential, or are left to deteriorate with no thought to their present or future value. In order to break this cycle, we need a people-centered heritage preservation-one that adapts our methods to engage with the past and plan for the future.

[280] *Chair*

Disque, Candice (New Mexico State University)

[59] *Can Architecture Reveal Elements of Ethnicity? A Case Study Using Ancestral Puebloan Built Form Aimed at Identifying Intracultural Variation in the Greater Mesa Verde Region during the Pueblo III Period*

Settlement locations and the resultant built form are an essential part in understanding the social and cultural ideals of prehistoric peoples. Vital information pertaining to intracultural diversity is lost when the ideals, beliefs, values, and identities of multiple communities within a culture are homogenized. Landscape analysis of the Sand Canyon Pueblo community, Cajon Mesa communities, and the Ten Acres Community has revealed distinct differences in site location and orientation; masonry style; and public architecture. This study focused on large Pueblo III period community centers in the Four Corners region to assess the presence of intracultural variation; a presence that may further be used to identify possible ethnic

differences between said communities. Ethnicity is not the same as culture, but rather allows for an individual to identify with a collective group. This paper will present the results of the study, showing that architecture serves as a medium of communication; a piece of material culture imbued with the symbolic patterns of a given group that can be used to evaluate intracultural variation among the Ancestral Pueblo people.

Ditchfield, Kane [302] see Manne, Tiina

Divido, Jared (Indiana University of PA)

[191] *Testing the Use and Reliability of 3D Scanning Technology in the construction of a Digital Comparative Faunal Bone Collection*

This poster presents methodologies for testing the use of 3D scanning in its ability to capture quality 3D images of faunal bones for comparative purposes. An investigation of prior studies confirms that 3D scanning has successfully been used in aspects of archaeological research. Yet, the full potential for the use of 3D scanning in zooarchaeology is still unclear. At present, zooarchaeologists often have to resort to loaning physical bone specimens from other institutions when comparative examples are not available in their local collections. The process of needing to borrow physical comparative collections can be timely and costly to the researcher. This research utilizes a MakerBot 3D Digitizer to test its accuracy for creating 3D representations of faunal bones. In particular, this project focuses on scanning various waterfowl and fish species. The long-term goal for testing the use and reliability of 3D scanning is to further aid in the development of digital faunal bone comparative collections. A digital repository of faunal bone comparative collections could drastically increase the availability of zooarchaeological collections to researchers across the globe. Consequently, this will bolster the potential for collaborative research efforts across the archaeological community since digital faunal collections could easily be shared among institutions.

Dixon, Christine C. (Green River College), Rachel Egan (University of Colorado, Boulder) and Nan Gonlin (Bellevue College, WA)

[293] *Natural Springs: A Critical Life Force in Ancient Costa Rica*

Water is a life sustaining substance, sought after, fought over, and revered in both the past and present. The relationship between humans and water resources is an essential component of our human history that warrants archaeological focus. Natural springs have been identified as key locations of archaeological remains throughout the Americas—places inherently intermixed with practices of drinking, bathing, cooking, and worship of the divine. In Costa Rica, the documentation of Silencio Phase (750 CE–1020 CE) footpaths has led to a critical discovery of the significance of springs in this ancient landscape. This paper contextualizes recent discoveries in the Arenal area of Costa Rica by utilizing case studies of the meanings and uses of springs throughout the Intermediate and Mesoamerican regions. Findings suggest that the spring as a focus of investigation is an understudied component of Costa Rican archaeology and a vital component of ancient life.

Dixon, Christine C. [80] see Egan, Rachel

Dixon, Donald [17] see Budhwa, Rick

Dobereiner, Jeffrey (Dartmouth College) and Rebecca B. Gonzalez Lauck (Proyecto Arqueológico La Venta)

[3] *Voted Off the Olmec Island: Remote Sensing and Regional Reconnaissance Surrounding La Venta, Tabasco, Mexico*

This paper reports on the first stage of a regional settlement study initiated in 2016 by the Proyecto Arqueológico La Venta (PALV). Previous work beyond the primary site core of La Venta, Tabasco, Mexico, has primarily focused on a limited subset of regional features. PALV's inaugural season of field reconnaissance, alongside analysis of 5-m resolution lidar and historic aerial photos, demonstrates that Formative and Post-Classic period occupations beyond the main La Venta "island" were likely more extensive than previously documented. This work is improving chronological and spatial resolution on the cultural trajectory of the Gulf Coast, enabling improved comparative analyses of emergent social complexity in Mesoamerica more broadly. Going forward, this multiyear project will draw upon a broader range of techniques, including geological coring and ground-based remote sensing, to produce a comprehensive model of settlement in La Venta's poorly understood hinterland. The expanded catalogue of archaeological sites in this region will also serve to help protect heritage from ongoing oil prospection and pipeline production by PEMEX.

Dobney, Keith [85] see Ameen, Carly

Dobrez, Patricia (AURA/ARARA)

[28] *The Intelligent Tool: The Body's Role in Making and Reading Tracks in Life and Art*

The approach of this paper is ecological, taking account of affordances for communication available to bodies interacting with environments. My focus is on the minimal affordance meanings of marks which, while ultimately lending themselves to symbolic use, have the capacity to disclose our real-world situatedness in unambiguous and immediate ways. I argue that the place to begin an inquiry into graphing is with human and animal traces in the landscape and the manner in which these have been represented in such rock art corpora as the Australian tracks-and-lines Panaramitee.

Dobrez, Livio (Australian National University, retired)

[210] *Rock Art Categorization*

Over the past ten years I have sought to elaborate a new categorization for rock art images and one based on analysis of visual perception bolstered by cognitive psychology experiments and current knowledge of visual system neurophysiology. The result has been a suggestion for three classes of image, viz the Canonical (mostly profile), Narrative (scene), and Performative (frontal). At the same time Patricia Dobrez has added two possible classes represented by hand traces and by tracks. In this paper I will give an account of this categorization, focusing on the idea of a scene. I would also like to ask whether any of the above classes might claim historical priority, whether any might have some sort of originary claim, and whether any might offer specific insights into human cognitive or aesthetic development.

Dockrill, Stephen [224] see Maher, Ruth

Dodd, Lynn (USC), Kevin Mercy (USC), Nolan Leuvano (CSU, Dominguez Hills) and Su Jin Lee (USC)

[300] *Analysis of Spatial Characteristics and Traditional Knowledge of Freshwater Springs as a Foundation for Predictive Settlement Modeling and Identification of Submarine Groundwater Discharge*

Modeling of late Pleistocene and early Holocene coastal regions in the northern Channel Islands and globally has provided important foundations for understanding impacts of sea level rise on the archaeological record, near coastal communities and environments during the past 20,000 years. A complex, effective model of suitable coastal locations for human settlement and habitation takes into account myriad variables, including resources such as water and less-quantifiable, cultural causes. The research reported here details initial research into forms of local and traditional knowledge about freshwater, and reports on geospatial analysis of freshwater on Santa Catalina Island, one of the southern Channel Islands off the coast of southern California. With Stage Three water rationing being instituted, freshwater sources play an ever more important role in sustaining Catalina Island. Spring locations, terrain parameters, geology, and landscape parameters, including elevation, slope, aspect, land cover, and geology were analyzed. These data comprise a foundation for our surveys to define and document submarine groundwater discharge around Catalina Island; support a fuller understanding of the water balance and hydrological systems; and are valuable in modeling human settlement, past, present, and future, on this island.

Dodd, Lynn [189] see Hanson, Eric

Dodd, Walter (California State University, Fresno)

[105] *How Were Hohokam Palettes Used? Testing a Novel Hypothesis*

Palette means "little shovel" in French. The name derives from a commonly held belief that these curious objects were shallow, hollowed-out containers in which paint pigments were prepared. Another suggestion is that they were used as snuff trays, i.e., surfaces for grinding up hallucinogens prior to chewing or inhalation. This paper advances a new hypothesis with testable implications. It is argued that palettes were employed as mirrors, possibly in ritual contexts. Test results from a series of simple experiments are presented that enable tentative acceptance or outright rejection of the hypothesis. Relevant facts from archaeology, ethnography, geology, and physics are interwoven to build and try a case for specular reflection.

Dodge, Robyn (University of Texas at Austin), David M. Hyde (Western State Colorado University) and Estella Weiss-Krejci (Institute for Oriental and European Archaeology, A)

[83] *La Milpa East, Hun Tun, and Medicinal Trail Communities: Ancient Maya Hinterland Settlements East of La Milpa, Belize*

The hinterland east of La Milpa is distinctive of an upland landscape with bajos on its edges, a few formal courtyard groups, monuments, and numerous informal clusters of mounds. Multiple landscape modifications such as terraces, depressions, chultuns, and linear features are present in these eastern hinterland settlements as well. This paper will provide an overview of the excavations into three specific hinterland communities: La Milpa East, Hun Tun, and the Medicinal Trail Community, as well as associated aguadas, or seasonal water holes, and dry depressions to document variable strategies of ancient Maya economy and water management. Archaeological evidence will be discussed as it relates to the function and interpretation of these hinterland settlements and the role they played in contributing to the larger, regional influence of the La Milpa polity.

Dodrill, Taylor, Nicholas P. Jew (University of Oregon), Scott M. Fitzpatrick (University of Oregon), Connor Thorud (University of Oregon) and Martin Nelson-Harrington (University of Oregon)

[46] *New Archaeological Site Recording and Assessment along the Southern Oregon Coast*

As part of a newly established University of Oregon field school along the southern Oregon coast in cooperation with the Coquille Tribe and Oregon State Parks, we conducted a pedestrian survey of Bullard's Beach State Park. During systematic survey across the southern portion of the park, we relocated known prehistoric sites, identified and mapped several new ones, and assessed site condition for each. Because the last major survey had taken place more than 20 years ago, this was an opportunity to examine how these sites may have changed over time as a result of various natural processes and human activities. Our results, garnered from a combination of ground survey, site record comparisons, and satellite imagery dating back to 1994, revealed that many of these coastal sites are actively succumbing to erosion from wind, rain, and tidal action. In addition, we identified cases of looting that have caused damage to subsurface deposits. Future research will focus on investigating a number of sites in the park to determine the time frame of native occupation, maritime and subsistence adaptations through time, the degree to which these sites are under threat, and how adverse effects might be mitigated to ensure their long-term protection.

Dodrill, Taylor [223] see Jew, Nicholas P.

Doelle, William (Archaeology Southwest)

[206] *Discussant*

Doering, Briana (University of Michigan)

[89] *Investigating a Late Holocene Subsistence Transition North of the Alaska Range: Compelling Results from Two Archaeological Sites*

Geospatial analyses on dated sites across central Alaska suggest important subsistence changes occurred in the region between 4,000–2,000 years ago. A significant shift from a general foraging strategy to a targeted collecting strategy appears to have occurred during this time, and recent investigations at two archaeological sites dating to this period have begun to shed light on the timing and extent of this subsistence shift in a specific region of central Alaska.

[314] *Discussant*

Doershuk, John (University of Iowa)

[342] *Exploring Potential Ancient Human-Proboscidea Interaction at Lake Red Rock, Marion County, Iowa*

Discoveries of juxtaposed proboscidean remains from a single individual are rare in the Midwest and there are no known human-occupied pre-Holocene sites in Iowa with good preservation. The Lake Red Rock (Marion County, Iowa) discovery locale has yielded preserved mammoth remains—a clear indicator of late Pleistocene (> 10,000 years ago) context—and the suggestion of possible human interaction. If validated such a site will be a first in the state and among only a few in the nation. The grant-funded project team conducted intensive, multidisciplinary (geomorphology, geology, paleontology, archaeology) field investigations for two weeks in late spring of 2016 to collect key environmental context and archaeological data from an actively eroding shoreline context. Recovery of a single stone artifact from the same location as the proboscidean bones is suggestive human activity co-occurred with the mammoth. Detailed laboratory investigation of recovered remains and associated sediments are underway including efforts to extract and date bone collagen. This poster will present the results of the field and lab efforts.

[256] *Discussant*

Dogandžic, Tamara [87] see Warren, Shannon

Dojack, Lisa [17] see Smith, Sarah

Dolan, Patrick (Amec Foster Wheeler) and Colin Grier (Washington State University)

[387] *Centralized Households and Decentralized Communities: Economic Integration in a Marpole Period Plankhouse Village*
The Marpole Period (2500 to 1000 BP) was a time of social transformation in the Salish Sea region of the Northwest Coast of North America. During this period, social and economic relations became increasingly bound up in the operation of centralized, long-lived, multifamily households. Yet, centralization arguably failed to extend far past plankhouse walls, producing regionally decentralized economic communities. This paper examines the processes underlying this pattern from the vantage point of inter-household interactions in the Marpole Period plankhouse community at the Dionisio Point site (DgRv-003) on Galiano Island in southwestern British Columbia. A recent examination of tool kit assemblages from contemporary households at the site illustrated how several pursued common suites of subsistence strategies. Here, we extend this analysis to the rest of the village and contrast these data with faunal evidence for household consumption practices. The results are consistent with patterns of household economic autonomy and by implication the operation of geographically decentralized communities. These patterns are in contrast to processes elsewhere on the coast where rising economic centralization within households appears to have been linked to greater integration between households.

Dolan, Sean (Los Alamos National Laboratory)

[368] *When Is a Fieldhouse? Reconsidering Fieldhouses on the Pajarito Plateau Using GIS Modeling and Excavation Data*
Archaeologists often assume that Ancestral Pueblo groups in the North American Southwest built small one- to three-room structures to serve as temporary fieldhouse shelters for extracting agricultural resources during the farming season, and to minimize transportation to and from their larger villages. If fieldhouses were associated with agriculture, then they should be found near agriculturally productive fields. To determine if there is an association between agriculture and fieldhouses during the Coalition and Classic periods (AD 1200–1600) on the Pajarito Plateau in north-central New Mexico, I present results from a GIS modeling study that incorporates the Revised Universal Soil Loss Equation and excavation data from fieldhouse sites located at Los Alamos National Laboratory (LANL). Further evaluation of what these small sites represent will be necessary if this study identifies that some fieldhouses were not built to assist with agriculture. Fieldhouses are the most ubiquitous site type on the Pajarito Plateau, and the results from this study impacts future interpretation and management of these cultural resources at LANL.

Dolan, Sean [366] see Madsen, Alan

Dolfini, Andrea (Newcastle University, UK)

[178] *Science and Archaeology: An Object-Centered Perspective*
According to Kristian Kristiansen, archaeology is now undergoing a major paradigm-shifting phase akin to the ones that defined the discipline in the mid-1800s and mid-1900s. He dubbed it “the third science revolution,” for fast-developing scientific methods, chiefly A-DNA and stable isotope analyses, sit at the core of the current changes. Arguably, similar if less visible changes are occurring in material culture studies. These are fostered by the marrying of new theoretical approaches (e.g., materiality and symmetrical archaeology) with new, or newly expanded, analytical methods (e.g., metalwork wear analysis). The paper discusses the implications of recent material culture research for the future of our discipline, focusing in particular on the wear analysis of European Bronze Age metalwork. It is argued that this research method has opened up a new window into the middle life-cycle of prehistoric bronzes, which were previously mainly studied for their production technology or deposition practices. Case studies will be discussed based on the Newcastle-led “Bronze Age Combat” project. These will show that the integration of meaningful, theoretically informed field experiments and the microscopic analysis of ancient and replica weapons are needed to reconstruct prehistoric combat as a socially contingent, embodied practice.

Doman, Jessamy [146] see Coutros, Peter

Dombrosky, Jonathan (Department of Anthropology, University of New Mexico), Emily Lena Jones (Department of Anthropology, University of New Mexico) and Seth Newsome (Department of Biology, University of New Mexico)

[340] *Raptor Management and Whistle/Flute Production in Pueblo IV New Mexico*
The Pueblo IV period (ca. AD 1300–1600) in New Mexico was a time of great societal change, and the religious significance of birds is thought to have flourished during this time period. In particular, whistles and flutes, commonly made from the ulnae of birds of prey, become ubiquitous in the Pueblo IV Middle and Northern Rio Grande. The importance of birds to Puebloan society has been well-documented ethnographically: raptors (primarily eagles) held captive by modern Puebloan groups are sometimes sacrificed, a religiously significant act. However, little has been done to connect Pueblo IV archaeological whistles/flutes with the ethnographically documented practices of capture and sacrifice. Were raptors whose bones were made into whistles and flutes managed in captivity? How exactly does the functional role of captive raptors extend beyond their sacrifice? In this paper we explore these questions through measurement of $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values of whistles and flutes recovered from Pottery Mound (LA 416) and Sapawe'uinge (LA 306), two sites in the Middle and Northern Rio Grande from the Pueblo IV Period.
Dombrosky, Jonathan [251] see Steele, Laura

Domeischel, Jenna (Eastern New Mexico University)

[315] *Moderator*

Domenici, Davide (University of Bologna, Italy)

[392] *Colorful Material Connections: Noninvasive Analyses of Mesoamerican Pictorial Manuscripts and Their Cultural-Historical Implications*
Noninvasive scientific analyses recently performed by the “MOLAB” mobile laboratory on a number of prehispanic and early colonial pictorial manuscripts provided a host of new data that deepen our knowledge of Mesoamerican coloring materials and painting practices. The huge corpus of available analytical data—obtained from codices Madrid, Cospi, Borgia, Vatican B, Laud, Fejérváry-Mayer, Nuttall, Bodley, Selden, Selden Roll, Tudela, Vatican A, and Mendoza—allows the first cultural-historical interpretive effort aimed at identifying different technological traditions and at evaluating how they match with established stylistic and thematic classifications, as well as their relations with other coloring traditions such as mural painting or textile dyeing. The comparison of manuscripts from different regions and epochs also provides interesting hints on topics such as cross-cultural interactions among prehispanic Mesoamerican painters/scribes, the emic perception of the materiality of color, and the technological changes introduced in early colonial times.

Domenici, Davide [283] see Vales, Immacolata

Domett, Kate [276] see Newton, Jennifer

Domingo, Ines [28] see Smith, Claire

Domínguez, María del (Universidad Autónoma de Campeche), Yolanda Espinosa Morales (Universidad Autónoma de Campeche), Javier Reyes Trujeque (Universidad Autónoma de Campeche), Francisca Zalaquett Rock (Universidad Nacional Autónoma de México) and William Joseph Folan (Universidad Autónoma de Campeche)

[349] *Los instrumentos musicales de la Estructura II y III de Calakmul, Campeche: Caracterización fisicoquímica e interpretación cultural*
Estudios recientes derivados de la caracterización de instrumentos musicales de Calakmul, Campeche, México, procedentes de las Estructuras II y III, han revelado importante información respecto a la relación que mantuvo Calakmul con ciertas tradiciones, más que alfareras desde el punto de vista estilístico con otras entidades políticas mayas. Es visible la presencia, en algunos instrumentos musicales, de rasgos y atributos procedentes de otras regiones mayas que nos hacen pensar en el indudable vínculo que Calakmul mantuvo con diversos sitios a través de relaciones políticas y diplomáticas, principalmente para el Clásico Tardío y Terminal. Un mapeo de estas tradiciones de los instrumentos musicales solo es posible a través de la caracterización fisicoquímica de los mismos, mediante diferentes técnicas analíticas como la difracción de rayos X, fluorescencia de rayos X y FITR.

Dominguez, Nancy (Dirección de Registro Público de Monumentos y Zonas Arqueológicas e Históricas)

[328] *The Importance of Updating Information: The "Proyecto de Actualización y Digitalización de las Cédulas del Registro Público"*

In 2010 the "Sistema Único de Registro de Monumentos y Zonas Arqueológicas e Históricas" was developed to face the need of having a modern and strong technological support capable to cover the legal, academic and institutional aspects that the Public Registry required as a fundamental area of the Institution. It has the duty to guarantee information for query and monitoring activities about federal and particular monuments involved in the system. Due to the vast universe of information which have been gathered by INAH from its foundation in 1939, to our days, and after the Federal Supreme Audit, the government seeks to incorporate the accumulated data of movable goods to "Sistema Único de Registro Público de Monumentos y Zonas Arqueológicas e Históricas" before its creation with the purpose of standardizing all records, updating the information, safekeeping and location, as well the verification of the collections. In this paper, I'll present the guidelines, procedures and preliminary results of "Proyecto de Actualización y Digitalización de las Cédulas del Registro Público," stressing the importance of this contribution in our workplace.

[328] *Chair*

Dominguez C., Maria del Rosario [217] see Folan, William J.

Dominguez-Bella, Salvador [23] see Querré, Guirec

Dominguez-Rodrigo, Manuel [305] see Mercader Florin, Julio

Donahue, Randolph (University of Bradford), Adrian Evans (University of Bradford), Antony Dickson (Oxford Archaeology North), Anne Clarke (Oxford Archaeology North) and Fraser Brown (Oxford Archaeology North)

[100] *Integrating Lithic Microwear and Sourcing to Improve Understanding of Socioeconomic Behavior in the British Mesolithic*

We present the results of an integrated study of lithic microwear analysis and lithic sourcing at the large Mesolithic site of Stainton West. Microwear analysis helped to understand why the site was so large and how the occupants supported themselves while at the site. Microwear analysis of 700 artifacts led to 49% identification of use. There is much diversity in tool use: hide working, butchery (meat/fish), impact, antler/bone working, wood working, and plant working. Various patterns were detected between tool use and tool technology. Many of the numerous microliths, showed impact damage, but are attributed to fishing rather than hunting. This conforms to the riverside location of the site on the River Eden. Hide working was primarily limited to dry hide, which supports the hypothesis that hunting was not the primary procurement activity and is also suggestive of a residential site, which is further supported by the diverse set of tools and wide range of activities represented. The sourcing study shows that raw material was procured from long distances in all directions. We conclude that the site was likely an aggregation site where many bands came together to exploit an abundant but temporary fish resource.

[100] *Chair*

Dong, Guanghui [78] see Zhang, Dongju

Dong, XinLin (Institute of Archaeology, CASS, China.) and Wang Ying (Institute of Archaeology, CASS, China.)

[25] *New Research and Understandings at the Royal City of the Liao Supreme Capital Site*

The Liao Supreme Capital site is located in Lindong, Balinzuqi, Inner Mongolia. It contains the Royal City in its north and the "Han" City in its south, with a total area of five squared km. To preserve and better understand the Supreme Capital's layout and evolution, Team Two of the Chinese Academy of Social Sciences Institute of Archaeological Research joined with the Inner Mongolia Institute of Archaeological Research to form the Liao Supreme Capital Archaeological Team, which conducted full coverage surveying, augering, and systematic excavations at the site from 2011–2015. The Team surveyed and augered a three square km area of the Royal City. Excavations were conducted on the Royal City's wall and its east and west gates, on the Buddhist temple site on the Royal City's western edge, on roads and their adjacent architecture in the southern part of the Royal City, on the Palace City's wall and east and west gates, and on the Palace City Hall Number 1. These investigations at the Supreme Capital resulted in foundational information on Liao Dynasty capital city archaeology, raised the level of research on the Supreme Capital's layout and evolution, and greatly promoted archaeological and historical research on Liao Dynasty capital cities.

Dongoske, Kurt E. (Zuni Cultural Resource Enterprise)

[255] *Discussant*

Dongoske, Kurt E. [394] see Anschuetz, Kurt F.

Donner, Kristin [132] see Cercone, Ashley

Donner, Natalia (Leiden University), Alejandro Arteaga Saucedo (Universidad Nacional Autónoma de México), Kaz van Dijk (Leiden University) and Alexander Geurds (Leiden University, University of Oxford)

[179] *What Do We Talk About When We Talk About Precolonial Sites in Chontales, Central Nicaragua?*

The Proyecto Arqueológico Centro de Nicaragua (PACEN), directed by Alexander Geurds, has recently conducted archaeological research in Chontales, Central Nicaragua. The main focuses of the study include the identification of the different types of settlements, understanding site and mound morphologies, as well as redefining the regional pottery sequence. Therefore, the authors of this paper carried out a systematic full-coverage high intensity survey of a 52 km² area, a complete mapping of the 46 mounded sites found, as well as stratigraphic excavations to diachronically and synchronically interrelate the different settlements. In this paper, we discuss the various distinctive traits that conform precolonial sites in Central Nicaragua, looking at archaeological remains, environment, and geomorphology as inherently interconnected analytical elements. Settlements are discussed as an intertwined combination of specific soil types, hydrology and landscape features, as well as particular architectural features and material culture. The analysis of the different sets of combinations of all these characteristics, which conform the quintessential ontology of the sites, will shed light on how we can define prehispanic settlements in the research area.

Dooley, William [345] see Todd, Lawrence

Doolittle, William (University of Texas)

[84] *Dirt, Rocks, and Water: Irrigation Here, There, Then, and Now*

Regional specialists spend most of their time studying many topics in one area. Indeed, it would be next to impossible to be an authority on a region and its complexities if one did otherwise. Topical specialists, travel widely and study numerous variations on a single theme. Each of these specializations has its pros and cons. Neither is superior to the other. They are complementary. This presentation focuses on ancient irrigation in the American Southwest and present-day parallels from other parts of the world. Similarities are striking, as are differences.

Doonan, R.C.P. [4] see Thompson, Lenore

Dorison, Antoine [340] see Manin, Aurelie

Doroszenko, Dena (Ontario Heritage Trust)

[348] *Pills and Potions at the Niagara Apothecary*

In 1964, pharmacist E. W. Field, closed his practice in Niagara-on-the-Lake due to ill health. This pharmacy had been in operation for a total of 156 years by 6 pharmacists, 5 of whom had been apprenticed to their predecessors. Reopened in 1971 as an authentic restoration of an 1866 pharmacy, the building is owned by the Ontario Heritage Trust and curated by the Ontario College of Pharmacists. Several archaeological investigations have taken place in the rear yard of the apothecary, most recently in 2016 with further work planned in 2017. The excavation of a large pit feature recovered hundreds of pharmaceutical bottles dating from the late 1800s to the early 1900s. This assemblage allows for discussion on the role of the pharmacist in a small community as well as allowing observations to be made regarding the community's behavior and social needs with this service over time particularly in response to disease. The local apothecary was part of an old tradition, that of being a medical advisor and this site has a wealth of historical records and archaeological data to review developments in the context of broader topics of health, disease and medicine in small town Ontario.

Dorshow, Wetherbee (University of New Mexico)

[130] *Toward a Dynamic Geospatial Model of Shifting Hydrologic Regimes and Agricultural Potential at Chaco Canyon: Report from the Field*

This paper summarizes objectives, strategies and preliminary findings of ongoing research at Chaco Canyon led by the University of New Mexico and the Puente Institute, and funded by the National Science Foundation. The paper focuses on the use of advanced geospatial technologies for field data collection, analysis, and visualization. Project datasets to be discussed include airborne and terrestrial lidar, stereo panoramic photogrammetry, kite/balloon mapping, GIS-based full-motion video, ground-penetrating radar, hyperspectral and multispectral imaging. The paper also will touch on advanced data access and visualization through a range of 2D, 3D and augmented reality apps and tools.

Dorwin, John T

[250] *Remote Sensing at 45PO435, the South Flying Goose Site*

In the summer of 2014, during the course of National Register evaluation of 45PO435, a site on the Kalispel Indian Reservation along the Pend Oreille River in the mountains of eastern Washington, an isolated small burned structure was located by means of magnetometry and ground-penetrating radar. Its existence was confirmed by means of soil augering. Its dimensions were delineated by a combination of augering, excavation and electrical resistance. This paper discusses the contributions made by each of these techniques to create a stronger picture of the whole. Functionality, ethnobotany and geoarchaeology of the structure were explored by Molly Carney.

[250] *Chair*

Dosseto, Tony [333] see Marwick, Ben

Dotzel, Krista [262] see Singer, Zachary

Doucette, Dianna (Public Archaeology Laboratory [PAL])

[16] *Style versus Occupation II: A Broader View of the Narrow Stemmed Tradition in Southern New England*

Artifact types are often used as markers of social boundedness or "ethnicity" although the relationship between typology and culture remains a very complex and poorly understood issue. Projectile points from the Narrow-stemmed Tradition (also called the Small Stemmed Tradition) are ubiquitous in southern New England and can rarely be attributed to a single component Native American archaeological site. Attempts have been made to seriate this style of point with varying success, given its style is one that would have been expediently made from local quartz cobbles and convenient enough to transcend across millennia. Typically assigned to the Late Archaic period (ca. 6000 to 3000 BP), the style is often recovered along with components of the Early Woodland period (ca. 3000 to 2000 BP). This paper expands upon a poster presented in 2011 on the analysis of Narrow Stemmed points from one site in eastern Connecticut. Recent excavations at the several other sites in eastern Connecticut and southeastern Massachusetts by PAL yielded large assemblages of Narrow-stemmed points, some in association with radiocarbon dated features, permitting an opportunity to compare and reassess the artifact typologies, cultural chronologies, and models of social organization southeastern New England.

Dougan, Sarah [46] see Muir, Robert

Douglas, Joseph (Volunteer State Community College)

[68] *Marking the (Under) Ground: Civil War Soldier Graffiti in the Mammoth Cave Region of Kentucky*

During the American Civil War, numerous Union and Confederate soldiers visited dozens of caves in the major karst areas of the border and Confederate states, often marking the subterranean walls with graffiti. In the most important karst area of all, the Mammoth Cave region of Kentucky, caves were significant (and famous) features of the landscape, possession of which was bitterly contested, especially in the military campaigns of 1862. A preliminary study of extant historic graffiti at several Kentucky cave sites including Diamond Cave, Mammoth Cave, and others shows that men in the Union and Confederate armies did not just visit caves throughout the region, but they also claimed the underground spaces with their graffiti as part of the struggle for physical and political control of Kentucky. Rival soldiers also had much in common; their cultural conceptions of caves were mostly the same, and many of them had been transformed as they left behind their civilian lives and embraced new identities as soldiers.

Douglas, Allison [394] see Dudley, Meghan

Douglass, Kristina (Smithsonian National Museum of Natural History)

[32] *The Anthropocene of Madagascar: Reviewing Chronological Evidence for Madagascar's Colonization*

The date of Madagascar's initial settlement has long been the subject of academic inquiry and debate. Archaeologists, historians, geneticists, linguists and paleoecologists interested in the history of Malagasy and Indian Ocean peoples, regional exchange, and environmental change have contributed diverse datasets and perspectives to this debate over Madagascar's colonization, but consensus on the timing of human arrival remains elusive. Despite its relative proximity to the African mainland, Madagascar was thought to have been settled around 1500 BP by iron-using agriculturalists from SE Asia. Recent archaeological findings, however, suggest that foraging groups reached the island by as early as ca. 4000 BP, if not earlier. Such early dates for Madagascar force us to reconsider models of the island's colonization, particularly in terms of the nature and rate of anthropogenic impact on its biotic communities. In this paper we review chronological evidence for the settlement of Madagascar, applying standards of chronometric hygiene that have been used to refine the settlement histories of islands in the Caribbean and Pacific. This review allows us to more productively compare the colonization of Madagascar to other island colonization scenarios around the world.

[32] *Chair*

Douglass, Matthew [38] see Braun, David R.

Doumani, Paula [290] see Hermes, Taylor

Dowd, Anne S. (ArchæoLOGIC USA, LLC)

[216] *Traditional Native American Raw Material Sources in the Yellowstone Region*

Obsidian and other lithic sources in the Yellowstone region of Wyoming and nearby Montana or Idaho were used up until contact with Euroamericans and information from oral traditions, ethnohistory, ethnoarchaeology, and toponymy provide data on the significance of certain raw material choices made by Native Americans such as the local Shoshone. Why did chipped stone weapons and tools persist even after new metal technologies were introduced? How did the choices of raw materials signal Native resistance to colonizing and settlement challenges posed by newcomers to the region? In what ways did the lithic raw material sources contribute to the formation of a set of quarry landscapes with symbolic associations meaningful within a broader cosmological worldview or social milieu? Were extraction locales perceived to have their own sacred power, potentially becoming traditional cultural properties? These themes are addressed from the standpoint of an anthropology of technology and a landscape archaeology approach.

Dowkes, Shalcey (University of Calgary) and Margaret Patton (University of Calgary)

[344] *Microwear on Shell Beads at Cluny Fortified Village (EePf-1)*

Beads in many forms have been used as decorative items on the Great Plains during the historic and prehistoric periods. Cluny Fortified Village (EePf-1), dating just prior to European contact, is an intrusive village unique on the Northwestern Plains. The unique artifact assemblage at the site offers information on the understudied topic of prehistoric shell bead production on the Northern Plains using local bivalves. During the past ten years, a number of shell beads, shell bead blanks, and waste materials have been recovered during excavation. Research elsewhere on bead production has suggested the use of drills to form the hole of the bead. However, at EePf-1 there are relatively few lithic drills despite the amount of shell beads uncovered. As shell is a relatively soft material, several materials are considered for use as drills including bone, wood, and lithic tools. Analysis of shell beads from the site indicates a variety of bead types and provides evidence connecting potential drill materials to bead production. Microwear analysis of finished and partially finished beads provides details on drilling methods and evidence of drill material. Microwear on suspected drills from the site also indicates whether or not these tools were used in bead production.

Downes, Jane (University of the Highlands and Islands) and Ingrid Mainland (University of the Highlands and Islands)

[124] *Coastal Erosion as an Arena for Change*

The problem facing archaeological heritage through loss and damage caused by rising sea levels and increased storminess requires responses that are multifaceted and creative. Sufficient resources to deal with exposed archaeological sites and deposits through established 'preservation by record' methodologies are not available anywhere. In the Scottish archipelago of Orkney the combination of sand and low lying shores and extremely rich archaeological heritage make the problems of coastal erosion particularly acute. Multi-period sites are cut through by erosion, revealing sections through

buildings and middens representing “deep time,” as frequently 5,000 years of occupation are visible. This paper describes a multidisciplinary and participatory approach to developing an understanding of the coastal erosion of archaeological heritage within wider contexts of debate around climate change and sustainability. The potential of creative and educative “uses” of the eroding coastal archaeological resource, are seen as complementary to the sites’ value as “distributed observing networks of the past.” The application of this approach is discussed using case studies from Orkney, and from Rapa Nui.

Downey, Jordan, Oliver Hegge, Kari Lentz and Steven A. Wernke (Vanderbilt University)

[75] *Photogrammetry All the Way Down: Multi-Scalar and Multiplatform Photogrammetry as Primary Spatial Registry in a Large Excavation Project*

In 2016, a large excavation project was carried out at the site of Mawchu Llacta in the Colca Valley of southern Peru. A colonial reducción (planned town), Mawchu Llacta is a large site with plazas, chapels, a parish, and domestic compounds. These spaces all consist of complex standing architecture in varying degrees of preservation. Eleven excavation blocks were opened to better understand ritual and everyday life in the town. The extent and distribution of the excavations, however, presented the significant challenge of how to document large-scale, multi-team excavations dispersed around the site. We present a photogrammetry-centered solution, focusing on an integrated workflow for multi-scalar and multi-platform photogrammetry, from UAS-based documentation of the whole site, to detailed recording of excavations. All excavation blocks were serially documented using photogrammetry to create high-precision 3D models of the entire process, starting from the surface and continuing all the way down through the end of excavations. These models were integrated with an RTK GNSS mapping system for plotting ground control points, individual contexts, and individual artifacts. In this paper we demonstrate our workflow with specific examples at each scale and distinct contexts. Finally, we offer suggestions for other archaeologists interested in implementing these methods.

Downey, Caitlin (Washington State University), Sydney Hanson (Washington State University), Molly Carney (Washington State University) and Jade d’Alpoim Guedes (Washington State University)

[260] *Paleoethnobotany in Undergraduate Research*

I have spent the last year gaining laboratory experience in the Paleoethnobotany laboratory at Washington State University. My purpose in the lab was to aid two graduate students with their master’s thesis research. Thus far, I have learned the basics of paleoethnobotanical analysis through examining material from both the Old World (Thailand) and the New World (the Pacific Northwest). These basics include how to identify different types of seed and wood charcoal, how to properly organize and label samples, and how to properly enter data for later quantification. Here, I propose how I will apply these skills to my future research. Additionally, I will discuss the importance of undergraduate research and laboratory experience in archaeology.

Downey, Nathan (University of Chicago), Alan Farahani (Cotsen Institute of Archaeology, UCLA) and Stephen Acabado (Department of Anthropology, UCLA)

[229] *An Examination of Anthropogenic Burning in Old Kiyangan Village, Ifugao*

The rapid expansion of the Old Kiyangan Village (OKV) in Ifugao, Philippines was accompanied by population increase and a shift in crop production—from taro to wet-rice. Archaeological excavations at OKV have also uncovered larger-than-expected quantities of wood charcoal that likely represent burning episodes associated with this shift. Preliminary analysis of the distribution of wood charcoal indicates that specific locations within the OKV were for anthropogenic burning practices. Moreover, initial taxonomic identification of the charcoal includes one member of the Cordillera Pine species (*Pinus kesiya* Royle ex Gordon), possibly used as kindling. Currently, the forests surrounding the OKV do not sustain large populations of *P. kesiya*. Through the careful integration of ethnohistoric evidence of tree cutting and burning practices in Ifugao alongside the examination of charcoal recovered from OKV, this paper investigates the historical anthropogenic burning practices of the Ifugao and provides preliminary results from the paleoethnobotanical investigation of the OKV. Finally, the paper also illustrates how seemingly “inaccessible” or “remote” kinds of archaeological data such as wood charcoal can be used to illustrate cultural practices that have meaning both in the past and present.

Downey, Sean and Randy Haas (University of Wyoming)

[227] *Early Warning Signals of Demographic Collapse Detected in a Meta-Database of European Neolithic Radiocarbon Dates*

This study uses statistical tests known as “early warning signals” (EWS) to determine whether declining socio-ecological resilience presaged a pattern of collapse during the Early Neolithic Period in Europe. Our earlier research has shown with a high degree of certainty that radiocarbon-inferred human demography during the Neolithic exhibits a boom-and-bust pattern. In this new study we analyze our meta-database of radiocarbon dates in order to determine whether societies on the verge of major reorganization—regime shift—may exhibit declining resilience, and if it can be detected using statistical methods. In seven of nine regional datasets we find increasing autocorrelation and variance leading up to collapse, suggesting that these societies began to recover from perturbation more slowly as resilience declined. We use simulation to validate our methods and show that sampling biases, atmospheric effects, radiocarbon calibration error, and taphonomic processes are unlikely to explain the observed EWS patterns. While EWS have been detected in biology and ecology, to our knowledge, this study is the first to find early warning signals of demographic regime shift among human populations.

Downs, Lauren (AECOM), Sandra Pentney (Atkins), Marla Mealey (California State Parks), Nicole Turner (California State Parks) and Natalie Brodie (LSA Associates)

[300] *Climate Change Risk Assessment of Coastal Archaeological Resources in San Diego County*

Climate change poses threats to both inland and coastal archaeological resources alike. Sites along the coast of San Diego County are under various threats such as inundation and erosion due to sea level rise. For over two years, the Society for California Archaeology (SCA) and the San Diego County Archaeological Society (SDCAS) have been directing the Climate Change Project to assess the effects of climate change on San Diego County resources. This study utilizes GIS analysis to examine coastal sites recorded by the Climate Change Project and compares those data with elevation and erosion models to create a risk map of the San Diego coastline. This map can then be used by agencies such as California State Parks when deciding where to concentrate preservation efforts.

Downum, Christopher [155] see Pawlowicz, Leszek

Doyel, David (Arizona State Museum)

[84] *Vision and Action: Suzanne Fish and Paul Fish and the Hohokam World*

Throughout their careers, Paul Fish and Suzanne Fish cast a wide net in their studies of the American Southwest, and the Hohokam region of southern Arizona in particular. This powerhouse duo vigorously applied their intellectual breadth and energy throughout their long productive careers to ferret out the complexities of the ancient past. Their team approach and complementary skill sets include regional archaeology; method and theory; settlement

structure and social organization; field survey and excavation; ethnography; analysis; synthesis; and more, coupled with an enviable publication record. Then there are their lifetimes of teaching, directing field schools, and their many students. They had great vision and problem solving skills, and they knew how to translate their vision into action. Their work has left a permanent mark on how we study the Hohokam. And, of course, they aren't done yet. This paper provides an overview of their productive careers with a focus on the Hohokam region of the Southwest.

Doyle, Colin [83] see Beach, Timothy

Drake, Lee (University of New Mexico)

[130] *Chemostratigraphic Analysis of Alluvial Sediments in Chaco Canyon, New Mexico*

Complex societies are generally dependent on agrarian economies whose success is contingent on water and nutrient availability. For Chaco Canyon, an Ancestral Pueblo cultural center in northwestern New Mexico with monumental construction dating from the ninth to twelfth centuries AD, the role of local agriculture has been of particular interest. Here, data are presented from three summers of fieldwork using X-ray fluorescence to identify the geochemical composition of sediments, with a focus on those elements relevant to agriculture (Potassium, Phosphorous, and Sulfur), indicators that can indicate evaporation as a proxy for hydrology (Calcium/Strontium ratio), and indicators of changing sedimentation sources (Titanium, Rubidium). Data was collected nondestructively along multiple exposed sections of the arroyo in 2–5 cm increments, allowing for a time series analysis to show changing patterns in all of the aforementioned elements during sediment deposition in the canyon.

Drake, Stacy [83] see Locker, Angelina

Drapela, Tomas [131] see Lieskovsky, Tibor

Dresser-Kluchman, Elizabeth (Barnard College)

[192] *Scarred Ponderosas, Rock Art, and Other Traces of Ute History: New Evidence from the Rio Grande Del Norte National Monument*

This poster reports on an archaeological survey in the Rio Grande Del Norte National Monument that has revealed important new evidence of the Ute and other hunter-gatherers dating to the late precolonial and early colonial periods. Of particular interest are a series of culturally modified Ponderosa pine trees, which are likely linked to Ute foodways employed during period of starvation or want. I examine these culturally modified trees as artifacts on the landscape within the context of the wider archaeological evidence in the survey. This evidence includes an especially notable concentration of rock art that contributes to the understanding of Ute iconography in the region, as well as other traces of hunter-gatherer life.

Drine, Ali [240] see Braekmans, Dennis

Driver, Jonathan (Simon Fraser University)

[85] *Discussant*

Druc, Isabelle (University of Wisconsin-Madison), Roberto Pimentel Nita (University of Warsaw, Poland), Maciej Kalaska (University of Warsaw, Poland), Rafal Siuda (University of Warsaw, Poland) and Marcin Syczewski (University of Warsaw, Poland)

[316] *Ceramic Production for Castillo de Huarmey, Peru: Multiple Productions and Buzzing Potters*

The paste analysis of the ceramics found in the Castillo de Huarmey, a Middle Horizon Wari political center on the north coast of Peru brought forth the existence of a variety of production areas and a panorama of multiple producers with different agendas or practices. Much of the ceramics appear to have been made with material available in the Huarmey lower valley, coastal area, and probably the adjacent Culebras Valley. The fine painted Wari ceramics and fine reduced impressed wares present a degree of manufacture denoting care in material selection, granulometry control and firing, with homogeneity in paste composition and technology. Mold impressed wares were more rapidly made, with variability in material provenance, composition and sorting. Communities of potters sharing the same technological tradition (and types of molds) must have been working close to the coast and in the lower to mid-valley. Upper valley producers probably contributed much less if at all to the distribution network feeding the Huarmey community.

Drucker, Dorothée [143] see Haller Von Hallerstein, Sophia

Dubois, Justin [264] see Kay, Marvin

Dubyagina, Ekaterina [290] see Hermes, Taylor

Dudar, Chris (Smithsonian Institution)

[63] *Discussant*

Dudgeon, John [123] see Franklin, Olivia

Dudgeon, John (Idaho State University—CAMAS)

[123] *Molecular Taphonomy of Biominerals in the Western Pacific*

Molecular and microarchaeological artifacts of human subsistence are recorded in the bones, tissues and residues of the skeleton. These artifacts provide substantial correlative evidence for macroscopic and sedimentary data of dietary plant and animal use in the archaeological record. Within the depositional context however, many factors in the local environment disturb or degrade these signatures, reducing or eliminating their usefulness in diet reconstruction. The islands of the tropical Western Pacific produce local environmental conditions that can be particularly disruptive to biogenic signatures, and methods to assess diagenetic alteration are prudent, given the destructive and costly nature of these analyses. Here, we present data collected using ATR-FTIR on Western Pacific specimens submitted for dietary and molecular analysis, and compare our indices of preservation with

local environments, chronologies, and dietary and molecular data survival. This is used to create a fine-scale inferential model for assessing the likelihood of extracting dietary data in these environments.

[123] *Chair*

Dudin, Alexander [223] see Pryor, Alexander

Dudley, Meghan (University of Oklahoma)

[394] *"Come Together, Right Now": The Oklahoma Public Archaeology Network and Its Role in Oklahoma Public Archaeology*

Like many other states, Oklahoma has a long history of productive public archaeology, with citizen and professional stakeholders working side-by-side to further archaeological research and preservation. However, the changing nature of archaeology (most particularly the shift to a heavy emphasis on compliance work) has led to miscommunication and misunderstanding among the many stakeholders in Oklahoma's archaeological community and to less-productive working relationship among them than existed several decades ago. Yet opportunities for citizen-archaeologist collaboration still abound, and with this in mind we founded the Oklahoma Public Archaeology Network (OKPAN). OKPAN facilitates dialogue among stakeholders and creates new opportunities for Oklahoma citizens, including members of the state's many indigenous nations and avocational archaeologists to engage together in the study and stewardship of the past. In its first year, OKPAN sponsored several major statewide initiatives, the goals and results of which we discuss in our presentation.

[291] *Discussant*

Duelks, Jonathan (University of British Columbia), Jacob Jones (University of British Columbia), Steve Mozarowski (University of Toronto), John Maxwell (Ethos Archaeology) and Bryn Letham (University of British Columbia)

[49] *A Post-Glacial Relative Sea Level Curve and Paleoshoreline Archaeological Survey for the Prince Rupert Harbour, BC, Canada*

We present a relative sea level (RSL) curve for the Prince Rupert Harbour area for the last 15,000 years that is based on nearly 150 radiocarbon-dated data points. RSL dropped from at least 50 masl to several m below current sea level immediately after deglaciation, before rising again to 4–6 m asl during the early Holocene. By 6,000 years ago RSL had approached its current position, though there have been some late Holocene fluctuations. We used this RSL history in conjunction with lidar-derived bare earth models to design and conduct an archaeological survey that targeted ideal landforms on paleoshorelines associated with the early Holocene high stand. We report on several archaeological sites that we found during this survey that date between 6500 and 9500 cal. BP, the oldest archaeological material currently recorded in the Prince Rupert Harbour. In addition, we highlight some other aspects of paleoenvironmental reconstruction for the region based on analyses of diatoms, charcoal, and other sediment characteristics in lake cores. Our research demonstrates the utility of a detailed understanding of RSL history and high resolution lidar digital elevation models for designing predictive models for surveying for early Holocene archaeological sites on coastal landscapes.

Duelks, Jonathan [257] see Anderson, Shelby

Dueppen, Stephen (University of Oregon) and Daphne Gallagher (University of Oregon)

[161] *Remodel, Rebuild, or Abandon? Changing Uses of Space in an Early West African Village*

Ancient villages in western Burkina Faso were long-lived communities, temporally rooted in deep social histories experienced in the built environment and local geography. The site of Kirikongo, continuously inhabited from ca. 100 CE to 1700 CE, and composed of 13 separate tells (mounds), exemplifies these spatio-temporal dynamics, as over time the economic and social characters of tells, and their spatial positioning and characteristics changed dramatically despite maintenance of certain spatial and temporal referents. In this paper, we discuss how historical dialogues with space, place and materials shaped different phases in the site's occupation. These relations and referents are at the core of changing identities from individuals to house and community. We explore how events and processes were significantly shaped by prior spatial and material choices as certain spaces maintained significant continuity for social roles, while others reflect the rejection of certain histories, through either abandonment and decay or through an active construction atop and physical alteration of the former space.

Duff, Andrew (Washington State University), Judith Habicht-Mauche (University of California, Santa Cruz) and Rob Franks (University of California, Santa Cruz)

[155] *Glaze-Paint Pigmenting Strategies in the Upper Little Colorado and Western Zuni Regions of the American Southwest*

LA-ICP-MS is used to examine glaze-paint pigmenting strategies during the Pueblo IV period in the Upper Little Colorado and Western Zuni Regions of the American Southwest. These data are integrated with INAA sourcing information and compared to glaze-paint strategies from other areas of the late precontact Southwest to define cross-cutting technological communities of practice and to trace the circulation of ideas, production techniques, raw materials and finished objects through networks of social interaction and shared practices at village, intraregional and interregional scales. These results contribute to the increasingly macro-regional exploration of how social networks facilitated the exchange of technical information, fostered migration, and served as arenas of social reproduction that transformed late precontact period social groups in the American Southwest.

Duffield, Seonaid [49] see McLaren, Duncan

Duffield, Seonaid (University of Victoria), Duncan McLaren (University of Victoria) and Iain McKechnie (University of Victoria)

[49] *Archaeological and Architectural Considerations of Intertidal Shellfish Use and Deposition on Hecate Island, Central Coast of British Columbia*

Detailed tracking of the chronology and spatial extent of shell middens on the Northwest Coast is a challenging and often expensive proposition given the size and time depth often represented at these sites. The Hakai Ancient Landscapes Archaeology Project (HALAP) used vibracore technology to efficiently sample intact 7 cm diameter stratigraphic profiles from multiple 4–6 m deep shell midden deposits at site EJTa-13 on Hecate Island. A series of radiocarbon dates from the initial core documents a continuum of site occupation ranging from 5000 to 1200 years cal BP. Faunal remains and artifacts from subsequent samples provide highly resolved records of coastal resource use, including the use of shell for personal adornment. Significantly, the purposeful terraforming of massive amounts of shell likely harvested from the broad intertidal zone fronting the site provides an engineered and well-drained foundation for the site. A major feature of this site is that the shoreward portion appears to have been eroded considerably from its former extent indicating that when occupied, the site physically expanded the terrestrial shoreline above high tide mark.

Duffy, Paul R. (University of Toronto)

[196] *Gone to Pot: Stylistic Breaks in a Radiocarbon-Based Ceramic Chronology for the Eastern Hungarian Bronze Age*

The Great Hungarian Plain is densely populated with fortified tell sites dating to the second millennium BC. At the end of the Middle Bronze Age (c. 1400 BC), however, these settlements were abandoned. Traditionally, archaeologists argued that locals were run off by invading Tumulus culture groups or suffered an environmental disaster. The lack of non-tell contexts and radiocarbon dates bridging this transition precluded an understanding of what changed after the tells were abandoned, and what marked the beginning of the Late Bronze Age. We address this discontinuity with a recently well-dated cremation urn cemetery in the eastern Great Hungarian Plain bridging the three traditional sub-phases of the Bronze Age (Early, Middle and Late). We use changes and continuities in ceramic form and style to measure points of continuity and discontinuity in the material culture during the use life of the cemetery. We provide evidence that although ceramic style changes do occur during the Bronze Age, the overall pattern is one of continuity rather than regional abandonment, with use of the cemetery continuing after 1400 BC when the tell sites go into disuse.

[196] Chair

Duffy, Paul R. [196] see Barlow, Robert

Dufour, Elise (Muséum national d'Histoire naturelle)**[238] *Geographic Origin of Sacrificed Camelids at Huanchaquito (Chimú Period, Northern Coast of Peru): Insight from Stable Isotopic Analysis***

Excavations at the Chimú site of Huanchaquito located in the Moche Valley (northern coast of Peru) led to the discovery of an exceptional sacrificial deposit of more than 200 domestic camelid skeletons. This finding adds to the many testimonies of the presence of camelids on the Peruvian coast during the prehispanic era. The abundant presence of animals suggests—but does not bring definitive evidence—that breeding took place locally in an unfavorable arid environment. Measurements of stable isotopes of carbon, nitrogen and oxygen and radiogenic isotopes of strontium in archaeological remains are a primary source of information on the life history of past humans and animals. Isotopic analysis was used to address the question of the geographic origin and movements of Huanchaquito animals among the different ecological zones of the Andes. Both organic tissues (bone collagen and hair) and hard tissues (bone apatite and enamel) are well preserved at Huanchaquito. The combined isotopic analysis of these tissues allow for the reconstruction of diachronic life history of camelids. Comparison with isotopic data for other cultures and valleys supports the existence herding practices specific to prehispanic times in northern Peru.

[238] Chair

Duggan, Ana T. [144] see Harris, Alison J T

Dugmore, Andrew (University of Edinburgh), Jette Arneborg (National Museum of Denmark), Christian K. Madsen (National Museum of Denmark), Thomas H. McGovern (Hunter College, City University of New York) and Rowan Jackson (University of Edinburgh)**[32] *Exploring the Limits of the Island Anthropocene: the Norse Colonization of Greenland in an Atlantic Context***

The medieval Norse colonization of Greenland was unique, but we can use this completed experiment to explore key drivers of, and limits to, the “island Anthropocene.” The indigenous biota of Greenland while sensitive, lacks the fragility of small, isolated low latitude oceanic islands rich in endemic species. The timing of Norse settlement was determined by the patterns and process of island colonization to the east combined with a suitable environmental and economic window of opportunity. The timing and scale of settlement was contingent- and the consequences were different to previous Norse island colonizations to the east. In Greenland Norse settlement was limited to pockets of the west coast where the settlers either lacked the numbers or the means to impose rapid or lasting environmental transformations—or they were inhibited by their approach to environmental management. Much of the Norse impact on Greenland was transitory as species they introduced were dependent on people and disappeared with them. Key drivers of exploration, colonization and settlement were honor and prestige, and the ways of achieving this through control of land or trade items; environment and distance strongly mediated the process, with transitions to alternate states strongly determined by the numbers of people.

[148] Discussant

Duin, Renzo [384] see Siegel, Peter E.

Duke, C. Trevor (University of Florida) and Martin Menz (University of Michigan)**[241] *Economic Intensification and Social Differentiation: A View from the Late Woodland Southeast***

Intensification has long been equated with the rise of tightly-controlled economies, often in association with incipient social inequality. Previous research has sometimes suggested that centralized control is necessary both for the development of intensification as a viable economic strategy, and for the management of its repercussions. Here, we present evidence from Kolomoki, Crystal River, and Roberts Island, three prominent Late Woodland (ca. AD 500–1000) mound centers of the American Southeast, to demonstrate that economic intensification existed on a broad scale, and grew out of the social practices of communities lacking apparent social hierarchy. Specifically, we evaluate these phenomena by comparing trends between inland domestic economies and coastal subsistence economies. Our evidence suggests that different social groups within some Late Woodland communities were associated with intensification of particular resources. In our view, these trends highlight striking similarities in the development of economic and social differentiation during this period across a broad swathe of the Southeast.

Duke, John [91] see Morin, Jesse

Duncan, Emily [259] see Peixotto, Becca

Duncan, Neil (University of Central Florida), Peter E. Siegel (Montclair State University), John G. Jones (Archaeological Consulting Services), Nicholas Dunning (University of Cincinnati) and Deborah M. Pearsall (University of Missouri-Columbia)**[180] *Causes and Consequences of Colonization in the Caribbean: What Is Known and What Is Unknowable***

One of the defining characteristics of humans is our propensity to migrate. However, the push or pull factors resulting in human migrations may be impossible to know in some cases. Furthermore, our sole reliance on the archaeological record may mislead our understanding of the timing and impact of migrations. Recognizing migrations in the archaeological past is made especially difficult in cases where migrating groups were small, leaving ephemeral traces of their occupations. Paleoenvironmental indicators provide clues to human activities that may predate known archaeological material remains. This paper will explore the interplay of cultural, social, and environmental causes for migrations into the Caribbean beginning at least 8,000 years ago and the environmental consequences of human occupation in the region.

Dung, Lâm Thị Mỹ [271] see Huffer, Damien

Dungan, Katherine (Archaeology Southwest), Sylviane Déderix (School of Anthropology, University of Arizona), Barbara Mills (School of Anthropology, University of Arizona), Kristin Safi (Oak Ridge National Laboratory) and Devin White (Oak Ridge National Laboratory)

[130] *Local Visibility and Monumentality in the Chaco World: A Total Viewshed Approach*

Chacoan great houses are considered "monumental," in the sense both of scale and of conveying meaning. Throughout the Chaco World, great houses and other large-scale buildings would have been associated to some degree with a larger, regional Chacoan ideology. At the same time, these structures vary and should be understood in the context of diverse local and regional histories. Visibility can be a key component of monumentality, and it has been suggested that great houses were frequently placed to be highly visible. We use "total viewsheds"—cumulative viewsheds generated using regularly spaced points across a complete study area—to examine the degree to which Chacoan buildings were positioned to maximize these structures' visibility within their local landscapes, which required leveraging advanced GIScience algorithms and techniques, as well as substantial supercomputing resources normally unavailable to archaeologists. The data aggregated by the Chaco Social Networks Project facilitate temporal and regional comparisons of visibility between AD 800 and 1200 across a sample of approximately 300 Chacoan buildings. The results of previous social network analyses allow us to consider the visibility choices made by the builders of Chacoan structures in light of the dynamics of intra- and intercommunity spatial and social organization.

Dungan, Katherine [303] see Clark, Jeffery

Dunn, Stacy (Edinboro University Department of Criminal Justice, Anthropology, & Forensic Studies)

[359] *Adolf Bandelier's 1892–1894 Expedition to the Central Coast of Peru*

Adolf Francis Alphonse Bandelier (1840–1914) was an ethnologist and archaeologist best known for his work in the American Southwest. What is less well-known is Bandelier's later years studying the ancient Andes, such as his 1892–1894 expedition on the central coast of Peru. Due to an unstable political environment, he moved his expedition to the Bolivian highlands and instead wrote about highland myths. Shortly thereafter, he passed away while pursuing historical sources in Seville, Spain to supplement his South America research. As part of the late nineteenth century shift toward an emphasis on material culture as a more truthful witness to the human past than the written word, Bandelier emphasized combining geographical, ethnological, and archaeological data to provide a more comprehensive portrayal of ancient societies. Unfortunately, Bandelier never had the opportunity to fully analyze or publish his work in central coast Peru. However, approximately 90 cases of items, including journals, watercolor maps, and photos, from his 1892–1894 expedition reside in the collections of the American Museum of Natural History in New York. This paper presents the details of Bandelier's life and work from this period based on these archival materials, along with some preliminary examination of the materials he recovered.

[359] *Chair*

Dunnavant, Justin (University of Florida)

[203] *In Search of King Tona's Palace: The Politics of Archaeology and Memory in Southern Ethiopia*

In 1896 Emperor Menelik II of Abyssinia engaged in one of the bloodiest battles of his military campaigns, attempting to unseat King Tona of Wolaita. After two weeks of fighting, King Tona was captured and the royal court devastated. The last palace of the Wolaita Kingdom stood in Dalbo just 10 km northeast of the current city of Soddo. While the general location of King Tona's palace is known, contesting narratives situate the exact location at different sites. This paper reports on findings from a 2016 survey and excavations at Dalbo in search of the palace of King Tona. Although the excavations revealed evidence of a stone foundation and wooden structure, the materials are unlikely associated with the famed palace of the Wolaita King. Instead, analyses of the ceramic and lithic material allude to a long occupation history at the site that may stretch back as far as the Middle Stone Age. These findings provide insight into the development of complex societies in southern Ethiopia and, interestingly, unearth key contentions of memory and forgetting within contemporary Wolaita social politics.

Dunning, Nicholas (University of Cincinnati), Armando Anaya Hernández (Universidad Autónoma de Campeche), Christopher Carr (University of Cincinnati), Deborah Walker (Florida Museum of Natural History) and Helga Geovannini Acuña (Universidad Autónoma de Campeche)

[337] *Preclassic Reservoirs and Urbanism at Yaxnohcah, Campeche, Mexico*

The need to collect and store rain water has been proposed as an important urbanizing force during the development of Maya civilization in the Elevated Interior Region on the Maya Lowlands, where surface water is naturally scarce and the dry season lengthy. We present data from Yaxnohcah, Campeche, Mexico indicating that the construction of large reservoirs was an integral part of the development of this urban center in the Middle and Late Preclassic periods. Data collected to date indicate that the water management system at Yaxnohcah became more sophisticated over time. Investigations are ongoing and seek to further document this early, complex water management system.

Dunning, Nicholas [83] see Beach, Timothy

Dupont-Hébert, Céline [190] see Woollett, James

Dupras, Tosha (Department of Anthropology)

[219] *The Elite Meroitic Necropolis of Sai Island, Part II: Bioarchaeological Interpretations*

Five Meroitic necropolises have been identified on Sai Island, located in northern Sudan between the 2nd and 3rd Nile cataracts. Recent archaeological excavations conducted by the French Unit of the National Corporation for Antiquities and Museums have focused on a small elite Meroitic necropolis (300 BC–AD 350). Although the archaeology of this necropolis is complicated by interments from other periods and looting, here we present the initial analyses of the Meroitic elite skeletal remains in concert with their contextual information, including demography, paleopathology, and stable nitrogen, carbon and oxygen isotope analyses, in an effort to reconstruct the life histories of this segment of the Sai Island Meroitic population.

[219] *Chair*

Dupras, Tosha [82] see Rumberger, Jacklyn

Dupuy, Paula (Nazarbayev University)

[209] *The Intersection of Clay and Fiber in Central Eurasian Prehistory: Methods for Evaluation*

This presentation focuses on analytical techniques for evaluating cloth and fiber characteristics imprinted on ceramic vessels, and how reconstructing textile industries contribute a social reading of Eurasian prehistory. Inner Asian Bronze Age pastoralists of the third—first millennium BC employed textiles to mold clay vessels as shown through woven fiber impressions coating the insides of containers. Although this production technique has preserved an otherwise marginally documented industry of early pastoralists, it has been methodologically challenging to accurately measure the morphological and structural features of cloth examples. The challenge not only stems from the lack of preserved textiles for comparative purposes but also from the rough surface texture of coarsewares that mask diagnostic features of fibers and weaves when viewed at close range. This paper outlines positive results from trials using high-resolution digital technology to examine textile features preserved in Bronze Age pottery from pastoral campsites of southeastern Kazakhstan. Findings suggest weaves and fiber processing were non-uniform across campsites and ecological micro-regions. Most significantly, the cross-use of textiles and clay in craft production demonstrate complex institutional ties and spheres of interaction among prehistoric pastoralists of central Eurasia that yield a new pattern for social exchange in this region.

Duran, Paul A. (New Mexico State University), Fumiyasu Arakawa (New Mexico State University) and NMSU 2015 Field School (NMSU Student Collaboration)**[303] *Research Analysis of Toolstone Procurement Patterns in the Gila Forks Region and Beyond***

Lithic data from Twin Pines Pueblo in the Gila Forks region of New Mexico can shed new light on toolstone procurement strategies in the American Southwest. The goal of this research is to track the economic strategies among the Mimbres people by investigating stone-tool raw material distributions and procurement strategies. I begin by defining local, semi-local, and nonlocal lithic materials in the Gila Forks region. Then, I investigate how groups in this region procured and used different raw materials using both mass and metric analyses. These analyses allow us to understand general and particular patterns of raw material distributions and lithic reduction processes. For local and semi-local materials, I address the following points: 1) what types of tools were manufactured using particular raw materials, and 2) did residents at Twin Pines manufacture stone tools at the site or areas away from the habitation area? For nonlocal materials, I use X-ray fluorescence (XRF) analysis for obsidian tools and their debris. This analysis addresses issues of procurement from local obsidian quarries. My analysis ends with a discussion of local and regional interaction within the landscape, possible settlement patterns associated with procurement strategies, and toolstone variables between local and regional raw material sources.

Dussol, Lydie (University Paris 1 Panthéon-Sorbonne)**[174] *Ritual Fires and Ancient Maya Termination Deposits at Naachtun (Guatemala): An Archaeobotanical Perspective***

Termination rituals have been a well-documented practice among ancient Maya societies. Generally including the spread of broken artifacts on floors, the manipulation of ancestor bones, and the intentional destruction of architectural structures, termination deposits are believed to have served to symbolically “kill” a building at the time of its abandonment. Regardless of the nature or function of these different deposits, their frequent association with ashes, charcoal and burn marks clearly attests that fire was a central element in the ritual practices they originate from. Fire must have been necessary to burn incense, as it is the case in modern societies. But the complexity and the variability observed in the composition termination deposits encourage to consider that fires associated with them were also intentionally composed, implying a more complex relation to the vegetal world as materialized by wood and plants. This paper presents an archaeobotanical study of termination deposits dated from the Terminal Classic period (AD 830–1000) at Naachtun (Northern Petén, Guatemala), which aimed to better characterize their formation process and sociocultural significance.

[174] *Chair*

Dussol, Lydie [174] see Goudiaby, Hemmamuthé

Dussubieux, Laure (Field Museum of Natural History), Mark Hill (Ball State University) and Gregory Lattanzi (New Jersey State Museum)**[4] *External Standards for the LA-ICP-MS Analysis of North American Copper Artifacts: Looking at Different Approaches***

Ideally, data produced by different laboratories performing the same type of analysis should be comparable. Comparability is important for exchanging data and the building of large databases in particular areas of research. Recently, the sourcing of North American copper using laser ablation—inductively coupled plasma—mass spectrometry (LA-ICP-MS) has developed significantly, prompting questions about the compatibility of the different published datasets. Several parameters affect the compositions obtained with LA-ICP-MS. The selection of external standards is used with LA-ICP-MS to convert the raw counts for each element in concentrations expressed in ppm or w%. Ideally external standards have a composition as close as possible to that of the analyzed object. Available standard reference materials are purer than archaeological artifacts and a combination of several of them is often selected to be able to quantify all the elements of interest. LA-ICP-MS laboratories use different sets of standard reference materials based on their experience, budget, and availability. This paper will compare three sets of copper standard reference materials that are used routinely to measure the composition of North American copper artifacts. It will assess how they affect the concentration measurements in those samples.

Dussubieux, Laure [4] see Hill, Mark

Dutton, Hannah [326] see Paling, Jason

Duvall-Irwin, Benjamin [4] see Quinn, Colin

Duwe, Samuel (University of Oklahoma)**[34] *An Archaeology of Becoming***

From the emergence into this world to the settling of the modern villages, the Pueblos view their own history as a dynamic, living process. While key elements of Pueblo identity and worldview have always been with the people, migration experiences and the amalgamation of people with diverse backgrounds and beliefs were essential in shaping the culture and cosmology of each Pueblo group. This process—called “becoming” by Pueblo scholars—is never complete and represents the malleability of the Pueblo people and their ideas, as well as cultural continuity and resilience of their beliefs, in the past, present, and future. In this paper we propose developing an archaeology of becoming that captures the fluid and ever-moving character of Pueblo history as a nexus of identity, memory, and values, and use examples from the Keres and Tewa worlds to frame our discussion.

[34] *Chair*

Duwe, Samuel [34] see Cruz, Patrick

Dye, Thomas (T. S. Dye & Colleagues) and Timothy Rieth (International Archaeological Research Institute, I)**[81]** *Warming to the Tempo of Change in Old Hawai'i*

Archaeologists sometimes claim that the refined chronologies yielded by Bayesian calibration make it possible to distinguish between Levi-Strauss's "hot" and "cold" societies. Historians of Hawai'i leave little doubt that Hawai'i was a "hot" society in the early historic period. A review and comparison of chronologies for the tempo of change in precontact Hawai'i distinguishes the "cold" society reconstituted by ad hoc methods from the "hot" society reconstituted by the Bayesian method. We make two claims: 1) the ad-hoc chronologies from Hawai'i are incongruous with the historical record, and 2) Bayesian chronologies provide context and time-depth for the "hot" Hawaiian society described by historians.

[112] *Discussant***Dye, David (University of Memphis), Keith Jacobi (University of Alabama) and William DeVore (University of Alabama)****[185]** *The Wheel of Conflict: Physical and Spiritual Permanence of Mississippian Violence*

Violence in the daily lives of individuals in late prehistoric eastern North America took many forms. Exposure to violence was pervasive and persistent. From the time you were born until the time you died you were a witness, a participant, and possibly a victim. In some instances death was a not release. In the Tennessee Valley of northern Alabama two Mississippian sites, Kogers Island (1LU92) and Perry (1LU25), demonstrate a range of evidence for interpolity violence. Familiar examples of violent encounters observed include: facial mutilations, decapitations, general dismemberments and mutilations, scalplings, and healed and unhealed blunt force trauma to the skull. Human remains were displayed and curated as one aspect of cultural identity and history. In addition, new protocols for violence are coming to light that are rewriting our understanding of past violent behavior. Partitioning skeletal remains and the closely tied practices of transformative proxies speak to the interwoven nature of the physical and spiritual realms that permeated the daily lives of Mississippian people, alluding to more abstract experiences and practices than we have previously given credit.

Dyer, Meaghan (University of Edinburgh)**[92]** *A Smashing Good Time: The Identification of Prehistoric Blunt Force Weapons Using Experimental Bioarchaeology*

Experimental bioarchaeology can aid identification of prehistoric weapons and inform current understanding of the context of violence and social interactions in small-scale societies. Determining the direct mechanism of cranial blunt force trauma in prehistoric cultures is currently a complex issue. A vast array of tools and weapons exist that can produce blunt force injury, complicating identification of individual weapons associated with archaeological cranial injuries. This paper presents a new application of an experimental skin-skull-brain model, which facilitates the testing of prehistoric wood, antler and stone clubs for comparison against the osteological record. Testing with early prehistoric materials from Western Europe has already yielded remarkable results. Due to the nature of prehistoric weapon technology, many of the Neolithic European weapons have clear parallels with known tools in North America. Most notably there are comparable ball headed clubs found in North America, along with other weapon-tools of similar nature to those tested in this research. This methodology is low cost, meets ethical standards and has improved accuracy over current animal analogues. The test results form a catalogue of fracture patterns that can aid identification of the mechanism of prehistoric trauma and facilitate the analysis of social implications of violence in small-scale societies.

Dyer, Jolon [190] see Solazzo, Caroline

Dzung, LamMy [113] see Kelley, Eric