

ICAZ-ASWA
XV International meeting
November 28th-December 2nd
Tokyo, Japan



Abstracts



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The Resona Foundation for Asia and Oceania

Welcome to ASWA-Tokyo 2022

Welcome to the XV ASWA. It is our great pleasure to greet you physically here in Tokyo, after two and half years of the pandemic. The social and private aspects of the lives of all of us have been greatly affected by lock downs, medical crises, social distancing, etc. etc. during this period. The conference was originally planned for the early summer 2021, but we were forced to reschedule due to the postponement of the Olympic Games in Tokyo to August 2021 and the unpredictable waves of the COVID-19 infection. We were still undecided in spring 2022, because the strict quarantine control at the port of entry continued to be enforced in Japan. We consulted a few colleagues in Europe whether they might instead host the conference. Finally in May, we decided to go ahead for the organizational work, aiming for November 2022 for the on-site meeting of the ASWA in Tokyo.

We are very grateful for the colleagues who expressed their physical participation, despite the short notice, the unpredictable factors of COVID 19 waves, and the border policy of the Japanese government. We were afraid that no one might be able to come after all, but we were very much encouraged by your support. In the end we received more than 60 applications for presentation, and about 50 participants expressed their intention to travel to Tokyo. This is the first ASWA meeting to be hosted outside of Europe and Southwest Asia. We hope you will all enjoy your stay in Tokyo, meeting and discussing with fellow researchers.

The venue and facilities for the meeting are provided courtesy of TOBUNKEN (Tokyo National Research Institute for Cultural Properties).

The XV ASWA-Tokyo is financially supported by:

JSPS KAKENHI (Grant-in-Aid for Scientific Research)

18H05444 "Subsistence Economy and Social Structures in West Asia"

20H05819 "Exploring the Dynamism of Eurasian Domestic Animal Cultures through
Zooarchaeological Studies"

22H00013, 22H00737, 21H00598, 21K18385, 19H05592, 18H00754

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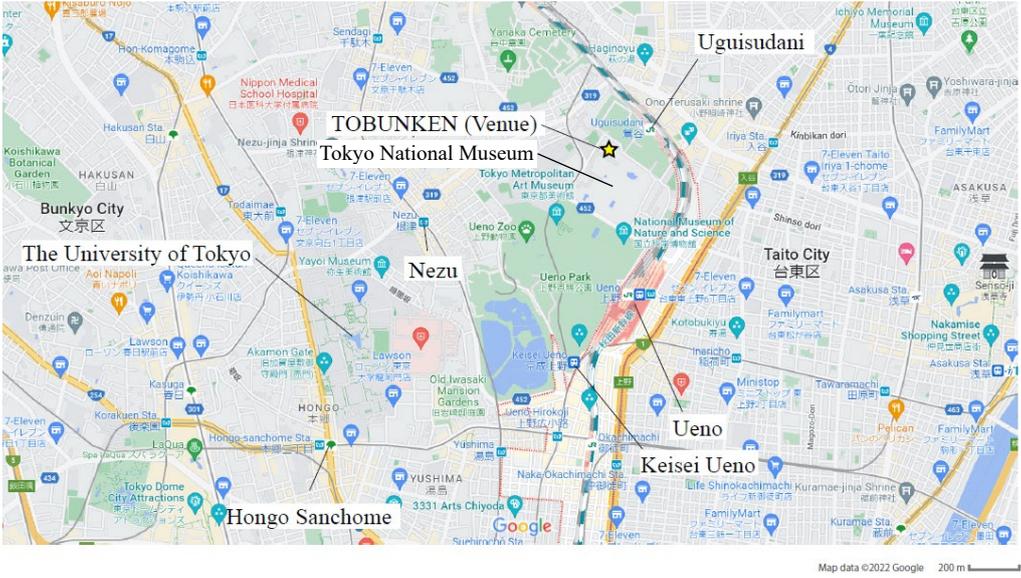
ASWA-Tokyo Organizing Committee

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Venue



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▲ Location of TOBUNKEN and related facilities

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- ◆ Keisei Line, 18 minutes from Keisei Ueno Station (1.4km)
- ◆ Chiyoda Subway Line, 18 minutes from Nezu Station (1.4km)

Welcome reception, November 28th (Mon) 18:00-20:00



GRACE BALI
 2F Tks Bldg.
 Ueno 2-11-12, Taito City
<https://www.grace-bali.com/shop/ueno/enkai/>

Just outside south exit of Ueno Park

Conference dinner, November 30th (Wed) 19:00-21:00



Gonpachi
 2F Nakagawa Bldg.
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*Tokyo Metro Ginza line, Asakusa station, Exit 4
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In case of illness or injury

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<https://www.mhlw.go.jp/stf/covid-19/qa.html>

Tokyo Fever Consultation Center

Those who have symptom(s)

Open: 24H (including weekends and public holidays)

TEL: 03-5320-4592

Language: JA, EN, ZH, KO, VI, TL, NE, MY, TH, FR, PT, ES

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Those who would like to consult in a foreign language. Those who are worried about COVID-19.

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Open: 24H, 365 days.

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Language: EN, ZH, KR.

Tokyo Metropolitan Government Medical Information Center *Himawari*

Offers medical and pharmacy information in Tokyo Metropolitan area.

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Language: EN, ES, CH, KR, TH

GO TOKYO The Official Travel Guide

On the designated COVID-19 page, it provides both national and Tokyo specific information and news regarding efforts to prevent the spread of infection. It also posts requests to those travelling, concerning countermeasures and things to pay attention to during your stay.

<https://www.mhlw.go.jp/stf/covid-19/qa.html>

Timetable

Day 1, November 28th (Mon) 10:20-16:50

9:30-	Registration open
10:20-10:30	Opening remarks
10:30-12:30	Keynote lectures
12:30-14:00	Lunch
14:00-16:50	Session 1: Anatolia (Coffee break 15:00-15:30)

Day 2, November 29th (Tue) 10:00-16:50

10:00-12:30	Session 2: Caucasus, Indus, Iran (Coffee break 11:00-11:30)
12:30-14:00	Lunch
14:00-16:50	Session 3: Levant 1 (Coffee break 15:20-15:50)

Day 3, November 30th (Wed) 9:30-12:10

9:30-11:40	Session 4: Levant 2 (Coffee break 10:10-10:40)
11:40-12:10	Poster session
12:10-	Lunch & visit to museums

Day 4, December 1st (Thu) 9:30-16:40

9:30-12:00	Session 5: Mesopotamia, Egypt, Mediterranean (Coffee break 10:30-11:00)
12:00-13:30	Lunch
13:30-16:40	Session 6: Domestication (Coffee break 14:50-15:20)

Day 5, December 2nd (Fri) 9:30-16:30

9:30-12:20	Session 7: Central & East Asia (Coffee break 10:30-11:00)
12:20-14:00	Lunch
14:00-15:20	Session 8: Levant 3 & methodology
15:20-15:50	Coffee break
15:50-16:20	General meeting
16:20-16:30	Closing remarks

Program

*Only first authors are indicated.

November 28th (Mon)

Opening remarks 10:20-10:30		
Keynote lectures 10:30-12:30		
L-1	Nishiaki, Yoshihiro	Archaeological projects in Southwest Asia by The University of Tokyo
L-2	Miyake, Yutaka	Archaeological projects in Southwest Asia by Tsukuba University
L-3	Crabtree, Pam & Campana, Douglas	Medieval Archaeology in Southwest Asia: Looking Beyond the Crusaders
<<Lunch>> 12:30-14:00		
Session 1: Anatolia		
Chair: Miyake, Yutaka 14:00-15:00		
O-1	Emra, Stephanie Frances	Subsistence strategies, transport decisions, and food preparation at PPNA Körtektepe and other PPN communities, Southeastern Turkey
O-2	Pöllath, Nadja	The inhabitants of Gusir Höyük (SE Anatolia) and their subsistence strategies – the odd one out?
O-3	Silibolatlaz, Derya	Human-Animal Relations at PPN Site of the Gre Filla SE, Türkiye
<<Coffee break>> 15:00-15:30		
Chair: Peters, Joris 15:30-16:50		
O-4	Sarıtaş, Özlem	Zooarchaeological Evidence for Human-Animal Interactions at Neolithic Boncuklu Höyük, Central Anatolia: a focus on <i>Sus scrofa</i> .
O-5	İlgezdi Bertram, Gülçin	Animal Exploitation in the Neolithic Period in Inner-Western Anatolia: The Evidence of Ekşi Höyük (Denizli, Türkiye)
O-6	Itahashi, Yu	Pig Managements in the Neolithic Anatolia Clarified with Isotope Analyses
O-7	Curci, Antonio	A giraffe bone from the Neo-Assyrian palace compound at Karkemish? A controversial osteological determination shedding light on influences and connections between Assyria and Egypt during the Iron Age III

November 29th (Tue)

Session 2: Caucasus, Indus, Iran		
Chair: Crabtree, Pam 10:00-11:00		
O-8	Vautrin, Adeline	Relations between lowland and mountain environments by agro-pastoral societies in the South Caucasus from the Neolithic to the Early Bronze Age
O-9	Zarikian, Noushig	The zoography of “Dragon stones”, prehistoric stelae in the Armenian Highland
O-10	Deshpande-Mukherjee, Arati	Preliminary insights into the Faunal economy at the urban Harappan metropolis of Rakhigarhi in Northern India.
<<Coffee break>> 11:00-11:30		

Chair: Hongo, Hitomi 11:30-12:30		
O-11	Amiribeirami, Sarieh	The Pleistocene Biodiversity of the Zagros Mountains: Carnivores of the Chenar Cave (Kermanshah- Iran).
O-12	Vaiglova, Petra	Seasonality, hunting patterns and life histories of ritual wild boars from Early Neolithic Asiab
O-13	Casanova, Emmanuelle	Exploitation of primary and secondary products of domesticated caprines for human subsistence during the Iranian Neolithic
<<Lunch>> 12:30-14:00		
Session 3: Levant 1		
Chair: Belmaker, Miriam 14:00-15:20		
O-14	Lebenzon, Roxanne	Body size and shape variability in a collection of modern gazelle (<i>Gazella gazella</i>) skeletons and its archaeological implications
O-15	Bar-Yosef, Daniella	Shell beads of the Middle Palaeolithic: Misliya and Qafzeh as case studies
O-16	Yeshurun, Reuven	Nesher Ramla Unit III (Israel): An aurochs mass hunting site?
O-17	Bar-Oz, Guy	Faunal turnover during the Pleistocene in the southern Levant
<<Coffee break>> 15:20-15:50		
Chair: Bar-Oz, Guy 15:50-16:50		
O-18	Rabinovich, Rivka	The role of archaeozoology in deciphering processes of accumulation in karstic pits in the Mediterranean – The case of Neta Pit
O-19	Munro, Natalie	The Emergence of Agriculture in the Jordan Valley: A view from Late Natufian Nahal Ein Gev II
O-20	Hirose, Masato	Epipaleolithic faunal exploitations in the arid southern Levant: faunal remains from the Mushabian layers of Tor Hamar, southern Jordan

November 30th (Wed)

Session 4: Levant 2		
Chair: Munro, Natalie 9:30-10:10		
O-21	Sierra, Alejandro	Hunting in the desert: animal exploitation at Nahal Efe (northern Negev) during the Pre-Pottery Neolithic B
O-22	Martin, Louise	New insights into Late Neolithic herding in the Jordanian harra: zooarchaeological results from Wisad Pools and Wadi al-Qattafi
<<Coffee break>> 10:10-10:40		
Chair: Chahoud, Jwana 10:40-11:40		
O-23	Greenfield, Haskel	The origins of metallurgy at Jericho (Tel es-Sultan): an updated analysis on distinguishing stone from metal butchering marks on the mammalian remains
O-24	Paxinos, Ptolemaios	So many astragaloi, so little time: Late Bronze Age Kamid el-Loz and astragaloi use in the Eastern Mediterranean
O-25	Belmaker, Miriam	Abandonment and destruction in Tel Hazor, Israel: the small mammal evidence
Poster session: 11:40-12:10		
<<Visit to museums>>		

December 1st (Thu)

Session 5: Mesopotamia, Egypt, Mediterranean		
Chair: Vila, Emmanuelle 9:30-10:30		
O-26	Greenfield, Tina	Religion and Ritual: The cult of sacrifice in ancient Mesopotamia
O-27	Trantalidou, Katerina	Hunting and rituals of adulthood on mountain Dikte in Crete through the animal remains
O-28	Grossman, Kathryn	Human-animal-divine relationships in Iron Age Cyprus: a social zooarchaeology of sacrifice
<<Coffee break>> 10:30-11:00		
Chair: Trantalidou, Katerina 11:00-12:00		
O-29	Van Neer, Wim	Osteological study of cat mummies from the Ancient Egyptian cemetery of Beni Hassan
O-30	De Cupere, Bea	Crocodiles in an undisturbed tomb at Qubbet al-Hawa (Aswan, Egypt)
O-31	Shimizu, Marina	Crocodile Worship in Middle Egypt in Greco-Roman Period
<<Lunch>> 12:00-13:30		
Session 6 Domestication		
Chair: Pöllath, Nadja 13:30-14:50		
O-32	Alcántara Fors, Roger	For a fistful of bacon. An integrated approach to pig domestication and management practices at Tell Halula (Syria, c. 7800-6700 cal BC) through geometric morphometrics, Linear enamel hypoplasia and dental microwear
O-33	Jiménez-Manchón, Sergio	Palaeodiet reconstruction as a marker of the early domestication process of Capra in the southern Levant. The contribution of dental microwear texture analysis
O-34	Ripoll Miralda, Joaquim	New insights on sheep management at tell Halula site (Syria): a multi analysis on animal cortical bone
O-35	Gourichon, Lionel	Animal resource exploitation during the Pre-Pottery Neolithic A and B in northern Jordan: preliminary faunal data from Kharaysin (Zarqa)
<<Coffee break>> 14:50-15:20		
Chair: Saña Seguí, Maria 15:20-16:40		
O-36	Vigne, Jean-Denis	The extinct small Cypriot wild boar (<i>Sus scrofa circeus</i>) was locally domesticated during the Middle PPNB
O-37	Mashkour, Marjan	What news about goats. Archaeozoology of Tepe Abdul Hosein, one of the earliest Neolithic settlements of Iran.
O-38	Frantz, Laurent	Zooarchaeological and paleogenomic evidence for long term reproductive isolation between wild and domestic cats
O-39	Peters, Joris	New insights into the early cultural history of the domestic chicken

December 2nd (Fri)

Session 7 Central & East Asia		
Chair: Vigne, Jean-Denis 9:30-10:30		
O-40	Arai, Saiji	Early dispersal of domestic ungulates into the Central Asian mountain region: a view from Southern Uzbekistan.
O-41	Decruyenaere, Delphine	From Bukhara to Samarkand along the Silk Road. Preliminary archaeozoological results of Iskijkat and Mingtepa during the Early Medieval Period
O-42	Uetsuki, Manabu	From trade center to pastoralist settlement: Change in animal resource use at Ak-Beshim, Kyrgyz Republic

<<Coffee break>> 10:30-11:00		
Chair: Uetsuki, Manabu 11:00-12:20		
O-43	Goren, Yuval	Ceramic Production and the Transition to Domestication in Northeast China
O-44	Yu, Chong	Pastoralist strategies of the Late Bronze Age in the Tianshan Mountains, Xinjiang, China
O-45	Kikuchi, Hiroki	Camels on the early eastern Silk Road
O-46	Dong, Ningning	Life on the edge: Animal exploitation at the Shichengzi military fort (Xinjiang, China)
<<Lunch>> 12:20-14:00		
Session 8 Levant 3 & methods		
Chair: Mashkour, Marjan 14:00-15:20		
O-47	Abreu De Sousa, Eléuterio	A zooarchaeological synopsis of the fauna from Jerusalem's Mt. Zion during the Byzantine and Islamic periods.
O-48*	Kahila Bar-Gal, Gila	Equids from the medieval period in the Holy Land: breeds, health and utilization
O-49	Vila, Emmanuelle	Investigating the Morphometric Characteristics of Modern Sheep Breeds from Southwest Asia and East Africa
O-50	Vuillien, Manon	Tracking the first sheep breed in Southwest Asia: a 3D morphometric geometrics investigation on astragalus (EVOSHEEP project)
<<Coffee break>> 15:20-15:50		
General meeting 15:50-16:20		
Closing remarks 16:20-16:30		

Posters

P-1	Ikeya, Kazunobu	Ethno-archaeological approach to water sources and bird hunting near Paleolithic sites in the Jebel Qalkha area, southern Jordan
P-2	Beller, Jeremy	Diachronic developments in animal butchering technologies at Tell Afek, Israel: A zooarchaeological perspective from the Early Bronze Age to Ottoman periods
P-3*	Askarpour, Vahid	Ritual and sacrifice: zooarchaeological analysis of the faunal remains from an Iron Age I temple at Beth Shemesh, Israel
P-4	Akashi, Chie	Livestock management using information from archaeobotanical remains
P-5	Kitagawa, Chiori	Use of horses in Piramesse, New Kingdom Egypt
P-6	Morand, Nicolas	Food patterns in the Western margin of the Nile Delta: first results of archaeozoological research
P-7	Toizumi, Takeji	Subsistence and paleoenvironment at Ra's Jibsh, Oman
P-8	Rivière, Julie	Animal deposits in the tombs of the Khor Jarama necropolis (Oman - 3500-2900 cal. BC)
P-9	Manca, Laura	Bone and shells. Artisanal exploitation of hard animal materials in the Iranian-Pakistani region during the Neolithic period.
P-10	Khazaeli, Roya	Agro-pastoralism in the Urban Landscape of Nishapur (Khorasan, NE Iran) from the 3rd up to the 13th century CE
P-11	Azadeh F. Mohaseb	Identifying Equids from archaeological sites in the Middle East using the shape criteria of the cheek teeth and metapodials from Eurasian modern reference collection
P-12	Tsumura, Hiroomi	Mathematical models and simulations for evaluating diversity in domestication processes

*: cancelled

Oral papers



Title:

Medieval Archaeology in Southwest Asia: Looking Beyond the Crusaders

Author(s):

Pamela Crabtree and Douglas V. Campana

Abstract:

Medieval archaeologists are interested in developing a global approach to the medieval period, and zooarchaeology can contribute to this transition. Southwest Asia has a particularly important role to play in the development of a global medieval archaeology. Important questions such as the transition from the late Roman to the early medieval world, the spread of Islam, and growth and development of cities in the medieval world, and long distance trade can be studied using zooarchaeological data. The talk will highlight some important contributions that zooarchaeology has made to our understanding of medieval Southwest Asia. We will conclude with a discussion of our own work at medieval Kinik Höyük.

O-1

Title:

Subsistence strategies, transport decisions, and food preparation at PPNA Körtiktepe and other PPN communities, Southeastern Turkey

Author(s):

Stephanie Emra, Joris Peters, Nadja Pöllath, Marion Benz, Abu B. Siddiq and Vecihi Özkaya

Abstract:

The Pre-Pottery Neolithic A settlement of Körtiktepe is one of few sites that attests continuous occupation from the end of the drier, colder, Younger Dryas period through into the warmer and wetter Early Holocene period. This presentation firstly presents the changes in the faunal spectrum observed over this environmental transition, such as the shift towards species more associated with woodland and riverine environments. This includes small increases in aurochs and wild boar as well as a major shift in the avifaunal spectrum towards geese. Secondly, observations from cutmarks, burning, bone breakage, and element representation will be presented. This information is used to consider the *chaîne opératoire* of the carcasses from the kill-site to discard and considers the role of transportation distance, carcass size, and butchery technique preference in the end zooarchaeological assemblage. Data will also be compared against other Pre-Pottery Sites in the region such as Göbekli Tepe, Gusir Höyük, and Gürcütepe.

Keywords: Körtiktepe, Pre-Pottery Neolithic, Southeast Anatolia, Butchery

Title:

The inhabitants of Gusir Höyük (SE Anatolia) and their subsistence strategies – the odd one out?

Author(s):

Nadja Pöllath and Joris Peters

Abstract:

At first glance, the archaeofaunal record of Gusir Höyük exhibits what one would expect from a late PPNA/early PPNB site in Upper Mesopotamia: Ungulates such as wild sheep, wild goat, red deer, wild boar and aurochs clearly dominate the assemblage, while the meat diet was enriched by a diverse spectrum of species from other animal groups including small mammals, birds and fish. Other characteristics such as the deposition of skulls also place the Gusir Höyük community within the cultural sphere of the Fertile Crescent. When looking closer at the spectrum of species and the surrounding landscape of Gusir Höyük, however, their mode of exploitation apparently differed from that of similar communities in the wider region: While each community obviously chose from the available resources, the inhabitants at Gusir Höyük highly favoured only some of these, while (almost) completely disregarding others although they most likely abound. The demographic profiles of caprines moreover show a distinct and rather unexpected pattern: The site inhabitants mainly targeted juvenile and old adult caprines, while other PPN communities investigated so far follow the Palaeolithic hunting pattern by mainly bagging prime adults.

Keywords:

Gusir Höyük; PPN; resource choices; SE Anatolia; subsistence

Title:

Human-Animal Relations at PPN Site of the Gre Filla SE, Turkiye

Author(s):

Derya Silibolatlaz

Abstract:

The archaeology of the Upper Tigris Region is marked by salvage excavations carried out in the flood zones several dams built on the upper basin of the Tigris River; Ilisu Dam. One of these dams is built on the upper valley of the Ambar Çay 49 km. north of the Tigris basin. Three mounds, Kendale Hecala, Gre Filla and Ambar Höyük will be affected by the flood. Gre Filla is currently among the settlements during Pre Pottery Neolithic (PPN A-B) and excavation were began in 2018. The animal bones were collected from inside of oval buildings equipped with four pillars, rectangular buildings surrounding central oval buildings. In this paper, it is focused upon the possible role human- animal relations at Gre Filla and provide zooarchaeological insights into the behavioral strategies of the Neolithic (PPNA-PPNB) hunter gatherer of the site. The composition of the fauna is diverse consisted mostly, wild boar remains, aurochs, ovis/capra, and deer species. The aim of this paper is to present the food processing, depositional practices and activities of subsistence, as well as the interaction with the natural environment. This will be indicated using faunal results from the site, focusing on the Neolithic phases of occupation. The result of this paper is important to elucidate animals on the role of Upper Tigris region for the Neolithization process .

Keywords:

Upper Tigris; Gre Filla; Neolithic; Zooarchaeology; Southeast Turkiye.

Title:

Zooarchaeological Evidence for Human-Animal Interactions at Neolithic Boncuklu Hoyuk, Central Anatolia: a focus on *Sus scrofa*

Author(s):

Özlem Sarıtaş, Louise Martin, Douglas Baird and Ardern Beaman-Hulme

Abstract:

Palaeoenvironmental reconstruction shows the early Neolithic site of Boncuklu Hoyuk to have been situated in a permanent wetland mosaic, with wild boar/pig as the most common mammal represented at the site. This paper presents the recent analysis of the abundance, size, morphology, cull profiles and treatment of *Sus* sp, in order to understand whether wild boar were hunted or managed by the Boncuklu inhabitants. Results are contextualised through comparison with wider zooarchaeological results from Neolithic Anatolia. Treatment of the Boncuklu *Sus* will be further be explored through analysis of taphonomic and Bone Surface Modification data.

Title:

Animal Exploitation in the Neolithic Period in Inner-Western Anatolia: The Evidence of Ekşi Höyük (Denizli, Türkiye)

Author(s):

Gülçin İlgezdi Bertram and Fulya Dedeoğlu

Abstract:

The recent studies conducted in Western Anatolia in the last few decades have brought new perspectives to the process of Neolithization in this region. New data have shown that the Neolithic lifestyle, which has previously thought to have reached the Aegean coast through the settlements in the Lake District, had begun almost simultaneously in the Aegean coastal region and in the Lake District in the first half of the 7th millennium BC. Nevertheless, the absence of excavation work in the basin located between the Lake District and the Aegean coast, which were fed by the Büyük Menderes River, until recently resulted in a lack of understanding concerning the role of the sea areas in the Neolithization process in Western Anatolia.

Ekşi Höyük is located in the Çal District of the Denizli Province (Türkiye). As the greater part of the cultural deposit of the settlement consists of levels from the Neolithic period, which can be traced back nearly uninterrupted, it becomes possible to evaluate the archaeological and zooarchaeological remains extensively and holistically, as well as to understand the transformation processes peculiar to the Neolithic itself.

The uncovered stratigraphical layers and finds are dated by radiocarbon dates and indicate that the settlement was continuously occupied from the first half of the 7th millennium BC to the middle of the 6th millennium BC. Through this long and continuous sequence, it is possible to comprehend the emergence and development of the Neolithic lifestyle in the Upper Menderes Basin.

Keywords:

Animal Exploitation; Neolithic; Turkey; West Anatolia; Zooarchaeology

Title:

Pig Managements in the Neolithic Anatolia Clarified with Isotope Analyses

Author(s):

Yu Itahashi

Abstract:

Pig, as an omnivore, can adapt to a diverse diet, and the diet is also susceptible to change due to anthropogenic influences. Because the pigs prefer human leftovers, garbage, and fecal waste produced as by-products of daily life and agriculture, they could consume animal protein in an anthropogenic environment. Actually, some isotope studies by bulk collagen have found evidence of early-stage pig management with human leftovers and dung in prehistoric East Asia. However, in the Near East, one of the origins of pig domestication, domestic pigs display isotopic compositions of bulk collagen that differ from those of humans but are close to those of herbivores. Domestic pigs in the Near East seem to have consumed few animal proteins through human leftover and dung. The choice of which pig management strategy each region in prehistoric periods would favor more would be related to its cultural and social relationships with animals, the natural environment, and the cultivation of cereals. Therefore, this presentation reviews the results of analyses of the stable carbon and nitrogen isotopes of collagen and the compound-specific nitrogen isotopes of individual amino acids in domestic pigs in prehistoric Anatolia. This presentation will try to reconstruct more detailed pig feeding and pig management in the Anatolia by the isotope analyses of the pig bones.

Keywords:

Domestic pig; Neolithic; Turkey; Isotope analysis; Collagen

Title:

A giraffe bone from the Neo-Assyrian palace compound at Karkemish? A controversial osteological determination shedding light on influences and connections between Assyria and Egypt during the Iron Age III

Author(s):

Antonio Curci, Elena Maini, Marzia Cavriani, Beatrice Demarchi, Elisabetta Cilli, Lucio Calcagnile, Gianluca Quarta and Federico Zaina

Abstract:

During the 2016 excavation campaign at Karkemish, a probable giraffe femur was found inside a stone-lined pit in a room of the Neo-Assyrian palace compound (Area C East). The pit containing the likely giraffe bone dates to Iron III (Phase 9a), the earliest of the two structural sub-phases identified in the room. Currently, ZooMS did not confirm the determination, while genetic analysis is still ongoing. The paper, therefore, presents the results of the osteological analysis of this controversial animal remain and reviews the archaeological evidence of connections between Assyrians and Egyptians at Karkemish during the Iron Age III.

Close connections with the Egyptian kingdom are archaeologically attested at the site since the Neo-Assyrian period. According to Egyptian sources, during the late 7th century BCE, Karkemish was the place of two important battles fought under Psamtek I and Neko II. The city was under Egyptian influence since the beginning of the Third Intermediate Period, when the Kingdom of Kush re-established its control over the Levant. Archaeological evidence supporting a direct connection between Assyrians and Egyptians at Karkemish has been extensively documented by both the British expedition (1911-1920) and the present Turco-Italian expedition (2011-ongoing).

Keywords:

Biomolecular analysis; Exotic animals; Iron age; Karkemish; Turkey

Title:

Relations between lowland and mountain environments by agro-pastoral societies in the South Caucasus from the Neolithic to the Early Bronze Age

Author(s):

Adeline Vautrin, Rémi Berthon, Marie Balasse, Delphine Bosch, Giorgi Bedianashvili, Denis Fiorillo, Irina Gambashidze, Giorgi Gogochuri, Lionel Gourichon, Andrew Jamieson, Gwendoline Lemaitre, Catherine Marro, Claudia Sagona, Thomas Stöllner, and Marjan Mashkour

Abstract:

Mountainous territories represent a large part of the region both in the Greater and Lesser Caucasus mountains ranges. Although in the Neolithic period settlements in the highland areas are not numerous in South Caucasus, they increase during the Chalcolithic period until the establishment of villages at the beginning of the Bronze Age. Through an integrated bioarchaeological approach on lowlands, piedmonts and highland sites in Azerbaijan and Georgia, we investigate the pastoral practices of these first agro-pastoral societies. Were there interactions between the plains and the mountains between the Neolithic and the early Bronze Age? At what season(s) were the sites occupied by the herders? To answer these questions, the first author combines classical archaeozoology to characterize the subsistence economies of the targeted sites with biochemistry and cementochronology. Caprine and bovine teeth cementum will determine the seasons of death and consequently the seasons of occupation of the sites. Dental enamel is also used to produce isotopic ratios of oxygen and carbon ($\delta^{18}\text{O}$, $\delta^{13}\text{C}$) as well as strontium ($^{87}\text{Sr}/^{86}\text{Sr}$), for informing on the season of birth, the type of diet including the practice of foddering and finally the mode of territorial occupation through pastoral mobility.

Keywords:

Azerbaijan; Georgia; isotopes; pastoralism; South Caucasus;

Title:

The zoography of “Dragon stones”, prehistoric stelae in the Armenian Highland

Author(s):

Noushig Zarikian, Samvel Pipoyan and Arsen Bobokhyan

Abstract:

“Dragon stones” (Arm. vishapakar) are ca. 1,5–5,5 m high stelae of basalt, carved with animal imagery and found in the territory of the Armenian Highland. Their name is connected to local folk tales where dragons are monstrous giants living in the mountains. The dragon stones appear in close groups of high altitude water rich meadows, on ca. 1300–3000 m above the sea level. A small number of dragon stones in lower zones appear not in groups but isolated. They are dated mostly to the Middle and Late Bronze Ages (ca. 2300-1200 BC), however their roots go back to early farming societies of the Chalcolithic period. These steale add important data to our knowledge about the early social processes and consings in the region. Accoirding to the images and shapes, the vishaps are traditionally considered as bulls, fishes and their hybrids. The present paper tries for the first time to precisely identify the zoography of those megaliths from the biological perspective. Among the species especially important are *Bos sp.*, *Capra hircus*, *Viper sp.* (Reptilia); *Ardea sp.* (Aves), as well as Amphibia and various fish species (Osteichthys).

Keywords:

Armenian Highland; Prehistoric societies, Megaliths, Dragon stones; zooarchaeology.

Title:

Preliminary insights into the Faunal economy at the urban Harappan metropolis of Rakhigarhi in Northern India

Author(s):

Arati Deshpande-Mukherjee, Pankaj Goyal, V.S.Shinde, Tarannum Caur, Sanjay Krishna and Atashi Maitra

Abstract:

Rakhigarhi, in northern India is identified as one of the five largest Harappan settlements of the Indus valley civilization. It is located in Hissar district, Haryana state as a series of mounds (11) with the ancient settlement overlain by the modern Rakhigarhi village. Recent excavations by Deccan College PGRI, Pune have revealed a cultural sequence from the early to the Mature Harappan period and chronology dating from the 5th to the 3rd millennium BC. Till date among the many IVC settlements reported from Northern India findings from Rakhigarhi are important for its early levels of occupation predating the mature phase, displaying urban characteristics of the IVC and human burials. The recovery of large quantities of animal remains are suggestive of a probable strong animal based subsistence economy in existence during its occupation. Here we report preliminary results of the ongoing faunal analysis. The faunal assemblage displays a fairly good preservation of animal bones and is mainly composed of cattle (*Bos indicus*) remains thereby suggesting maximum exploitation of this group of animals in addition to a parallel herding of goats and pigs. In contrast, wild fauna are less represented comprising mostly *Antelope cervicapra*, *Gazella* sp., *Boselaphus tragocamelus* and *Axis axis*. Identification of aquatic fauna such as fish and shells of freshwater turtle and molluscs is indicative of their exploitation by the Rakhigarhi inhabitants as a supplementary food resource.

Keywords:

Bos indicus; Cattle; Early Harappan; Indus valley; Northern India; Mature Harappan; Subsistence.

Title:

The Pleistocene Biodiversity of the Zagros Mountains: Carnivores of the Chenar Cave (Kermanshah- Iran).

Author(s):

Sarieh Amiri, Fereidoun Biglari, Alain Argant, Evelyne Crégut-Bonnoure, Azadeh F. Mohaseb, Angela Nosedà, Alireza Moradi Bistouni and Marjan Mashkour

Abstract:

Over the past decades, several Pleistocene caves and rock shelters in the Zagros Mountains have been discovered with remarkable evidences of carnivore remains. This paper presents the assemblage of Chenar cave located in Kermanshah (West-Central Zagros), at 1630m asl, on the southern face of the Paraw Mountain. The cave was discovered through an archaeological survey in 2007 by FB and AMB. It included two shafts damaged by looters. The back-dirt sediment was systematically examined indicating 795 animal bones. The nature of the sediment and taphonomical features are undoubtedly an indication of Pleistocene cave. Carnivore remains (43%) consist of fox (*Vulpes sp.*), striped hyena (*Hyaena hyeana*), golden jackal (*Canis aureus*), lynx (*Lynx sp.*), leopard (*Panthera pardus*), brown bear (*Ursus arctos*), cave bear (*U.spelaeus / Spelearctos deningeri*), caracal (*Caracal caracal*) and spotted hyena (*Crocuta crocuta*). The herbivore remains (37%: sheep, goat, boar and cattle) may have been the prey of these carnivores although any anthropogenic traces on the bones have been observed. The Chenar cave was used as a den alternatively for multiple carnivore species, similar to the profile of the Wezmeh cave (SW of the Chenar). Despite the disturbed character of the remains, the presence of spotted and striped hyenas and cave bear adds precious information about the evolution of these species on the Iranian Plateau. Along with Chenar, the past biodiversity of Iran during the Pleistocene is gradually documented by with zooarchaeological studies from Wezmeh and Zilou caves in the Zagros and Darband cave in the Alborz Mountains.

Keywords:

Pleistocene; Zagros Mountains; Chenar Cave; Biodiversity; Carnivore Remains

O-12

Title:

Seasonality, hunting patterns and life histories of ritual wild boars from Early Neolithic Asiab

Author(s):

Petra Vaiglova, Pernille Bangsgaard, Lisa Yeomans, Hojjat Darabi, and Tobias Richter

Abstract:

This talk will present the preliminary results of a study that investigates the life histories of wild boars recovered from a 'boar pit' in the Early Neolithic Asiab, Iran. By integrating developmental features on teeth (assessed using high-powered microscopy) with fine-scaled stable oxygen isotope sequences obtained using a Sensitive High-Resolution Ion Microprobe (SHRIMP), the results will provide an opportunity to reconstruct the seasonal water and dietary intake of the animals on a weekly scale over the course of tooth formation. This will shed light on aspects of seasonality of birth and death, as well as the location and timing of the ritual hunting activities. The case study will illustrate the applicability of this method for inferring how human–animal interactions impacted past environments and build the foundation for a future large-scale and systematic project of human–animal dependencies.

Title:

Exploitation of primary and secondary products of domesticated caprines for human subsistence during the Iranian Neolithic

Author(s):

Emmanuelle Casanova, Hossein Davoudi, Antoine Zazzo, Audrey Boco, Reinhard Bernbeck, Susan Pollock, Akira Tsuneki, Om ol Banin Ghafoori and Marjan Mashkour

Abstract:

The Fertile Crescent in SW Asia is a key region for the early domestication of ruminant animals. The domestication of caprine in SW Asia started about 10000 years ago and took an important place in the development of a farming economy. With the introduction of caprine domestication comes the question of which products they were exploited for: their primary products (meat), their secondary products (milk) or both. The Zagros in Iran is a center for the early goat and sheep domestication and expansion of agropastoralism to the East. Caprine exploitation for their primary or secondary products remains to be elucidated for this region. One method to highlight the exploitation of secondary products is to look at dietary archives, particularly, the food residues preserved in ancient pottery vessels. Using molecular and isotopic analyses on lipid residues recovered in the vessels, food sources can be identified and carcasses fats discriminated against dairy fats. We report here the study of lipid residues from about 300 Neolithic pottery from various sites dating from the 7th to 5th Millenium BC. The results revealed both the carcass and dairy fats were processed in pottery vessels at all the studied sites suggesting products from domesticated caprines particularly their milk, took an essential part in human subsistence during the Neolithic period in the region compared to the wild resources.

Keywords:

Domestication; caprine; human subsistence; dairy; Iran

Title:

Body size and shape variability in a collection of modern gazelle (*Gazella gazella*) skeletons and its archaeological implications

Author(s):

Roxanne Lebenzon and Natalie D. Munro

Abstract:

Animal body size and shape are impacted by both cultural and natural factors. Linear skeletal measurements have long been harnessed by zooarchaeologists as a tool to provide information about the sex and age of animals, as well as a marker of environmental conditions and human-animal interactions. However, because of equifinality—many factors may correlate with changes in body size—it remains challenging to interpret body size data in the archaeological record. Here, we investigate the sources of animal morphological variability in a modern skeletal collection of gazelle (*Gazella gazella*) to better understand the relative contribution of sex, age and environmental factors (temperature and precipitation) on gazelle morphology. We explore variation in linear measurements of five commonly preserved skeletal elements (scapula, humerus, second phalanx, tibia and astragalus). We show that sex is the most significant determinant of gazelle body size, while age has little impact on most elements in our study. In some elements, size is also impacted by temperature. The relationship between the other climatic factors and body size may be confounded by human activities, such as agriculture and landscape modification, that alter the natural scheduling of resources to gazelles. Next, we explore how the development of new 3D quantitative tools for bone shape analysis can help untangle body size change in the archaeological record at the Pleistocene-Holocene boundary in Southwest Asia. We discuss how changes in bone shape can provide a more nuanced understanding of how animals respond to anthropogenic and environmental factors.

Keywords:

Age; Anthropogenic impact; Measurement; Net-Primary Productivity (NPP); Sex

Title:

Shell beads of the Middle Palaeolithic: Misliya and Qafzeh as case studies

Author(s):

Daniella E. Bar-Yosef Mayer

Abstract:

Beads made of mollusc shells form an integral part of modern humans' material culture. Middle Palaeolithic sites in Africa and the Levant demonstrate that non-utilitarian shells, in particular complete *Glycymeris* valves, were collected from at least 160 ka. Two sites, Misliya Cave in Israel and Pinnacle Point in South Africa yielded such shells. The earliest known perforated gastropod shell beads were used around 140 ka in North Africa. At Qafzeh Cave, Israel, naturally perforated *Glycymeris* shells were shown, using use-wear analysis, to have been suspended on string. We conclude that between 160 ka BP and 140 ka BP there was a shift from collecting complete valves to perforated shells, which reflects both the desire and the technological ability to suspend shell beads on string to be displayed on the human body.

Keywords:

beads; modern humans; mollusc shells

Title:

Nesher Ramla Unit III (Israel): An aurochs mass hunting site?

Author(s):

Reuven Yeshurun, Kathryn M. Crater Gershtein, Gideon Hartman, Hila May, Florent Rivals, and Yossi Zaidner

Abstract:

Mass hunting, the capture of several herd individuals in a single event, marks an important threshold for Paleolithic societies, but its archaeological identification is challenging. Large accumulations of bovine (bison or aurochs) remains exist in several open-air, seemingly short-lived deposits in the European Middle Paleolithic, and these are sometimes portrayed as mass hunting sites. The Levant region, with its rich Paleolithic record, has nonetheless lacked evidence of such large-scale bovine accumulations up to now. Unit III is a distinct ~30 cm-thick layer within the eight-m-thick Middle Paleolithic deposits of the Nesher Ramla sinkhole (ca. 130k BP) in central Israel. It seems to be a special activity campsite, likely dedicated to the seasonal hunting and processing of aurochs. To test the hypothesis that the aurochs assemblage in Unit III represents a mass hunting event, we examined their age, sex, and taphonomy, in conjunction with dental micro- and mesowear and dental stable isotope analysis. We also discuss a unique find, a flint chip stuck in an aurochs tibia, with evidence to show that it resulted from a failed hunting attempt. The demography and seasonality indicators accord with a mass hunting scenario but do not prove it. Furthermore, recapture evidence and dental isotopic variability cast doubt on the mass hunting hypothesis. We conclude that Unit III evidence seems to accord better with a series of repeated hunting/butchery episodes close in time, performed by aggregating hominins in the MIS 5 Levant.

Keywords:

Aurochs; Hunting injury; Levant; Mass hunting; Seasonality

Title:

Faunal turnover during the Pleistocene in the southern Levant

Author(s):

Guy Bar-Oz and Yoram Yom-Tov

Abstract:

We review in high-resolution accumulating zooarchaeological data on mammalian communities from the Mediterranean region of the southern Levant and compare temporal turnover of species among carnivores, ungulates and small mammals. A journey through time allows us to chart several waves of animal extinctions and replacements. Episodes of faunal extinction that occurred throughout the Pleistocene and Holocene epochs correlate with periods of climate change and human hunting and rapid habitat loss due to anthropogenic landscape transformation.

We divided the zooarchaeological data to three groups: small mammals (mainly rodents and insectivores), carnivores and herbivores and examined the changes that took place in their distribution during sub-periods of the Pleistocene and the Holocene. We found significant changes in the structure of groups. While the average number of small mammals and carnivores was fairly constant (45 and 33, respectively), their composition changed dramatically overtime, and more than half of each group had disappeared. The herbivores underwent major loss, ~80% of the 39 species became extinct by the beginning of the Holocene. Nowadays only 5 herbivore species survived!

The timing of the extinction episodes of carnivores and herbivores and the more reduced intensity of such extinctions among small mammals suggest that likely causal factors combined direct persecution by human hunters with species-specific vulnerabilities to climate change and habitat fragmentation. This distinctive south Levantine mass extinction trajectory is attributed to the complex biogeography of the region, the resulting sensitivity of many local species which are on the edge of their range of distribution (source-sink processes), and long history of pervasive human environmental intervention.

Keywords: Extinctions; Holocene; Pleistocene; Southern Levant

Title:

The role of archaeozoology in deciphering processes of accumulation in karstic pits in the Mediterranean – The case of Neta Pit

Author(s):

Rivka Rabinovich, Luca Pandolfi and Amos Frumkin

Abstract:

The association of archaeological finds with bones require elaboration, moreover in complex settings as karst shaft that are common in various areas along the Mediterranean realm. One such case was found northern to Jerusalem during a speleological survey. A shaft named Neta pit, consists of two parts: the upper, epikarst part, from the surface to a depth of 15 m, leading to a major karst shaft, 55 m deep. The bottom of this shaft had a deposit of Pleistocene archaeological and faunal remains. These finds must have fallen from a kind of a natural 'trap' close to the surface. This trap is geomorphologically relict, as the system does not function as a trap anymore. Today, the surface area above the karst pit is a shallow karst doline, covered with terra rossa soil and dolomitic rocks. The type and form of the former trap is presently enigmatic. Following the discovery of bones and archaeological finds speleological survey and mapping excavations took place in the Pit and above it in order to locate the archaeological site/s from where the finds originated, before drifting into the subterranean system the source of the finds. The animal bones and the stone tools, together with the dates on speleothems and teeth suggest a rather clear history of accumulation under certain paleo-ecological conditions.

Keywords:

Caves, fauna, Middle Paleolithic, taphonomy

Title:

The Emergence of agriculture in the Jordan Valley: A view from Late Natufian Nahal Ein Gev II

Author(s):

Natalie Munro and Leore Grosman

Abstract:

This paper sets the faunal assemblage from the Late Natufian site of Nahal Ein Gev II into its regional context in the Jordan Valley of Southwest Asia and compares the nature of the emergence of agriculture in this region to the neighboring Mediterranean Hills. The faunal record, architecture and site deposits at Nahal Ein Gev II signify intensive site occupation in this region during the Late Natufian. This contrasts sharply with the Mediterranean Hills where mobility increases in the Late Natufian. Using faunal data and other contextual information from published sites dating from the Early Epipaleolithic to the end of the Pre-Pottery Neolithic, we explore how these differences in site occupation intensity relate to the timing and character of the emergence of agriculture in the Jordan Valley versus the Mediterranean Hills. Preliminary analyses suggest that the earliest signs of animal management occur several hundred years earlier than in the Mediterranean zone.

Keywords:

Southern Levant; Animal management; Epipaleolithic; Diverse fauna

Title:

Epipaleolithic faunal exploitations in the arid southern Levant: faunal remains from the Mushabian layers of Tor Hamar, southern Jordan

Author(s):

Masato Hirose

Abstract:

Tor Hamar is one of the Paleolithic rockshelter sites in the Jebel Qalkha area of the southern marginal arid regions in Jordan. This site was excavated in the 1980s and faunal remains have been reported (Klein, 1995). Since 2016, renewed excavations have been conducted, and faunal remains were newly recovered from the layers attributed to the Mushabian cultural entity. This large faunal assemblage is quite rare for the Mushabian sites due to preservation problems in the arid areas. The poor preservation hinders wide-area and diachronic data comparisons for the Epipaleolithic faunal assemblages within the southern Levant.

This presentation will provide the zooarchaeological data of the Mushabian (Around 15000 cal BP) faunal remains newly obtained from Tor Hamar, focusing on the taxonomic composition, skeletal element abundances, and age structures. Although we have already presented some faunal and isotope data of Tor Hamar (Hirose et al., 2022; Naito et al., 2022), in this presentation, I will integrate previous considerations and improve the discussion.

After comparing the new data to the previous report of the 1980s investigations and discussing hunting strategies and seasonality at Tor Hamar, the data will be compared to the compiled data of Epipaleolithic faunal assemblages in the southern Levant. I will evaluate diachronic trends in the proportions of gazelles and small games, and in the frequencies of juvenile gazelles by comparing four sub-regions in the southern Levant. Such discussions can also present implications for issues of the geographic and diachronic variability and commonality of Epipaleolithic faunal exploitations.

Keywords:

Age structure; Epipaleolithic subsistence; Mushabian culture; Seasonality; Southern Levant

Title:

Hunting in the desert: animal exploitation at Nahal Efe (northern Negev) during the Pre-Pottery Neolithic B

Author(s):

Alejandro Sierra, Roger Alcàntara, Lionel Gourichon, Maria Saña, Jacob Vardi and Ferran Borrell

Abstract:

The ongoing excavations at Nahal Efe have revealed the largest and best preserved Pre-Pottery Neolithic B (PPNB) settlement in the Negev and Sinai, with architectural remains preserved up to more than one metre high, thus yielding a wide array of new high-quality (and in some cases challenging) data that are key to refine our understanding of the cultural developments that took place in the area during the 8th millennium cal. BC.

In this communication we present the results of the study of the faunal remains from Nahal Efe recovered during the 2015-2019 seasons. Although the faunal remains are not abundant and are badly preserved, the assemblage offers an opportunity to shed new light on the otherwise elusive knowledge of animal exploitation by the hunter-gatherer groups that inhabited the Negev during the PPNB and, in particular, those that settled the northern fringes of the desert.

Preliminary results show an economy focused on the exploitation of *Capra*, *Gazella* and small game, such as hare and fox, but also different species of birds of prey. ZooMS was performed to improve the taxonomic identification of some fragmented material.

Keywords:

Nahal Efe; PPNB; Negev desert; Hunting; Animal exploitation

Title:

**New insights into Late Neolithic herding in the Jordanian *harra*:
zooarchaeological results from Wisad Pools and Wadi al-Qattafi**

Author(s):

Louise Martin and Ozlem Saritas

Abstract:

There is wide variation in the timing and nature of the adoption of caprine herding in the southern Levant, with a consensus that by the Middle PPNB (8,000-7,500 cal BC) the herding of both sheep and goats was present in central highlands areas, and by the PPNC/Early Late Neolithic we see pastoralism expand in the eastern Jordan steppes and deserts. This paper presents new zooarchaeological evidence from Late Neolithic sites at Wisad Pools and Wadi al-Qattafi in Jordan's eastern Basalt Desert (*harra*) which adds understanding to the expansion and development of mobile caprine herding. We discuss herd management goals, the seasonality, nature and regional networks of mobile pastoralism, and the continued economic, ecological and social roles of hunting in Jordan's steppes and deserts.

Title:

The origins of metallurgy: an updated analysis on distinguishing stone from metal butchering marks on the mammalian remains at Jericho (Tel es-Sultan)

Author(s):

Haskel J. Greenfield

Abstract:

The advent of tin and bronze metallurgy contribute to the development of social complexity in the Old World. Researchers studying early metallurgy have primarily confined investigations to the use of inferential models based on the appearance of metal objects and the decline of stone tools. However, relatively few metal tools have survived in the archaeological record, and stone tools have been demonstrated to continue being used into late antiquity. Thus, these are biased measures. Through experimental research, the author has explored and noted the morphological differences between butchering slice marks made by stone tools and those made by metal tools on bone. The application of this method has allowed for a re-evaluation of the spread of metallurgy and its impact on the development of complex societies. This paper reanalyses the butchering mark data from Jericho (Tel es-Sultan) which was the first assemblage from the Near East analysed by the author. The periodisation utilisation in the original publication is now considered to be too general and has led to further questions about the shift in technology at Jericho. In this paper, I reevaluate the evidence from Jericho and demonstrate how a more subtle chronological assignation can be used to inform on the adoption and spread of early metallurgy in the region.

Keywords:

Bronze Age; Bronze knives; Butchering technology; Chipped stone knives; Cut and slice marks.

O-24

Title:

So many astragaloi, so little time: Late Bronze Age Kamid el-Loz and astragaloi use in the Eastern Mediterranean.

Author(s):

Ptolemaios Paxinos, Shira Gur Arie, Daniela Lenz, and H  l  ne Weber

Abstract:

Kamid el-Loz (ancient Kumidi) is a Bronze Age site in Lebanon which reached its zenith in the Middle (c. 1750-1550 BC) and Late Bronze Age (1550/1450-1200/1150 BC). The constructing of a monumental palace and a temple in the MBII is a testament to the administrative importance of the site. We analysed a small faunal assemblage (~2500 bones) which represents probably the last remaining animal bones from the excavations of the University of Saarland. Apart from bones belonging to caprine skeletons from pit 028 and a late Roman/Byzantine puppy skeleton, the remaining 693 bones were found in the temple area from the LBA. A total of 72 caprine tali were identified in the temple area, representing 10.3% of this material. Although S. B  k  nyi conducted extensive archaeozoological analyses no overrepresentation of tali was noted. Here, we present the results of our analysis with a focus on the caprine tali. Interestingly, at least one of the caprine tali in pit 028 shows wear traces resulting probably from multiple throws in the air and falling to the ground. Similar traces were observed on five tali from the temple area. Due to this wear and their high frequency, we postulate that they were used in games or in ritual practices (e.g. astragalomancy). This study puts Kamid el-Loz on the map with Bronze Age sites of the Eastern Mediterranean yielding tali ecofacts and shows that even a small sample can reveal new facets in old material.

Keywords

Astragaloi; Bronze Age; Caprine; Tali; Games

Title:

Abandonment and destruction in Tel Hazor, Israel: the small mammal evidence

Author(s):

Miriam Belmaker and Shlomit Bechar

Abstract:

Identifying periods of abandonment and destruction in the archaeological record is critical for understanding social processes. Evidence from crisis architecture, termination rituals, imported vs. local ceramics, and consumption practices are used to identify the tempo and mode of demise. However, such evidence may provide equivocal results. An overlooked potential proxy, small mammals, can provide a lens through which to study site formation and demise in the archaeological record.

Here we present a case study based on Tel Hazor, Israel. Hazor was the most significant Canaanite kingdom in the 2nd millennium BCE and a crucial administrative center in the 1st millennium BCE. However, during these two millennia, two major destructions are evident. A destruction in the 13th century BCE and another after the conquest of Tiglath Pileser in the 8th century BCE. During the excavation of the upper city of Hazor, a large-scale wet sieving project was undertaken, which revealed a rich assemblage of small mammals.

We compared the taxonomy and taphonomy of small mammals between the two destructions. Results suggest that the 13th century BCE assemblage is small, dominated by the commensal house mouse, suggesting that this destruction was abrupt. In contrast, the 8th century BCE includes various non-commensal and wild species, including shrews, voles, and birds deposited by raptors indicating that areas of the city were abandoned before the conquest and therefore spared. We propose that small mammals can be used as a proxy for site destruction processes and can be helpful when other lines of evidence are ambiguous.

Keywords:

Taphonomy; taxonomy site; urban crises; site destruction process

Title:

Religion and Ritual: The cult of sacrifice in ancient Mesopotamia

Author(s):

Tina Greenfield and Sebastien Rey

Abstract:

The Early Dynastic Period (2950-2350 BCE) in S. Mesopotamia is when city-states, with large institutions and text archives, appear and spread across the landscape. The region's ancient textual archives are rich in economic documents that record elite diets and animal exploitation. This is also a time of organized religion whereby both the elite and lower stratum sectors participated in elaborate festivals dedicated to the patron god of their cities. Textual sources primarily focus on the elite members of society and their ritual behaviour (i.e. animal sacrifice) while largely ignoring the larger lower stratum population.

Recent excavations at Girsu/Tello has provided data on the religious activities performed at the ancient site. The city was an urban religious centre where yearly religious festivals occurred that saw individuals from across the hinterland travel to the city to participate and pay tribute to the patron gods. A small portion of a *favissa* was excavated in 2015 and yielded a tremendous number of ritual artifacts including a significant amount of faunal remains. The *favissa*, located along the Sacred Way to the temple, was the location where these sacrificial activities took place prior to the entrance to the city and temple.

Questions about religious and socio-economic behaviours associated with animals and cultic spaces can be further understood from the analysis (traditional and isotopic studies) of these animal remains and will help to further our knowledge on how these citizens organized their sacred spaces and religious festivals, in order to satisfy the ever-demanding needs of the Gods.

Keywords:

Animal sacrifice; Mesopotamia; Ritual, Southern Iraq; Stable Isotopes

Title:

Hunting and rituals of adulthood on mountain Dikte in Crete through the animal remains

Author(s):

Katerina Trantalidou

Abstract:

The persistent and patient work of various researchers contributed to the detection of the main structures and functions of the Sanctuary of Hermes and Aphrodite at Syme Viannou. Tens of votive offerings and tens of thousands of bone fragments were collected. The Sanctuary was located on the southern slopes of the Dikti mountain range on the island of Crete and at an altitude of 1,130 m. The sanctuary had a long, continuous life from around 2000 BC through the 3d century AD and beyond.

The Sanctuary, at the border of cities, at the crossroads of shepherds and hunters, marked the dividing line between civilization and wildness, between domesticated - cultivated and wild countryside. In the vector of time, the building complexes were transformed, abolished or replaced entirely as each religion dying out, gave its place to the next. The appeal of the Sanctuary in Crete was to be so wide that the specific place of worship would transmit the sanctity to the entire mountain.

In this presentation, the main idea is to discuss the spatial distribution of the bioarchaeological fragments in the Sanctuary. An attempt is made to understand the interpersonal relationships of the participants, the interaction of people with their environment, the role of the wild goat hunting and the coming-of-age ceremonies of east Cretan inhabitants during the Geometric - Archaic period (1050-500).

Keywords:

Adulthood; East Crete; Hunting; Sanctuary

Title:

Human-animal-divine relationships in Iron Age Cyprus: a social zooarchaeology of sacrifice

Author(s):

Kathryn Grossman, Erin Averett, and David Reese

Abstract:

In recent years, zooarchaeologists have shifted their attention away from animals as passive participants in their own fate, and focused instead on animals as constitutive members of multispecies societies. The intertwined lives of humans, animals, things, and divinities come together dramatically in the case of religious sacrifice, where boundaries between worlds are broken down and rebuilt through ritual, death, and consumption. In this paper, we consider the fates of people and animals as together they practice religious sacrifice in Cyprus in the Late Cypriot through Hellenistic periods. Cypriot religious and ritual iconography is rife with animal imagery, in votive offerings, depictions of deities, and zoomorphic masks, suggesting a broad role for animals in Cypriot religious life. Despite the starring role of animals in Cypriot ritual, however, an in-depth study of the zooarchaeological evidence for animals as participants in these religious practices has yet to be undertaken. Our project combines a zooarchaeological study of published and unpublished animal remains from sanctuaries across Cyprus with art historical and archaeological evidence. Building on a traditional zooarchaeological study of Cypriot fauna (taxa, age, sex, etc.), we use our multistranded analysis to highlight the ways in which animals contributed to world-building (through the negotiation of earthly, liminal, and divine realms) and knowledge-creation (through prognostication and divination).

Keywords:

Cyprus, Iron Age, Sacrifice, Social Zooarchaeology

Title:

Osteological study of cat mummies from the Ancient Egyptian cemetery of Beni Hassan

Author(s):

Wim Van Neer, Bea De Cupere and Frank Zachos

Abstract:

Numerous musea worldwide hold cat mummies in their collection that were exported from Egypt mainly at the end of the 19th century. In most cases, these are well preserved mummies that can be analysed without unwrapping them through various imaging techniques. These studies focus on the exact contents of the bundles and search for possible evidence for the cause of death of the animals. A few natural history musea possess ancient Egyptian cat skulls and skeletons that were prepared from mummies, as they were seen in the past as excellent osteological study material of Egyptian fauna. The largest collection of ancient cat skeletal remains, with in addition a known provenance, is housed in the Natural History Museum of Vienna. The material comes from the cemetery of Beni Hassan and consists of around 120 individuals, mainly represented by their skulls and mandibles. The osteomorphological and osteometrical study that we performed indicates that not only domestic cats (*Felis catus*) were used for the preparation as votive offerings, but that also other small felids were held in captivity for that purpose. These include wild cat (*Felis silvestris*), jungle cat (*Felis chaus*) and probably also hybrid forms. The regular occurrence of healed fractures and tooth calculus allows inferences about the conditions of keeping of the animals.

Keywords:

Cat, Egypt, mummies, osteometry, osteomorphology

Title:

Crocodiles in an undisturbed tomb at Qubbet al-Hawa (Aswan, Egypt)

Author(s):

Bea De Cupere, Wim Van Neer, Vicente Barba Colmenero and Alejandro Jiménez Serrano

Abstract:

Qubbet al-Hawa is a site located on the west bank of the Nile opposite to the town of Aswan (Egypt) and consist mainly of rock cut tombs in which dignitaries of the region were buried. Most of these date from the late Old Kingdom to the late 12th Dynasty, while there is also evidence for the occupation of the site during the New Kingdom, the Late Period and the Byzantine period. During the 2019 field campaign, excavations at Qubbet al-Hawa revealed the exceptional deposit of various crocodiles in an undisturbed tomb. The finds include the remains of five more or less complete, large animals as well as five skulls from varying size. This presentation describes the crocodile remains, with a focus on their general state of preservation, the completeness of the skeletons and skulls, the presence of cut or other marks that may be indicative of the cause of death, and the processing of the carcasses. In addition, the possible provenance of the crocodiles, the methods of capture and killing of the animals and their possible chronological attribution are discussed. Finally, it is attempted to identify the species (*Crocodylus niloticus* and *C. suchus*) using morphological and metrical characteristics.

Keywords:

ancient Egypt; *Crocodylus niloticus*; *Crocodylus suchus*; natural mummification; osteometry

Title:

Crocodile Worship in middle Egypt in Greco-Roman Period

Author(s):

Marina Shimizu

Abstract:

Many religions worldwide worship divine animals due to the awe of animals. It is not an exception that in ancient Egypt, there was a close relationship between animals and humans, leading to a peculiar religion called animal cults. From the Late period, animals were given various divinities and mummified, including not only dogs and cats, the companion animals of today, but also crocodiles, hippopotamuses, ferocious animals that could be dangerous to humans, and even insects such as scarab beetles. These animal mummies were deposited in burial facilities built throughout Egypt, for each animal species respectively.

This presentation will focus on analyzing crocodile worship, which reached its zenith during the Greco-Roman period. The archaeological site researched here is Akoris in Middle Egypt and the Faiyum, one of the centers of crocodile worship in Egypt. Here in this site, not only crocodile mummies were found but also niches where mummified crocodiles were kept. By discussing the possible crocodile worship based on the temple data from Akoris and comparing it with examples from other sites, this presentation will clarify one aspect of crocodile worship in the early imperial Roman period.

Keywords:

Ancient Egypt; Akoris; Crocodile; Animal Cult; Religion

Title:

For a fistful of bacon. An integrated approach to pig domestication and management practices at Tell Halula (Syria, c. 7800-6700 cal BC) through geometric morphometrics, Linear enamel hypoplasia and dental microwear

Author(s):

Roger Alcàntara, Alejandro Sierra, Allowen Evin and Maria Saña

Abstract:

Recent studies combining multiple methodological and technical approaches such as aDNA, geometric morphometrics, dental hypoplasia, calculus and microwear demonstrate that the domestication of pigs is a complex process and, far from being homogeneous, static and linear, it implies continuous and unequal changes, questioning the usual wild and domestic categories.

Tell Halula is a well-known site with an occupation record ranging from the middle PPNB to the Halaf period, a characteristic that allows observing changes in human-animal interactions and their effects on the latter through a 2000-year period of successive occupations.

This communication focuses on the results obtained from analysing a sample of 127 *Suidae* teeth from the site of Tell Halula through 2D geometric morphometrics, dental hypoplasia and microwear. The results of this integrated approach shed light on the exploitation of domestic pigs during the early occupation phases of the site, the intensification of exploitation and management practices of this species, and its potential effects on their diet.

Keywords:

Tell Halula; pig domestication; Geometric morphometrics; Linear enamel hypoplasia; Microwear

Title:

Palaeodiet reconstruction as a marker of the early domestication process of *Capra* in the southern Levant. The contribution of dental microwear texture analysis

Author(s):

Sergio Jiménez-Manchón, Lionel Gourichon and Juan José Ibáñez

Abstract:

The southern Levant is being increasingly considered as another primary centre of goat domestication, alongside eastern Anatolia and the Zagros. Assessing the status (i.e. wild or domestic) of this animal in this region, however, is hampered by the difficulty of morphologically distinguishing domestic goats from their wild relatives. In this scenario, palaeodiet reconstruction is a powerful approach to address this issue since, unlike free-ranging populations, feeding of managed animals is partially controlled by their owners. Here we explore, for the first time, the early domestication process of *Capra aegagrus* in the southern Levant using dental microwear texture analysis (DMTA), a method widely used to reconstruct mammal palaeodiets. Our study aims to identify, if possible, the early stages of goat breeding before the appearance of domestic-type skeletal morphologies. For this purpose, we constructed a reference collection of 59 extant wild and domestic goats. Dental microwear texture parameters were measured on three species of wild goats (19 *Capra pyrenaica* from the southern Iberian Peninsula, 13 *C. ibex* from the Alps and 12 *C. nubiana* from the Near East) and 15 domestic goats (*C. hircus*) reared in extensive systems in Mediterranean scrubland areas. Firstly, DMTA showed significant differences between extant wild and domestic goats, revealing a good predictive capacity for the correct classification of the individuals. Secondly, based on the more discriminant microwear texture parameters, we analysed the DMTA variability of specimens of *Capra* f. *aegagrus* from three Pre-Pottery Neolithic B sites in the southern Levant: Tell Qarassa (Syria), Kharaysin (Jordan). The preliminary results show an intra-site high variability in the texture dental microwear of Neolithic goats, suggesting the presence of diversified diets. This raises questions about the diversity of goat exploitation modalities and the possible concomitance of hunting and breeding practices at that time.

Keywords:

Neolithic, domestication, caprine, microwear, confocal microscopy

Title:

New insights on sheep management at tell Halula site (Syria): a multi analysis on animal cortical bone

Author(s):

Joaquim Ripoll, Roger Alcàntara, Kaveh Yousef-Pouran and Maria Saña

Abstract:

Sheep is introduced in tell Halula site (Euphrates Valley, Syria) about 9.500 years ago. Domestic species such as goats were already part of the domestic economy of the settlement. Sheep was already adopted in a domestic form and included to that economic system. Traditional zooarchaeology has focused on many analysis to try examine how this species were related to the human husbandry strategies. While this has been very successful, new approaches can bring unique perspectives to some unknown subjects about the early domesticates such as: were they part of a unique management of the herd? Were there differences about cortical bone robustness? Could some part of the herd be in a different mobility regime? Different and combined methods have been applied to know more about the conformation of the cortical bone of sheep in tell Halula. Biometry, bone microstructure analysis and cortical bone cross sections have been performed in order to seek differences in the conformation of cortical bone. Results show that the sheep herd of tell Halula was not suffering stress in a unanimous way, and that different life conditions of some domestic sheep might occur in the past. The three analysis combined constitute a solid methodology that brings new knowledge about the response of the bone to stress, and how humans might be applying that stress in past societies.

Keywords:

Sheep; Animal management; Tell Halula; Cortical bone; First domesticates

Title:

Animal resource exploitation during the Pre-Pottery Neolithic A and B in northern Jordan: preliminary faunal data from Kharaysin (Zarqa)

Author(s):

Lionel Gourichon, Sergio Jiménez-Manchón, Juan Muñiz and Juan José Ibáñez

Abstract:

The site of Kharaysin is located on a hill overlooking a tributary of the Zarqa River in northern Jordan. Occupied more or less continuously from the second half of the 10th (PPNA) to the 8th millennium BC (Late PPNB), it offers a chronocultural sequence of great importance for understanding the lifestyles and evolution of the early Neolithic communities in the Southern Levant. In this perspective, the emergence of animal husbandry during this pivotal period is a major issue. The first results of the archaeozoological study show that gazelles were the main game of the PPNA inhabitants, along with aurochs and small game hunting, as in other contemporary sites in the region. From the Early PPNB onwards, goats become more and more prevalent, reaching more than two thirds of the bone assemblages from the later phases, while the faunal spectrum is reduced in diversity. As suggested by other data, these significant changes in the exploitation of the animal resources may be related to the intensification of human control of local goat populations.

Keywords:

Neolithic, Southern Levant, Animal domestication

Title:

The extinct small Cypriot wild boar (*Sus scrofa circeus*) was locally domesticated during the Middle PPNB

Author(s):

Jean-Denis Vigne, Thomas Cucchi, Auriale Domont and Hugo Harbers

Abstract:

A comprehensive morphometric study associating classical and LSR analysis of 2640 measurements with 2D and 3D geometric morphometrics (GMM) respectively of the second lower molar and the calcaneus, reached three main conclusions regarding the now extinct wild boar recently identified on Cyprus between the 11th and the 9th mill. cal BC.

It displays three insular idiosyncrasies: a 13.3% size reduction, a significant reduction of the dewclaws and a reduced and simplified molar form. This novel insular morphology compared to the continental variation of contemporaneous relatives led us to propose a new subspecies, *Sus scrofa circeus*.

Molar GMM suggest (1) that this insular lineage derived from Late Glacial wild boar populations of the north Levant plains and foothills and (2) that domestic pigs which were reared starting from the end of the 9th millennium in Cyprus, were locally domesticated from this small endemic Cypriot wild boar.

Keywords:

Sus scrofa; Insular subspecies; Cyprus; Pre-Pottery Neolithic; Domestication

O-37

Title:

What news about goats. Archaeozoology of Tepe Abdul Hosein, one of the earliest Neolithic settlements of Iran

Author(s):

Marjan Mashkour, Hosein Davoudi, Kevin Daly, Homa Fathi, Roya Khazaeli, Sanaz Beizaeedoost, Salvador Bailon, and Laura Manca

Abstract:

Tepe Abdul Hosein is a highland site located at 1860m above sea level in the Province of Luristan in the Zagros Mountains of Iran. The site was excavated by Judith Pullar in 1978 with a unique Pre-Pottery occupation. The lower levels consist of ashy deposits and the upper levels contained a more substantial mud-brick architecture. Radiocarbon dates obtained on osteological material indicate around 8200 to 7800 cal BCE. Genetic studies on the human provide information on the Neolithic people of the Zagros and their spread to the East. We present here the archaeozoological study of the large faunal remains stored at the Osteology Department of the National Museum of Iran. The fauna is composed of a large majority of small ruminants, in particular goat remains. Goat appears in the early levels, and domesticated sheep in the later levels of the Neolithic settlement when a small village was present. Cattle, boar, red deer, gazelle and turtles are the other taxa present in the fauna. The site is also remarkable for its collection of bone and shell artefacts. In this paper we will present the evolution of the animal exploitation between the EPPN, LPPN and Early Chalcolithic, the three well documented occupations of the site with a particular focus on the question of the goat domestication as highlighted in recent genetic studies.

Keywords:

Neolithic, Domestication, Zagros mountains, Goat, Hunting, Herding

Title:

Zooarchaeological and paleogenomic evidence for long term reproductive isolation between wild and domestic cats

Author(s):

Alexandra Jamieson, Sean Doherty, Alberto Carmagnini, Jo Howard-McCombe, Mark Beaumont, Claudio Ottoni, Naomi Sykes, Greger Larson and Laurent Frantz

Abstract:

Modern domestic cats (*Felis catus*) derive most of their genetic ancestry from Near Eastern wildcats (*Felis lybica lybica*). A popular model of cat domestication posits that they were attracted to small rodents who themselves were enticed by grain stores associated with Near Eastern settled agricultural communities as early as ~10,000 years ago. Despite issues with identifying wild and domestic cats morphologically, zooarchaeological evidence suggests domestic cats were spread from the Near East into southern Europe by the Classical Antiquity period (2800-1500 years before present [BP]), and domestic cats were not present north of the Alps until the Roman period. Here I will present results of zooarchaeological and ancient DNA analyses of 258 cat bones collected from 85 sites across the Middle East and Europe. These analyses clarify the timing of dispersal of cats from the Near East into Europe and the degree to which domestic and wild cats have interbred over time. Specifically, as opposed to many domestic species, our analyses show that domestic and wild cats have been mostly reproductively isolated for at least 2,000 years. The antiquity and strength of this reproductive isolation between introduced domestic cats and local wild cats was likely the result of behavioural differences including a higher tolerance amongst domestic cats for living in greater population densities. This strong reproductive isolation, however, is now being eroded because of anthropogenic activities.

Keywords:

domestic cats; wild cats; interbreeding; palaeogenomics

Title:

New insights into the early cultural history of the domestic chicken

Author(s):

Joris Peters

Abstract:

The chicken is the most common domestic animal in the world. For decades, zooarchaeologists studying the spatio-temporal dispersal patterns of *Gallus (gallus) domesticus* have relied on the conclusions of Zeuner (1963) and West and Zhou (1988). While these authors address aspects relevant to the cultural history of the chicken in Eurasia and northeast Africa, they have never provided an explanation of how and why the red jungle fowl became integrated into human subsistence practices. To better understand the domestication and early dispersal history of the species, we have conducted a comprehensive study of the zoogeographic, morphological, osteometric, stratigraphic, contextual, iconographic and textual evidence for chickens found at over 600 sites in Eurasia and Africa. Our review not only shows that the studies mentioned above have major flaws, but also provides a verifiable spatial and temporal framework for the emergence of chickens in the natural distribution of the Red jungle fowl. In doing so, it also opens an elusive window on the cultural circumstances of the bird's early association with humans. Presumably, soon after the establishment of poultry farming, translocation of birds took place in various directions including SW Asia, which will be dealt with in more detail.

B. West and B.-X. Zhou (1988) Did chickens go north? New evidence for domestication. *J. Archaeol. Sci.* 15, 515–533.

F. E. Zeuner (1963). *A History of Domesticated Animals* (Hutchinson, London).

Keywords:

Domestic chicken; Cultural origins; Spatio-temporal dispersal; Eurasia

Title:

Early dispersal of domestic ungulates into the Central Asian mountain region: a view from Southern Uzbekistan.

Author(s):

Saiji Arai, Otabek Aripdjanov and Yoshihiro Nishiaki

Abstract:

Increasing archaeological projects in the Central Asian countries, which situated between the West and East Asia, have provided critical insights into the early dispersal of domestic ungulates from the West. Aside from Jeitun culture in the foothill of Kopet Dagh in Southern Turkmenistan, renewed projects in Kyzyl-kum to the northeast confirmed the dispersal of livestock into the desert as early as in the alluvial lowland. In this paper, we will discuss on the early dispersal of domestic ungulates into the mountain region in Central Asia. Although the presence of domestic caprine in the region before Bronze Age has already been claimed by Soviet archaeologists in the late 20th century, and recently confirmed by proteomic and genetic study at Obishir V in Southern Kyrgyz, the introduction process of domesticates has been left unclear. The Japan-Uzbek joint excavations at Kaynar Kamar, a newly discovered rock shelter in Southern Uzbekistan, established a long sequence of prehistoric and historic occupations at the western part of Pamir-Alay range from the beginning of Holocene. The most significant result came from comparison of archaeological materials between 7th and 6th millennium layers. Sudden increase of caprine (mainly sheep), appearance of cattle suggests introduction of pastoral way of life in the early 6th millennium BC in tandem with new lithic and bone tool technologies.

Keywords:

Central Asia, Mountain, Neolithization, Caprine

Title:

**From Bukhara to Samarkand along the Silk Road -
Preliminary archaeozoological results of Iskijkat and Mingtepa during
the Early Medieval Period**

Author(s):

Delphine Decruyenaere, Rocco Rante, Alisher Begmatov,
Tomoyuki Usami, Husniddin Rakhmonov, Elise Dufour and Marjan Mashkour

Abstract:

Many archaeological studies have been conducted on the Silk Roads. However, some aspects remain poorly documented as the subsistence economy and the management of animal resources of populations established along these routes from the Antiquity to the medieval periods (300 BC to 1600 AD). Dietary habits, herding strategies, etc. are essential for understanding the processes and interactions that were taking place, as they reflect the natural, cultural and economic heritage of the Eurasian communities. In addition, these practices characterize the relationship of individuals with their ecological environment and reflect the changing political context and ideological choices.

This talk will present the first archaeozoological data from the Sogdian cities of Iskijkat (Bukhara) and Mingtepa (Samarkand). This study is based on the first author' PhD project dealing with the human nutrition and management of animal resources in the Zerafshan Valley (Uzbekistan). Sheep, goats and cattle were the main herded animals. Two species native to East Asia, the pig and the chicken, were also represented. The remains of pack animals such as horses, donkeys and their hybrids as well as camelids were identified. These may have been also consumed. In addition, remains of commensal animals like dogs and rats were also present in the assemblages. Finally, some wild taxa such as gazelle, deer and hare were hunted but in very limited quantities.

This preliminary study shows that domestic animals were predominant and extensively used for food, raw materials and transport. Further isotopic analyses will be carried out to identify the movements of animals.

Keywords:

Archaeozoology; Domesticates; Silk Road; Uzbekistan; Zarafshan Valley

Title:

From trade center to pastoralist settlement: Change in animal resource use at Ak-Beshim, Kyrgyz Republic

Author(s):

Manabu Uetsuki, Saiji Arai, Kazuya Yamauchi, and Bakit Amanbaeva

Abstract:

Ak-Besim was a city built by the Sogdians at a strategic point along the Silk Road and prospered as a regional trading center from the 5th to 10th centuries CE. In the 7th century, a military garrison of the Tang Dynasty, which had advanced from the east, was built adjacent to the site. The site is a unique existence embodying the contact between the East and the West. Analysis of long-term changes in the use of animal resources at the site has revealed changes in the character of the site. During the period of the trading city, the animal remains were characterized by a strong consumer character with a bias toward meat use, a high percentage of horses related to trade, and pigs suggesting the presence of a diverse residents. In contrast, in the period of small pastoralist settlement following the decline of the city, a change was observed such as the predominance of cows associated with milk production, a bias in the sheep body part profiles towards less valuable parts, and a decrease in the number of horses and pigs, which symbolize the urban character, all pointing to a shift to a more producer-like characteristic of the site.

Keywords:

Pastoralist; Silk Road; Central Asia

Title:

Ceramic Production and the Transition to Domestication in Northeast China

Author(s):

Yuval Goren, Ofer Marder, Noam Shalev, Mingyu Teng, Dongdong Tu, Lonia Friedlander, Ana Millionschick and Gideon Shelach-Lavi

Abstract:

The earliest evidence for pottery production in China dates back some 20,000 years, and is found throughout much of East Asia, including Japan and the Amur region in the Russian Far East. Hunter-gatherer societies produced and used pottery thousands of years before the transition to agriculture. This has fostered an intense discussion about pottery production among hunter-gatherers, its function, and possible cultural manifestation. Much less attention has been paid to the impact that the use of ceramic vessels may have had on (or by) the transition to sedentism and domestication and how ceramic technology itself changed during this process. This paper examines the technological features of pottery produced by hunter-gatherer societies and societies in the transition phase to agriculture and domestication. This is viewed through the pottery assemblages from two sites excavated in the Fuxin Area, Liaoning province of China. While the earlier of the two represents a small semi-sedentary society, which was still entirely dependent on hunting-gathering, the other, being later by ca. 400 years, is a village still based mainly on hunting and gathering, but already incorporating the exploitation of millet and perhaps the first steps towards the domestication of pigs. Through a series of analytical methods, technological differences between the two assemblages are evaluated and discussed with the broader aspect of the links between social, economic, and technological variation, and the meaning of pyrotechnological changes in prehistoric realities.

Keywords:

Northeast China; Neolithic; Pottery; Ceramic Technology; Domestication

Title:

Pastoralist strategies of the Late Bronze Age in the Tianshan Mountains, Xinjiang, China

Author(s):

Chong Yu, Yue You, Jiaming Luo, Qiurong Ruan and Minoru Yoneda

Abstract:

Northwestern China is a key region for the exchange of population, commodity, technology, custom and culture between the east and west part of the Old World since prehistoric times. However, we lack zooarchaeological and isotopic evidences from settlement sites in Xinjiang province, which makes it difficult to understand the pastoral economies and livestock herding activities of the Late Bronze Age in this area. Here, we present a study of the earliest and meanwhile the first systematic analysis from the Late Bronze Age settlement, the Halehaxite site in northwestern Xinjiang. Our findings pointed out that the herd of Halehaxite comprises four domestic animals: cattle, sheep, goats and horses. The herd is dominated by cattle, different from other contemporaneous sites in the Central and East Tianshan Mountains. Mortality patterns of the domesticates were linked to sophisticated milk exploitation and not many individuals were kept for long-term secondary production. Bulk collagen and enamel sequential isotopic analysis revealed distinct methods of management from cattle and caprids.

Keywords:

Xinjiang, Pastoralism, Late Bronze Age, isotope

O-45

Title:

Camels on the early eastern Silk Road

Author(s):

Hiroki Kikuchi

Abstract:

According to the Classic ancient literature such as Shiji 史記 and Hanshu 漢書, as well as the sacrifice of camels in the burial pit of Pingling 平陵, camels were very active among the five grassland animals that supported the Silk Road after the Western Han Dynasty. However, from zooarchaeological studies, Bactrian camels from Central Asia local origin had been used in the Tianshan Mountains during the Western Zhou Dynasty, and in the Spring and Autumn and Warring States periods, they had been extended to the Hexi Corridor. On the other hand, from the distribution of camel designs in archaeological materials, it is possible that camels were introduced into Guanzhong Basin during the Spring and Autumn Period and the Warring States Period, it is assumed that the northern route of the early Silk Road may have been opened at this time.

Keywords:

Camel; Western Zhou Dynasty; the early eastern Silk Road; northwest China

Title:

Life on the edge: Animal exploitation at the Shichengzi military fort (Xinjiang, China)

Author(s):

Ningning Dong, Chen Sun, Xuchu Zhu, Xiaohong Tian, Yong Wu, Yahao Luo, Yuxuan Zhou and Jing Yuan

Abstract:

With the Han dynasty's (202BC – 220AD) imperial expansion to west, Xinjiang, became a frontier region for political negotiation, military conflict and cultural contact among agricultural and pastoral communities across Eurasia. Recent excavation at the Shichengzi military fort has rendered an opportunity to examine the animal exploitation in the empire's frontier. The results of our zooarchaeological analysis suggest that meat production largely relied on herding animals (i.e. sheep and goats). Horses, cattle, donkey and camels were explored for labour. Pig husbandry was a novel addition to the local agropastoral regime, and pork became a signature food stating the identity of the garrison community. A 'meat-not-milk' dietary preference also underscores this cultural identity. The animal exploitation was a combined result of subsistence adaptation and military reinforcement. Our work further highlights the tension between the flexible husbandry strategy adapted to the new environment and the conservative culinary attitude held by immigrants towards certain new foods. This case study helps contextualise the interaction and integration of different ways of life.

Keywords:

Frontier zone; Han empire; Military fort; Xinjiang; Zooarchaeology

Title:

A zooarchaeological synopsis of the fauna from Jerusalem's Mt. Zion (Israel) during the Byzantine and Islamic periods

Author(s):

Eleuterio Abreu De Sousa, Haskel Greenfield, and Jennifer Zimni

Abstract:

The Byzantine and Islamic periods were significant times of change in Israel as the political power base shifted from Byzantine Christian to Omayyad Islamic. Changes in religious and dietary practices are assumed to , coincide with the larger socio-political transformations. During the Byzantine period, the Mt. Zion section of Jerusalem was a wealthy flourishing part of the city with mosaic floors and fine pottery vessels. The settlement dramatically changed during the Early Islamic period when the living quarter became an industrial crafts quarter. Excavations on the southwestern slope at Mt. Zion recovered a large quantity of animal bones that were likely food remains. This talk will present the results of the 2017 faunal remains that were recovered from a series of stratigraphically superimposed and chronologically secure deposits in Area I during the 2017 field season and data . These remains increase our understanding of the history of Jerusalem as it changed hands from Christian Byzantine to the Arab Islamic empires. Information on subsistence is deduced from this study and changes in the food consumption of the local population, particularly the shifts between the Byzantine and Islamic periods, are explored.

Keywords:

Byzantine, Fauna, Islamic, Israel, Mt. Zion

O-48 (cancelled)

Title:

Equids from the medieval period in the Holy Land: breeds, health and utilization

Author(s):

Gila Kahila Bar-Gal, Hadas Motro, Sagi Polani, Mark Yanko, David Atias, Ohad Levi, Amos Tatz, Lia Hadas, K.L. Rasmussen and Roni Elenblum

Abstract:

The ability to cover large distances and transport merchandise has made the horse one of the most important domestic animals in human history. The improvement of equine equipment during the Middle Ages and the rise of empires increased the horse's importance for transportation, warfare, agriculture and the economy. Through this process, both conscious and unconscious selection occurred for different horse types suitable for human requirements. These processes resulted in significant phenotypic and genotypic changes within the horse species. The goal of this study was to determine the breed of the horse, its origin, health and usage using biometric, morphological, art examination, molecular genetics and trace elements analysis. Three horse breeds were identified: Arabian horse, horses that resemble Mongolian and Barb/Akhal-Teke breeds. Several specimens showed various pathologies that indicate the care and nurturing of the horses. Trace elements, based on the horse dietary indicated three different origins shedding light on human activity in the region, as the Levant during the medieval times was a major junction of interaction.

Title:

Investigating the Morphometric Characteristics of Modern Sheep Breeds from Southwest Asia and East Africa.

Author(s):

Emmanuelle Vila, Jwana Chahoud, Sofiane Bouzid, Moussab Albesso, Agraw Amane, Bea De Cupere, Hossein Davoudi, Homa Fathi, Azadeh Mohaseb, and Marjan Mashkour

Abstract:

The multidisciplinary project Evosheep studies the origin and evolution of ancient sheep breeds by means of archaeozoology, geometric morphometrics, genetics, iconography and epigraphy in the ancient Near East from the six millennium BCE. In the framework of this project, in order to have a reliable osteological reference collection of modern breeds, we created new osteological collections of sheep from Lebanon and Ethiopia and used two existing collections from Iran and Turkey. Along with the geometric morphometrics and genetics analyses, we performed a morphometric analysis on the same modern bone collections to develop methodological approaches for osteological remains. Several biological characteristics have been established on the ten modern breeds, including sex, age, weight, description of phenotypes (type of fleece: wool, hair, coarse; type and shape of the tail: fat, rump, thin) and a collection of overall measurements was taken. This paper examines shape and size characteristics of the studied sheep breeds using the Log Size Index and Log Shape Ratio methods. The diversity of sizes, allometry and body parts proportions are compared for specimens from the same breed and between breeds. The results offer a baseline to investigate the osteological variations in archaeological assemblages.

Keywords:

Evolution of sheep; Log Size Index method; Log Shape Ratio method; Osteological

Title:

Tracking the first sheep breed in Southwest Asia: a 3D morphometric geometrics investigation on astragalus (EVOSHEEP project)

Author(s):

Manon Vuillien, Emmanuelle Vila, Jwana Chahoud, Rémi Berthon, Béa De Cupere, Hossein Davoudi, Daniel Helmer, Moussab Albesso, Agraw Amane, Sofiane Bouzid, Homa Fathi, Josephine Lesur, Azadeh Mohaseb, Adeline Vautrin, Lionel Gourichon, Marjan Mashkour and Thomas Cucchi

Abstract:

Sheep husbandry has played a major role in the economy of human societies in Southwest Asia over the last 10 millennia. However, if archaeological and archaeozoological "clues" provide insight into husbandry practices developed by early human societies, it is still difficult to assess the diversity of first breeds these societies relied on, due to the difficult disentanglement of anthropogenic selective pressure and adaptation to ecological conditions. To tackle this issue, EVOSHEEP project explore the complex history of early sheep husbandry in Southwest Asia between the Late Neolithic and the Bronze Age by integrating palaeogenomic, morphometric and historiographic data.

The morphometric study presented here will disclose the first results using 3D geometric morphometrics on astragalus from modern and archaeological sheep in Southwest Asia and East Africa. Ancient sheep have been collected from forty archaeological sites and covering five millennia of economic and cultural transformations, between the 6th and the 1st millennium BC. We will first explore biotic and abiotic component of sheep bone variations relying on well-documented modern comparative material and, second will contrast modern and past diversity considering geography, genetic data and chronocultural contexts, in order to correlate morphometric features and the emergence of the first sheep morphotypes in Southwest Asia.

Keywords:

breed; EVOSHEEP projet; geometric morphometrics methods; sheep; Southwest Asia

Posters



Title:

Ethno-archaeological approach to water sources and bird hunting near Paleolithic sites in the Jebel Qalkha area, southern Jordan

Author(s):

Kazunobu Ikeya, and Seiji Kadowaki

Abstract:

The inland Levant including southern Jordan is currently characterized by hyper-arid environments with less than 50 mm annual precipitation. Although paleoclimatic records indicate occurrences of more humid conditions in the Pleistocene, they were still in the range of semi-arid environments. Paleolithic adaptation to such dryland areas is one of key questions in the investigations of densely distributed Paleolithic sites in southern Jordan particularly of the late Middle Paleolithic, Upper Paleolithic, and Epipaleolithic periods. In this study, we present results of ethno-archaeological fieldwork on the procurement of water and bird hunting in mountainous drylands in southern Jordan. Currently, the study area is occupied by the Bedouin living on livestock herding (sheep, goat, and camels). They have historically inhabited the desert regions in the Arabian Peninsula and the Levant. Although the area is very dry, our survey found that the local people use several pools that keep water for a long time after rainfall. Some of the pools are natural depressions in sandstone bedrock and located near some of several Paleolithic sites, particularly Upper Paleolithic in the Jebel Qalkha area. The water gets depleted at various timing depending on the pools, but some pools apparently maintained water almost year-round. We also report our survey of bird hunting by local people with fall-traps made of stones to catch three types of small birds including chukars, and captured birds are dismantled for food. Chukars are one of animal species identified in the faunal remains from Upper Paleolithic and Epipaleolithic deposits at Tor Hamar in the same area. In this way, our ethnographic fieldwork found the exploitation of water and small birds even in the currently hyper-arid settings.

Keywords:

Bird hunting, Fall-trap, Chukar, Water sources, Paleolithic

Title:

Diachronic developments in animal butchering technologies at Tell Afek, Israel: a zooarchaeological perspective from the Early Bronze Age to Ottoman periods

Author(s):

Jeremy A. Beller, Haskel J. Greenfield, and Tina L. Greenfield

Abstract:

In recent years, zooarchaeological research has suggested that the transition from stone to metal butchering technology in the southern Levant occurred during the Middle Bronze Age or even later periods and that it was accompanied by dramatic changes in butchering patterns. However, there are very few large and well-dated zooarchaeological assemblages that transcend this moment in time have been systematically examined. In this study, the recently analysed zooarchaeological data from Tell Afek (Aphék-Antipatris), Israel, is used to investigate the nature of butchering technology and how it changes at the site over time. Tell Afek is a prominent settlement overlooking the coastal plain of central Israel. The site has been inhabited since the Chalcolithic and served as an important regional political and economic centre since the beginning of the Early Bronze Age.

The faunal remains with evidence of butchering were subjected to microscopic (including scanning electron microscopy) analysis in order to determine if the butchering marks were made by stone or metal tools. The evidence clearly shows that stone tools dominate in its earliest periods (Chalcolithic and Early Bronze Age), but that a dramatic and sudden shift toward metal butchering tools occurred with the advent of the Middle Bronze Age occupation at the site. This pattern continues through the later periods of occupation at the site (until Ottoman times). By the end of the Late Bronze Age, stone tools were completely replaced by metal tools as part of the butchering process. Associated with this shift, there are clear changes in butchering efficiency (fewer marks/bone) and a shift to a more systematic mode of butchering (with greater standardisation in location of marks). The analysis of butchering raw material allows for a unique perspective on the technological and economic changes occurring between the Early Bronze Age and later periods in the southern Levant.

Keywords:

Bronze Age, southern Levant, butchering, stone tools, metal tools

P-3 (cancelled)

Title:

Ritual and sacrifice: zooarchaeological analysis of the faunal remains from an Iron Age I temple at Beth Shemesh, Israel

Author(s):

Haskel Greenfield, Vahid Askarpour, Karin Tamar, Dale Manor, and Zvi Lederman

Abstract:

Very few Iron Age I temples have been excavated with modern systematic excavation and recovery methods of zooarchaeological remains. Systematic excavations conducted over the past quarter century at Tel Ain Shams, the ancient city of Beth Shemesh, uncovered the remains of an Iron Age temple in Levels 5-6 (c. 1150-1100 BCE). This small (3ha) site is strategically located to control movement both east and west through the Soreq valley, as well as to the north and south of the hill country (Shephelah). Artefacts suggest cultural continuity from the Late Bronze into the Iron I. The site continues to be inhabited by Canaanites, who face the Philistines to the west and Judahites to the east. The Iron Age I temple is a small building in the northern quarter of the site. Features within the temple include a stone table and two large stones with a groove for draining fluids that may represent sacrificial platforms or altars. Also, representations of female deities (e.g., Ashera) were found in and near the temple. Comparison of the zooarchaeological material within and immediately without the temple enclosure shows remarkable similarities and supports the interpretation of this structure and its immediate surroundings as a temple complex. There is little difference in the taxonomic distribution and age groups between the temple enclosure and surrounding deposits. The commonality between the temple and deposits around it deposits might suggest that the fauna from the temple were also dumped outside of the square temple

Keywords:

Iron Age; Israelite/Canaanite; Ritual; Southern Levant; Temple.

Title:

Livestock management using information from archaeobotanical remains

Author(s):

Chie Akashi

Abstract:

Archaeobotanical remains can provide insights into livestock management, particularly in dry regions where animal dung is commonly used as fuel. Researchers agree that charred plant seeds/fruits from archaeological sites in West Asia are partly derived from dung fuel.

This enables the investigation of plant foods eaten by animals, based on the total plant assemblage, distribution of plant remains, and characteristic of each plant species. Seeds and fruits can embed to dung pellet itself, thereby providing direct evidence of animal diet and revealing the vegetation of the fields where the animals were pastured.

This study analyzed the animal fodder/grazing plants recovered from two sites of Syria: Tell Ghanem al-'Ali (TGA) and Tell 'Ali al-Hajj (TAH). Both sites are located along the middle Euphrates and are considered to have used sheep/goat dung as fuel.

Keywords:

archaeobotany; Bronze Age; dung fuel; Syria

Title:

Use of horses in Piramesse, New Kingdom Egypt

Author(s):

Chiori Kitagawa

Abstract:

Piramesse (Qantir), in the Eastern Delta, Egypt, was the capital of ancient Egypt from c. 1300 BCE to c. 1100 BCE. Among the osteofaunal remains, those of livestock accounted for a high proportion. In this poster presentation, particular focus will be given to horses (mules) among domestic animals. In Piramesse, stables, chariots and the architectural remains of a chariot training yard have been recovered. LSI (Logarithmic Size Index) values of horses/mules, which were used by the royal family and upper classes in Piramesse, are compared with those excavated at neighbouring sites.

A multifunctional workshop was also found in Piramesse, where worked animal remains and related tools for processing were excavated. The archaeological context of the artefacts and tools revealed that the processing area for osteofaunal remains coexisted with workshops for other raw materials (wood, leather, bronze, stone etc.). It appears that thick and straight horse/mule limb bones were one of the preferred raw materials at the bone workshop in Piramesse.

Keywords:

Ancient Egypt, bone workshop, horses, Piramesse

Title:

Food patterns in the Western margin of the Nile Delta: first results of archaeozoological research

Author(s):

Nicolas Morand

Abstract:

The Western margin of the Nile Delta is a complex territory at the interface between the lagoon of Mareotis lake and the Libyan desert. This occidental frontier of Egypt was progressively occupied from the end of the second millennium BC to the Late Roman period. Firstly, different border checkpoints and towns were settled on the Mediterranean coastline and the shoreline of Mareotis Lake. After the conquest of Egypt by Alexander the Great, its successors built the new capital of the Ptolemaic kingdom: Alexandria. The region became the hinterland of this vast harbor city. Several French, Polish, and Egyptian archaeological teams have unearthed many human occupations (dwellings, workshops, villas, and temples) attesting to the dynamism of this strategic area. These excavations have yielded a large sample of faunal remains. The wildlife spectrum from ten sites is diversified and highlights various meat supplies from breeding, hunting, and fishing activities. Food patterns differ spatially and change through time. These differences could be related to cultural, social, and environmental factors. This poster summarizes the first results of archaeozoological studies renewing the history of animal exploitation in the fringes of Lower Egypt.

Keywords:

Animals, Meat consumption, Antiquity, Lower Egypt, archaeozoology

Title:

Subsistence and paleoenvironment at Ra's Jibsh, Oman

Author(s):

Takeji Toizumi, Manabu Uetsuki, and Hiro'omi Tsumura

Abstract:

Three shell midden location was excavated to investigate the relationship between change in subsistence and paleoenvironment. JBH1 is early Neolithic with Mesolithic-like characteristic remaining (5450-5200 cal BC); JBH3 is late Neolithic with large stone blades (4040-3850 cal BC); JBH2 is post-Bronze Age (1070-1220 cal BC). The sabkha (paleo-lagoon) adjacent to the shell midden was covered by a surface layer of wind-formed sand, with a subsequent water-formed sand/mud alternation (770-670 cal BC), then a marine sand layer containing shells from the inner bay sand/mud flats (3980-3800 cal BC). At some locations, possible shell midden layer (4300-4110 cal BC) was detected beneath the marine strata, raising the issue of the relationship between its formation and marine transgression. Therefore, a lagoon and sandy-muddy tidal flats existed in the sabkha during the Neolithic, with small mangrove swamps scattered nearby, but the lagoon seems to have declined after the Bronze Age. Vegetation was covered with herbaceous vegetation during the early Neolithic, which may have been used as fuel; but became extremely scarce after the late Neolithic. During the Neolithic, the only subsistence confirmed was shellfish gathering and net fishing in the lagoons and coastal areas. Due to the lack of evidence for hunting, a year-round occupation is questionable, and the possibility of seasonal habitation needs to be examined. A more extensive study is also necessary in terms of lithic materials acquisition method. After the Bronze Age, shell midden formation declined with the disappearance of lagoons, and the shellfish composition shifted to coastal pelagic species.

Keywords:

Arabian Peninsula; Neolithic; shell midden; subsistence; paleoenvironment

Title:

Animal deposits in the tombs of the Khor Jarama necropolis (Oman - 3500-2900 cal. BC)

Author(s):

Julie Rivière and Christophe Sévin Allouet

Abstract:

Excavations led since 2018 on the site of Khor Jarama, in Oman's Ja'alan, have revealed an as-yet unseen local culture characterized by a new burial tradition and the construction of the first monumental tombs known to date in the region. The dates of the latter are very early in the second half of the 4th millennium B.C., and are thus much earlier than those of the monuments of the Hafit culture. This discovery fills a data gap that existed until now in Oman for the period between 3500 and 3100 BC. The excavation of southern tombs, which comprise a small group of four monuments, has indeed provided bone elements of sheep and goat (*Ovis aries/Capra hircus*), whose deposit in the form of meat quarters leaves little doubt as to their status, especially since the anatomical pieces belong to only one side of the animal. These deposits, placed separately from the bodies of the deceased, are made up of anatomical parts with a high food value (limbs and ribs), taken from young adults or juveniles (18-20 months, male and female). This choice of a species from livestock constitutes, to our knowledge, a unique or rare case of an animal funeral offering, due to the regional traditions of this chronological period during which communities usually value marine or mangrove resources (malacofauna or marine mammals), which are the basis of their economy.

Keywords: Oman, necropolis, 4th millennium, animal deposit, meat quarters.

Title:

Bone and shells. Artisanal exploitation of hard animal materials in the Iranian-Pakistani region during the Neolithic period

Author(s)

Laura Manca, Marjan Mashkour, Aurore Didier, Aline Averbouh, Sanaz Beizaei Doost, Roya Khazaeli, Michael Buckley, and Yutaka Miyake

Abstract:

The production of hard animal materials by the agro-pastoral societies of South-West Asia is currently poorly known from a technical and economic point of view. This poster will present the new data acquired in the framework of the EXAMS project (Sorbonne-University Alliance) which define the modalities of transformation and use of these productions by revealing the technical choices specific to the groups occupying the transcultural corridor from the Zagros -and adjacent areas- to the Indus Valley.

Keywords:

Bone; Iran; Neolithic; Pakistan; shell

Title:

Agro-pastoralism in the Urban Landscape of Nishapur (Khorasan, NE Iran) from the 3rd up to the 13th century CE

Author(s):

Roya Khazaeli, Haeedeh Laleh, Zahra Lorzadeh, Sanaz Beizaeedoost, Marjan Mashkour

Abstract:

Nishapur was one of the main urban centers of the Iranian world and a metropole of the eastern Islamic world in Great Khorasan. Nishapur centrality within the exchange network and its role in the flow of resources and materials in both inter- and trans-regional scales had been a critical factor in its development.

For two decades, several national and international excavations have been carried out that resulted in the discovery of a significant amount of animal remains from different parts of the urban landscape. In total almost 11000 animal bones have been studied at the Archaeozoology section of the bioarchaeology laboratory of the University of Tehran. The archaeozoological results indicate that sheep, goat, cattle and equid were the most exploited animals for both food and secondary products. Equid remains confirm the use of the horse and donkey in various activities and probably food consumption. The presence of fish remains along with primary textual data both point to Nishapur waterscape in which *qanat* system and rivers played an active role. Metric analyses of sheep bones indicate the presence of large breeds in Nishapur. Moreover, the heterogeneity in the size reflects the presence of various populations that were introduced to the city from surrounding regions. The discovery of a bucranium of a wild sheep with imposing horncores points to the practice of hunting. This may also be linked to the long-lasting traditions of the ritual display of bucrania on the graves as we can see in Iran and Turkmenistan.

The faunal assemblages collected in Nishapur are the unique source of bioarchaeological data for documenting agropastoral activities and animal production economies in North East Iran and Southern Central Asia in a period of intense exchanges in the Khorasan trade network.

Keywords:

Nishapur, Khorasan, Archaeozoology, Subsistence economy, Islamic period

Title:

Identifying Equids from archaeological sites in the Middle East using the shape criteria of the cheek teeth and metapodials from Eurasian modern reference collection

Author(s):

Azadeh F. Mohaseb, Raphaël Cornette, Michaela Zimmermann, Hossein Davoudi, Rémi Berthon, Thomas Cucchi, Elmira Mohandesan, Véra Eisenmann, Joris Peters, and Marjan Mashkour

Abstract:

Equids have shaped past Eurasian societies in many ways. This applies in particular to domestic horses, donkeys, and their hybrids. Key to documenting modes of exploitation and cultural trajectories in past societies is the correct taxonomic classification of remains found in archaeological sites. However, close osteomorphological resemblance of wild and domestic equids and their hybrids, mules and hinnies, complicates the identification of intentionally fragmented or naturally damaged archaeological specimens. Here, we apply Geometric Morphometrics to mandibular teeth and metapodials, two skeletal elements commonly found in archaeological collections and known for their diagnostic properties using traditional morphometric methods, on domestic horses, domestic donkeys, hybrids, and Asiatic wild asses. Taxonomic classification of these specimens considered both *shape* and *form*, applying Linear Discriminant Analysis, k-Nearest Neighbors algorithm and Artificial Neural Networks to six combinations of taxa. We obtained correct classifications in over 87% of the teeth and in over 93% of the metapodials. This modern dataset was used to classify equid specimens from three archaeological sites in the Middle East, already analyzed morphologically, namely the Neolithic settlement of Alikemek Tepesi in the south of the Republic of Azerbaijan, the Iron Age level of Tepe Hasanlu in north-western Iran, and the medieval site of Shahre Qumis in north-eastern Iran. Taking into account the past zoogeography of wild equids and the historical distribution of their domesticated descendants and hybrids, the GM approach presented in this study offers the possibility to morphologically classify archaeological equids with far greater certainty than has been the case so far.

Title:

Mathematical models and simulations for evaluating diversity in domestication processes

Author(s):

Hiroomi Tsumura, Yasushi Ota and Akiko Yusa

Abstract:

The process of domestication has been understood mainly through the application of social models based on excavated materials. For this reason, there has been little discussion about the characteristics of paleoecological diversity and the discontinuity of evolution. In this study, we estimated each paleoecological parameter by simulation based on a mathematical model, and examined the diversity of the domestication process. The Lotka-Volterra equation was applied to the mathematical model, and the size of human biomass relative to paleovegetation and paleoecology was used as the final estimation variable. A paleoenvironmental model using GIS was applied to estimate the field of the simulation, and the size of human biomass was estimated by substituting paleoenvironmental parameter values according to the transition of this virtual space-time. As a result, the lower and upper limits of human biomass were calculated during the process of domestication, and it was clarified that there exist different rates and extents of domestication according to various aspects of carrying capacity and subsistence diversity. Regarding the environmental bias of livestock and farming, by calculating the combination method and mixing ratio, it was shown that there is diversity in the magnitude of the impact of the environmental bias on human society from West Asia to Far East Asia. They show many intermittent aspects in the process of human evolution, suggesting diverse aspects of prehistoric society, such as explosive biomass expansion and discontinuity, that cannot be discussed from the excavated materials.

Keywords:

Domestication; Paleoenvironment; Lotka-Volterra equations; Biodiversity; Simulation