



*XIV International meeting
3rd to 7th of June
Barcelona*

PROGRAMME & ABSTRACT BOOK

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Laboratori d'Arqueozoologia

The Archaeozoology laboratory is a leading research group focused on understanding human-animal interactions in our past. The research lines spread to the birth and consolidation of first farming societies with a special focus in animal domestication processes, animal resources management in hunter-fisher-gatherer american societies, exploitation of coastal resources and animal management in historical times. The application of innovative research and leading techniques and analysis such as staple isotopes analysis, aDNA, biomechanics, GMM, osteon analysis and finite elements analysis allows us to move forward and develop the discipline.

Institute of Human Paleoecology and Social Evolution (IPHES)



The Catalan Institute of Human Paleoecology and Social Evolution (IPHES) is a transdisciplinary institution that promotes advanced research, education and knowledge transfer, and social engagement with science. Therefore, we cross and combine different fields of science, humanities and social sciences, but also geosciences and biosciences to apply them to the study of human and social evolution. Our aim is to promote knowledge both about ancient human species of the past and about human beings today.

Grup de Recerca Arqueològica al Mediterrani i el Pròxim Orient (GRAMPO)



GRAMPO is a research group that clusters the study, diffusion and research work of three intertwined archaeology research groups. 'SAPPO' focuses on archaeology of the first farming societies of the Near East and the Iberian Peninsula. 'Laboratori d'arqueozoologia' researches the birth, consolidation and development of animal domestication processes. 'ARCHAEOM' is centred on archaeometry of pottery from the near East, the Mediterranean basin and the Iberian Peninsula. GRAMPO has a long and unique trajectory in Spain of transmediterranean multidisciplinary research, with stable excavation and research projects. The combination of solid archaeological data with the application of innovative analytics are the base for its scientific research.

Museu d'Arqueologia de Catalunya



**Museu d'Arqueologia
de Catalunya**

The Museu d'Arqueologia de Catalunya (MAC), where archaeology teaches, inspires, and thrills us, displaying Catalonia's history from prehistory to the Middle Ages. The museum also offers a varied and interesting programme of activities and temporary exhibitions (the museum currently exhibits: 'Archaeology in exile: The Archaeology museum of Catalonia and the Spanish war. 1936-1939'), and is a must for anyone interested in archaeology and the ancient art and history of Catalonia and the eastern Mediterranean.

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Generalitat de Catalunya
**Agència Catalana
del Patrimoni Cultural**

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GENERAL PROGRAMME FOR THE XIVth ASWA[AA] MEETING, BARCELONA 2019

MONDAY 3 JUNE

- 16.00 - 19.30 Registrations and Helpdesk open at the *Museu d'Arqueologia de Catalunya* (MAC)
- 17.00 - 17.20 Welcoming ceremonies
- 17.20 - 18.20 Invited Conference Prof. Dr. Joris Peters
Outstanding and enigmatic: perspectives on the early Neolithic site of Göbekli tepe (SE Turkey)
- 18.30 - 19.00 Open visit at the Museu d'Arqueologia de Catalunya (MAC)
- 19.00 - 20.00 Welcoming cocktail Reception

TUESDAY 4 JUNE

- 8.30 - 9.00 Registration and Helpdesk open at Sala d'Actes de la Facultat de Ciències Polítiques i Sociologia (Meeting Hall of the Faculty Political Science and Sociology), Autonomous University of Barcelona (UAB)
- 9.00 - 9:20 Opening Ceremony; invited talks Scientific and Institutional Support Committees
- 9:20 - 10:00 Invited Conference, Dr Prof. Louis Chaix.
Cattle, sheep, goats and dogs: companions for the death (Kerma Sudan, 2500-2000 BC)
- 10.00 - 18.30 Scientific Programme sessions
- **Session 1:** Walking on the wild side
 - **Session 2:** (Pre)-Domestication and early domestic scenarios



WEDNESDAY 5 JUNE

- 8.30 - 9.00 Registration and Helpdesk open at the Sala d'Actes de la Facultat de Ciències Polítiques i Sociologia (Meeting Hall of the Faculty Political Science and Sociology), Autonomous University of Barcelona (UAB)
- 9.00 - 18.15 Scientific Programme sessions
- **Session 3:** Consolidating experiences, settling bases
 - **Session 4:** Bronze period, gleams of light
 - **Session 5:** From gleams to the Iron light
- 21.00 - Gala dinner

THURSDAY 6 JUNE

- 9.00 - 9.30 Registration and Helpdesk open at Sala d'Actes de la Facultat de Ciències Polítiques i Sociologia (Meeting Hall of the Faculty Political Science and Sociology), Autonomous University of Barcelona (UAB)
- 9.30 - 16.45 Scientific Programme sessions
- **Session 6:** Telling Hellenistic, Roman and Byzantine animal histories
 - **Session 7:** From late-modern to current times
 - **Session 8:** Animals through time
- 17.30 - 18.00 Closing Ceremony & ASWA Meeting

FRIDAY 7 JUNE

Post-Conference Excursion



SCIENTIFIC PROGRAMME



Tuesday, June 4th

- SESSION 1: WALKING ON THE WILD SIDE

Chairperson: Carlos Tornero

- 10.00 - 10.15 Rivka Rabinovich; Rebecca Biton & Sharon Gonen
(pg. 21) Completeness of elements and exploitation modes in the Mousterian site of Nahal Mahanayeem Outlet (Middle Paleolithic, Israel)
- 10.15 - 10.30 Reuven Yeshurun & Nehora Schneller-Pels
(pg. 22) The Ahmarian and Aurignacian Archaeofaunas at Manot Cave (Israel) and the Early Upper Paleolithic of the Levant
- 10.30 - 10.45 Kate Swinson & Louise Martin
(pg. 22) Long-term trends in animal exploitation in prehistoric Jordan, 26k-11k cal BP
- 10.45 - 11.00 Ignacio Aguilar Lazagabaster & Nimrod Marom
(pg. 23) Modelling the effects of human settlement intensity and faunal extinction on food webs in the Judean Desert

Discussion and Coffee break

- SESSION 2: (PRE)-DOMESTICATION AND EARLY DOMESTIC SCENARIOS

Chairperson: Reuven Yeshurun

- 11.30 - 11.45 Anne Bridault & Rivka Rabinovich
(pg. 24) Investigating wild game exploitation in the Final Natufian of Eynan/Mallaha (Northern Jordan Valley, Israel): contribution of the macro-mammals remains
- 11.45 - 12.00 Florent Rivals; Rivka Rabinovich; Iván Ramírez-Pedraza; Hamoudi Khalaily; François Valla & Anne Bridault
(pg. 25) Ungulates paleodiet and seasonality in the Final Natufian assemblage from Eynan/Mallaha (Northern Jordan Valley, Israel)
- 12.00 - 12.15 Rebecca Biton & Salvador Bailón
(pg. 26) Frogs, Lizards and Snakes from Eynan - Background Fauna or More?



12.15 - 12.30 Mary C. Stiner; Natalie Munro; Hylke Buitenhuis; Mihriban Özbaşaran & Gunes Duru
 (pg. 26) *An Early Pathway to Sheep Domestication at Aşikli Höyük (Central Anatolia, Turkey): Evidence from Age and Sex Structures*

Chairperson: Natalie Munro

12.30 - 12.45 Lionel Gourichon; Daniel Helmer; Carlos Tornero & Juan José Ibáñez
 (pg. 27) *Animal resource exploitation at Tell Qarassa North, an Early Pre-Pottery Neolithic B village in southern Syria*

12.45 - 13.00 Lisa Yeomans & Pernille Bangsgaard
 (pg. 28) *New work at Ganj Dareh: Initial results from the ongoing analysis of the faunal remains*

13.00 - 13.15 Eva-Maria Geigl
 (pg. 28) *Paleogenetics of the domestication of animals in SWA*

- Lunch break - 1h 45 min

Chairperson: Roger Alcàntara Fors

15.00 - 15.30 Poster Presentation, Sessions 1 & 2

- | | |
|----|--|
| P1 | Emily Tilby
(pg. 64) <i>Reconstructing the local environment of Neanderthals and Modern Humans: Preliminary zooarchaeological analysis of the micromammals of Shanidar Cave (Iraqi Kurdistan)</i> |
| P2 | Ivan Ramírez; Florent Rivals; Thorsten Uthmeier & Victor Chabai
(pg. 64) <i>Seasonality and paleoenvironmental of the last Neanderthals at Kabazi II (Crimea) using tooth microwear analysis</i> |
| P3 | Hagar Reshef; Marie Anton; Fanny Bocquentin; Jacob Vardi; Hamoudi Khalaily; Guy Bar-Oz & Nimrod Marom
(pg. 65) <i>A Thought Fox: Late Manifestation of Animism in a Joint Burial of Humans and Foxes in Pre-Pottery Neolithic Motza, Israel</i> |
| P4 | Ella Tsahar; Roi Talbi & Nimrod Marom
(pg. 65) <i>Cattle husbandry as a potential proxy to climate change in the southern Levant</i> |



Chairperson: Max Price

- 15.30 - 15.45 Allowen Evin; Max Price; Roger Alcàntara Fors; Azadeh Mohaseb; Maria Saña; Marjan Mashkour; Joris Peters; Thomas Cucchi; Greger Larson & Keith Dobney
(pg. 29) Tracking long-term human and pig relationship in Southwest Asia using geometric morphometrics
- 15.45 - 16.00 Kaveh Yousef Pouran; Maria Saña & Joan Anton Barceló
(pg. 30) A Biomechanical approach to understand Neolithic animal husbandry
- 16.00 - 16.15 Ozlem Saritas; Ardern Hulme-Beaman & Louise Martin
(pg. 31) Applying Geometric Morphometrics to Regional Questions on the Early Management of Pigs in Central Anatolia: The Results from Boncuklu Hoyuk.
- 16.15 - 16.30 Roger Alcàntara Fors; Josep Fortuny; Miquel Molist & Maria Saña
(pg. 31) A story of bone strength. Goat mobility through cross-sectional properties and geometric morphometrics of long bones in tell Halula
- 16.30 - 16.45 Joaquim Ripoll; Roger Alcàntara & Maria Saña
(pg. 32) Bone microstructure as a marker of sheep and goat management strategies during the Early Neolithic in the Middle Euphrates Valley

- Coffee break -

Chairperson: Allowen Evin

- 17.15 - 17.30 Canan Çakırlar; Rémi Berthon; Pamela Burger; Mehmet Kara Erkut; Sevil Kilimci Figen; Janoscha Kreppner; Sara Lado; Marjan Mashkour; Sarah Macclure & Joris Peters
(pg. 33) Hidden hybrids: Camels and cultural blending in the Ancient Near East
- 17.30 - 17.45 Cheryl Makarewicz; Taylor Hermes; Liora Horwitz & Henry Schwarcz
(pg. 34) Isotopic variation in early Neolithic sheep and goats from the southern Levant: Challenges in the use of tooth enamel $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ to detect mobility



17.45 - 18.00 Jacqueline Meier

(pg. 34) Neolithic Kfar HaHoresh: Contextualizing diet and disposal practices at a ceremonial center

18.00 - 18.15 Cheryl Makarewicz & Nimrod Marom

(pg. 35) The Woolly Margin: Late Pre-Pottery Neolithic Settlement Patterns in Jordan and the Pastoralist Connection

18.15 - 18.30 Nadja Poellath & Joris Peters

(pg. 35) Birds of a feather flock together - early Neolithic avifaunas in Upper Mesopotamia

Discussion



Wednesday, June 5th

- SESSION 3: CONSOLIDATING EXPERIENCES, SETTLING BASES

Chairperson: Joris Peters

- 9.00 - 9.15 Natalie Munro & Mary C. Stiner
(pg. 36) A zooarchaeological history of the Neolithic occupations at Franchthi Cave and Paralia, Greece
- 9.15 - 9.30 Linoy Namdar; Yitzhak Paz; Jacob Vardi; Khamoudi Khalailah & Lidar Sapir-Hen
(pg. 36) Human-Animal Relationships during the Late Neolithic period in the Southern Levant
- 9.30 - 9.45 Rémi Berthon & Delphine Decruyenaere
(pg. 37) Herds on their way to the pastures: Zooarchaeological results from Uçan Agil campsite (5th-3rd mill. BC / Nakhchivan - Azerbaijan)
- 9.45 - 10.00 Emmanuelle Vila
(pg. 38) Early Uruk village economy in the Southern Kurdistan (Iraq): The faunal analysis of Girdi Qala (Qara Dagħ Project)
- 10.00 - 10.15 Max Price
(pg. 38) Production and Consumption at Tell Surezha: A Picture of an Animal Economy on the Erbil Plain during the Transition to Complex Societies

Chairperson: Lionel Gourichon

- 10.15 - 10.30 Julie Daujat; Ardern Hulme-Beaman; Allowen Evin; Richard Allen; Greger Larson & Naomi Sykes
(pg. 39) Tale of a two deer cruises in the Eastern Mediterranean
- 10.30 - 10.45 Selena Vitezović
(pg. 39) Exploitation of animal resources and use of animal hard tissue in the Eneolithic period in the Balkans
- 10.45 - 11.00 Kevin Lidour & Mark Jonathan Beech
(pg. 40) Fishing strategies and adaptation to maritime environments during the Neolithic on Marawah Island, United Arab Emirates



11.00 - 11.15 Caroline Mougne; Lapo Gianni Marcucci; Emilie Badel; Philippe Béarez
(pg. 41) *Exploitation and use of marine invertebrates at the Neolithic site of Ra's al-Hamra 6 (Muscat, Sultanate of Oman)*

Discussion and Coffee break

Chairperson: Emmanuelle Vila

- SESSION 4: BRONZE PERIOD, GLEAMS OF LIGHT

11.45 - 12.00 Cheryl Makarewicz; Max Price & Roz Gillis
(pg. 42) *The evolution of cattle management in the southern Levant*

12.00 - 12.15 Gwendoline Maurer
(pg. 42) *Cattle Away from Home: The Kura Araxes at 3rd Millenium BC Tel Bet Yerah*

12.15 - 12.30 Jwana Chahoud
(pg. 43) *The economy of Bronze Age societies in the Central Levant*

12.30 - 12.45 Hervé Monchot; Lionel Gourichon; Anaïs Marrast; François Villeneuve & Zeidoun Al-Muheisen
(pg. 43) *4000 years of food history at Dharih (Tafileh, Jordan)*

12.45 - 13.00 Kathryn O. Weber
(pg. 44) *The Herd and the Hunt in the Bronze Age South Caucasus*

13.00 - 13.15 Siavash Samei; Natalie Munro & Gideon Hartman;
(pg. 44) *Zooarchaeological and Stable Oxygen ($\delta^{18}O$) Isotope Analyses of Herd Management Strategies at the Early Bronze Age Kura-Araxes Settlement of Köhne Shahar in Northwestern Iran*

- Lunch break – 1h 45 min



Chairperson: Joaquim Ripoll Miralda

15.00 - 15.30	Poster Presentation, Sessions 3, 4 & 5
P5	Scott Rufolo <i>(pg. 67) Completing the Zooarchaeological Picture of Rural Responses to Urban Developments in the Early Bronze Age Khabur Basin of Syria</i>
P6	Dimitris Filioglou Dimitris <i>(pg. 67) Animals in pits: A case study from the Middle-Bronze Age 'Megaron' in Marathon, Greece</i>
P7	Moussab Albesso Moussab <i>(pg. 68) Local strategies and trends in the animal economy at Tell Madaba (Jordan) during the Iron Age</i>
P8	Laura Strolin <i>(pg. 68) Gazelle exploitation at Iron Age Salut (Oman)</i>

Chairperson: Marjan Mashkour

- 15.30 - 15.45 Giovanni Siracusano
(pg. 45) From Sheperds To Farmers At Arslantepe (Eastern Turkey) During The Early Bronze II And III, From 2750 to 2000 BC
- 15.45 - 16.00 Inbar Ktalav; Ezra Marcus & Guy Bar-Oz
(pg. 46) Cultural and Economic aspects in Middle Bronze Age Tel Ifshar: Preliminary results of the faunal remains
- 16.00 - 16.15 Laurel Poolman & Kathryn Morgan
(pg. 46) A Woven Economy: Middle Bronze Age Sheep Economies at Zincirli Höyük
- 16.15 - 16.30 Zohar Turgeman
(pg. 47) The old and the new: recent discoveries in the faunal aspect of Middle Bronze Age burial customs in the Levant

Discussion and Coffee break



Chairperson: Guy Bar-Oz

- SESSION 5: FROM GLEAMS TO THE IRON LIGHT

- 17.00 - 17.15 James Roberts; Lloyd Weeks; Melanie Fillios; Charlotte Cable & Yaaqoub Youssef Al-Ali
(pg. 48) The Faunal Remains from Saruq al-Hadid: an insight into human occupation of the desert fringes of southeastern Arabia during late prehistory
- 17.15 - 17.30 Shyama Vermeersch; Jens Kamlah & Britt M. Starkovich
(pg. 48) Tell el-Burak (Lebanon): a look into agricultural developments during the Bronze and Iron Age in the Southern Levant
- 17.30 - 17.45 Kamilla Pawlowska
(pg. 49) Bones never lie: Depositional pathways of food disposal at Çatalhöyük from the Bronze Age to the Phrygian, Hellenistic, and Muslim periods
- 17.45 - 18.00 Liora Kolska Horwitz; Omri Lerna; Eliezer Oren & Henk K. Mienis
(pg. 50) New Kingdom Military-Administrative Centers Along 'The Way of Horus', Northern Sinai
- 18.00 - 18.15 Jacqueline Studer; Andrea Loprieno-Gnirs & Noémi Villars
(pg. 50) Archaeozoology in the service of chronology: bone deposits from the Theban tomb complex of Mery (TT95) in Sheikh 'Abd el-Qurna, Egypt (15th century BC to present)



Thursday, June 6th

- SESSION 6: TELLING HELLENISTIC, ROMAN AND BIZANTINE ANIMAL HISTORIES

Chairperson: Jacqueline Studer

- 9.30 - 9.45 Abra Spiciarich & Lidar Sapir-Hen
 (pg. 51) *The Citadel and the Slaughterhouse: Faunal Remains from Hellenistic Jerusalem*
- 9.45 - 10.00 Derya Silibolatlaz-Baykara & Ismail Baykara
 (pg. 52) *Archaeozoological Evaluation of the Hellenistic Period at Tatarlı Höyük (Turkey)*
- 10.00 - 10.15 Nimrod Marom; Dina Avshalom-Gorni; Sarel Shalev & Miriam Pines
 (pg. 52) *Of Fish and Donkeys: Faunal Remains and Industry in Early Roman Magdala on the Sea of Galilee*
- 10.15 - 10.30 Katie Tardio; Sarah Adcock & Benjamin Arbuckle
 (pg. 53) *Corralled Cattle: Faunal Remains from the Late Roman and Byzantine Phases of Çadır Höyük, Turkey*
- 10.30 - 10.45 Pernille Bangsgaard
 (pg. 53) *A faunal analysis of Byzantine, Umayyad and Mamluk remains from the Northwest Quarter of Jerash, Northern Jordan*

Discussion and Coffee break

- SESSION 7: FROM LATE-MODERN TO CURRENT TIMES

Chairperson: Angelos Hadjikoumis

- 11.30 - 11.45 Rachel Bleviss; Guy Bar-Oz & Irit Zohar
 (pg. 54) *The role of Red Sea Parrotfish (Scaridae) as Trade Indicators in the Negev Desert during the Byzantine-Islamic Transition Period*
- 11.45 - 12.00 Marjan Mashkour; Sareh Amiri; Homa Fathi; Roya Khazaeli; Karyne Debie; Delphine Decruyenaere; Sanaz Bezaee Doost; Benoît Clavel; Safoora Kamjan; Rusudan Jajanidze; Valentin Radu; Emmanuelle Stoetzel & Eberhard W. Sauer
 (pg. 55) *Herding And Hunting On The Highlands Of Transcaucasia And Ciscaucasia From The Sasanian To Late Medieval Periods. The Archaeozoology Of The Dariali Gorge*



12.00 - 12.15 Louis Chaix

(pg. 56) *Cattle and temples. The meroitic butchery from Dukki-Gel (Northern Sudan) (100 BC-100 AD)*

12.15 - 12.30 Ninna Manaseryan

(pg. 56) *Caucasian Bison: Pages of History*

Chairperson: Mark Jonathan Beech

12.30 - 12.45 Jill Goulder

(pg. 57) *Looking ethologically at the past: working donkeys and cattle in modern Africa and 4th-3rd millennium BC Mesopotamia*

12.45 - 13.00 Angelos Hadjikoumis

(pg. 57) *Ethnozoarchaeological study of caprine husbandry in mixed agropastoral systems: questions of scale*

13.00 - 13.15 Maayan Lev; Reuven Yeshurun & Mina Weinstein-Evron

(pg. 58) *Identifying Accumulation and Post-depositional Taphonomic Processes on Reptile Bones Using Experimental Archeology*

- Lunch break - 1h 45 min

Chairperson: Alejandro Sierra

15.00 - 15.30 Poster Presentation, Sessions 6, 7 & 8

P9 Margarit Marjanyan; Noushig Zarikian & Boris Gasparyan

(pg. 69) *Ectoparasites remains from Areni-1 (Birds Cave) cave in Armenia*

P10 Noushig Zarikian; Boris Gasparyan & Kim Dilbaryan

(pg. 69) *A Tick remains from Areni-1 (Birds' Cave), Armenia*

P11 Francesca Slim; Canan Çakırlar; Janine Van Noorden & Brian Rose

(pg. 69) *Galatians in Gordion: animal husbandry practices during the Hellenistic period in central Anatolia*

P12 Roya Khazaeli; Marjan Mashkour; Homa Fathi & Hayedeh Laleh

(pg. 70) *A review of recent archaeozoological investigations from the Islamic period in Iran*

P13 Laura Harutyunova & Iren Kalantarian

(pg. 71) *Mollusks from the Archaeological Excavations of Getahovit-2 Cave (Armenia)*



- SESSION 8: ANIMALS THROUGH TIME

Chairperson: Adrià Breu Barcons

15.30 - 15.45 Meir Orbach

(pg. 59) Reassessing Late Pleistocene Hyenids in the Southern Levant: Taxonomy, Size Variability and Feeding Behavior

15.45 - 16.00 Laura Llorente-Rodríguez; Arturo Morales Muñoz; Nathalie Smits; Bruno Overlaet; Eisa Yousif & Sabah Jasim

(pg. 60) Molluscs beyond subsistence: The mollusc assemblages from Dibba al Hisn (Sharjah, UAE)

16.00 - 16.15 Marco Masseti

(pg. 61) Artistic evidence of the occurrence of two phenotypic varieties of horse in Bronze Age Egypt

16.15 - 16.30 Ninna Manaseryan & Nora Yengibaryan

(pg. 61) Armenia: The Horse in religion and Art

16.30 - 16.45 Marco Masseti

(pg. 62) The representation of doves (Columbidae Illiger, 1811) in the 2nd millennium BC Near Eastern and Aegean art

Discussion and Coffee break



ABSTRACT BOOK

Oral contributions



SESSION 1: WALKING ON THE WILD SIDE

Completeness of elements and exploitation modes in the Mousterian site of Nahal Mahanayeem Outlet (Middle Paleolithic, Israel)

RIVKA RABINOVICH¹, REBECCA BITON¹, AND SHARON GONEN¹

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In the Jordan Valley where a rich human record reflects the occupation of the area through the Pleistocene, the Nahal Mahanayeem Outlet (Middle Paleolithic, 65,000 BP) open air site is unique by its short term occupation and preservation. It was deposited in a dynamic waterlogged environment. Complete elements were uncovered, that required immediate on site conservation treatment as cracking and splitting occurred immediately with the exposure. However the bones remained fragile but complete. Thus we can actually characterize the size, morphological traits and species differences based on complete bones. Apparently, in the southern Levantine Middle Paleolithic record this is a very rare case. Crabs, fish, birds, amphibians and reptiles, rodents were uncovered from the site. Thus the environment can be reconstructed in great detail. Among the mammals, aurochs, rhinoceros, wild pig, fallow deer and gazelle are common. Both testudines species freshwater turtle and tortoise were exploited, being the earliest evidences of butchering of freshwater turtle at a Levantine Paleolithic site.

Aurochs are quite common in Middle Paleolithic assemblages in particular in open air sites, but not merely. Rhinoceros frequencies fluctuate. Both species appear in most sites in the southern Levant. Being the largest in the faunal record (more than one tone in weight), they require specific modes of retrieval and exploitation. When uncovered in the sites elements of both species are quite fragmented, limiting a reliable reconstruction of the species size and morphology. Moreover long bone splinters might be lumped in the same body size category, or ignored altogether, when species identification is impossible. Thus we lack a complete comprehensive of the relation between the Middle Paleolithic hunter-gatherer and the large beasts of his time – the aurochs and the rhinoceros. On a broader scale, a local base line of the aurochs can be build to serve for comparison to latter periods changes on species selection, over hunting and even domestication.

The stone tools are relatively few and composed of “hunter tool-kit”. Yet again, we should challenge the mode of animal exploitation at the site, and examine if every species reflect the same depositional history. Detailed taphonomy procedure coupled with spatial distribution is applied to face this challenge.

Keywords: Middle Paleolithic, taphonomy, mode of exploitation



The Ahmarian and Aurignacian Archaeofaunas at Manot Cave (Israel) and the Early Upper Paleolithic of the Levant

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¹*Zinman Institute of Archaeology, University of Haifa, Haifa, Israel – Israel*

The Early Upper Paleolithic period in the Levant exhibits cultural differences between two entities, the "local" Early Ahmarian and the Levantine Aurignacian, which is suggested to represent a short incursion of back-migrating European groups. This cultural variability raises the question of differing adaptations. Here we use archaeofaunal remains from the Early Upper Paleolithic sequence of Manot Cave (Western Galilee, Israel), to track human hunting patterns, carcass transport and processing within the Early Ahmarian (46–42 ka) and Levantine Aurignacian (38–34 ka) phases. We test two hypotheses: 1) The Ahmarian and Aurignacian represent adaptations to different environments; and 2) The two entities differ in mobility patterns and site use. Our taphonomic analysis showed subtle differences in depositional processes between the two phases and demonstrated a primarily anthropogenic complex. In both phases, human subsistence was based on two ungulate species, mountain gazelle (*Gazella gazella*) and Mesopotamian fallow deer (*Dama mesopotamica*), with some contribution from birds, tortoises and small mammals. The prey spectrum and choice occupy a middle position between the Middle Paleolithic and the late Epipaleolithic of the region. Carcass transport and processing patterns are similar in both phases and indicate hunting in the vicinity of the cave. Aging and sexing data tentatively lead us to suggest a summer-autumn occupation for both cultures. Despite this, there are also several significant differences between the phases such as increased exploitation of small ungulates (gazelle) and small game (especially birds), and greater accumulation of material in the Aurignacian. When evaluated against independent paleoenvironmental proxies, these patterns cannot be ascribed to environmental change but rather indicate greater occupation intensity during the Aurignacian compared to the Ahmarian. This could explain the outstanding archaeological character of the Aurignacian entity in the Levant.

Keywords: Early Ahmarian, Levantine Aurignacian, Gazelle, Fallow deer, Intensification, Taphonomy

Long term trends in animal exploitation in prehistoric Jordan, 26,000–11,000 cal BP

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This paper presents the results of a meta-analysis of published zooarchaeological data from sites in Jordan dating to between 26,000 and 11,000 cal BP. Taxonomic abundances from forty two assemblages are compiled and used to identify long term trends in animal exploitation. Drawing on broad-spectrum theory, we use both conventional time series analysis of faunal categories (e.g. fast vs. small game; large vs. small ungulates) and more holistic multivariate approaches. The results strengthen recent findings of significant geographic diversity in the composition of assemblages from different ecoregions within the southern Levant. Considering these regions independently provides evidence suggesting multiple, often divergent, trajectories in animal subsistence over time. We compare these trends against palaeoclimate and demographic data in order to elucidate possible drivers of faunal turnover and change in



subsistence strategies.

Keywords: Epipalaeolithic, Jordan, Broad Spectrum Revolution, Climate change, Population pressure, Correspondence analysis

Modelling the effects of human settlement intensity and faunal extinction on food webs in the Judean Desert

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The Judean Desert is a northern extension of the Negev, contained within the eastern slopes of the Judean Mountains to the Jordan Valley. The aridity of the Judean Desert is ameliorated by the presence of wadis (= valleys) with water, which are biodiversity hotspots for flora and fauna. The absence of mammal species that have been identified in the zooarchaeological record (such as deer, leopards, and maned rats), suggests that human activities in the region may have contributed to sharp changes in community structure through the Holocene. Here we investigate the effect of these extinctions in the Judean Desert ecosystem by using food web theory and network analysis. We build a food web of the Judean Desert through an exhaustive search in the literature and other online sources. We complete the food web with species no longer present in the Judean Desert, based on archaeozoological data. We then model the random extinction of species in the food web and calculate network parameters, including number of links (L), number of species (S), connectance (L/S), predator: prey ratio (P/p), and number of secondary extinctions (ExtAcc). We use this random extinction model as the null model to compare the real known data on species extinction. The results show that changes in the network parameters of the real extinction model are significantly different ($p < 0.05$) from the null random model. We hypothesize based on differences in network parameters that this departure from the null model is related to trophic cascade effects produced by the extinction of the top predator, the leopard, which considerably affected food web stability and predator-prey interactions in the study region. We discuss these results in the context of human occupation intensity in the area and the archaeological record.

Keywords: ecosystem, extinction, network, trophic, zooarchaeology



SESSION 2: (PRE)-DOMESTICATION AND EARLY DOMESTIC SCENARIOS

Investigating wild game exploitation in the Final Natufian of Eynan/Mallaha (Northern Jordan Valley, Israel): contribution of the macro-mammals remains

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The onset of the Natufian culture is regarded as a critical shift to a new level of complexity, sedentism or semi sedentism and subsistence intensification. The Final Natufian is, on the contrary, generally seen as a phase of decline in settlement density and a return to a more mobile settlement strategy in a context of increased resource stress. Archaeofaunal studies have contributed significantly to characterize the changes in human economic strategies across the Natufian period, with comprehensive syntheses deriving mainly from the western Galilee-Mount Carmel region (e.g. Stutz, Munro, Bar-Oz, 2009). The site of Eynan/Mallaha was one of the main Natufian “hamlet” in the Mediterranean region of the southern Levant, consisting of semi-buried buildings of stone and brush. The richness of the humid ecosystem of the Hula Valley and its surroundings attracted Natufian hunter-gatherer-fishers who intermittently settled at the site for several millennia during the Early, Late, and Final phases of the period. The Final Natufian layer (Ib), was excavated between 1996–2005 under F. Valla and H. Khalaily on approximately 250 m² and it is dated between 10,730 and 9760 cal BC, 2σ. The study of the tens of thousands of macro-mammals remains recovered from the layer Ib underway for several years (e.g. Bridault et al, 2008) is still in progress. In the recent years, we have expanded our study sample and reoriented our sampling strategy in order to get more data on the ungulate dental age. We present the relevant results of the zooarchaeological investigation (i.e. prey choices, carcass exploitation patterns, hunting profiles, and seasonality indices) in order to shed light on the game exploitation strategy and the site occupation pattern during the Final Natufian in the Northern Jordan Valley.

Keywords: subsistence strategy, Hula Valley, Late Epipalaeolithic



Ungulates paleodiet and seasonality in the Final Natufian assemblage from Eynan/Mallaha (Northern Jordan Valley, Israel)

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In this study, we present the combined results of eruption and dental microwear analyses on the ungulate assemblages recovered from the Final Natufian (level Ib) at Eynan/Mallaha (Israel). Dental wear refers to two methods for reconstructing dietary habits in ungulates. They correspond to two scales of analysis, macroscopic (mesowear) and microscopic (microwear), which are related to different temporal scales. Consequently, each method is giving access to very different periods in the life history. Mesowear is a proxy averaging diet over months while microwear reflect the diet of the last days before death. The first objective is to integrate the results from mesowear and microwear to provide indirect evidence of the dietary habits of the ungulates (fallow deer, roe deer, red deer, mountain gazelle and wild boar) and to reconstruct their habitat(s). The second objective is to use tooth microwear patterns (microscopic features produced by food items on teeth) as a high-resolution proxy for estimating the duration of mortality events and their seasonality, and to compare with the data obtained from tooth eruption and wear patterns. Regarding the dietary habits of the ungulates from Eynan, dental wear classifies the fallow deer, roe deer and gazelle as leaf browsers, red deer as grass-dominated mixed feeder, and wild boar in the mixed-feeding category. There is no overlap in dietary patterns, which suggest significant niche partitioning among the ungulates. These data also support the presence of diverse habitats around the site (both wooded and open areas). The study of the mortality events through zooarchaeology or microwear provides significant information about seasonal resource procurement by the Natufian groups. Microwear analysis also permitted to classify each species of ungulate as resulting from seasonal events. The results are supporting the seasonal hunting of the ungulates. The combined approach will permit to define if these animals were hunted during a single season, or if they could correspond to different seasons over the year. This technique opens new perspectives to investigate seasonal patterns of ungulate accumulations in archaeological sites using non-destructive sampling.

Keywords: microwear, mesowear, seasonality, ungulate, zooarchaeology



Frogs, Lizards and Snakes from Eynan - Background Fauna or More?

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Eynan/Ain Mallaha is a Late Epipaleolithic (MIS 1) archaeological site located in the Hula Valley, Israel. Eynan's hunter-gatherers settled at the foot of hills, near the spring of "Enot Enan" (Ain Mallaha), a complex of large artesian springs that provided a year-round water source. The Final Natufian layers are replete with archaeological finds associated with built habitations and diverse structures such as fireplaces and postholes. Ample archaeozoological data collected up till now confirms hunting, gathering and fishing took place at Eynan, with the medium-size mammals apparently being the major dietary component. More than five thousands amphibian and squamate remains were retrieved from a selected area of the site. These remains comprise the most taxonomically diverse assemblage of amphibians and squamates from a Southern Levantine archaeological site with at least 15 different taxa identified so far. Some of the taxa are reported for the first time in the Pleistocene Hula Valley record, other are particularly important because they fill a temporal gap between the recently published Pleistocene amphibians and squamates from Gesher Benot Ya'aqov (MIS 20–18) and Nahal Mahanayem Outlet MIS 4/3) and the present fauna in the Hula Valley. The outstanding amphibian and squamate assemblage combined with the thorough excavations at the site enables a comprehensive interpretation of the finds. Most of the frogs, toads, lizards and snakes are identified as background fauna and can be used to reconstruct the paleoenvironment in the vicinity of the site while occupied. But the accumulation of some taxa is apparently the result of human exploitation and therefore strongly biased by anthropological preferences. Three snake species were gathered in large quantities and brought to the site for further exploitation. Relative species abundance, spatial distribution, taphonomic observations and ecological considerations all point to the same conclusion: the Final Natufian inhabitants of Eynan intensively exploited specific snakes while overlooking other species.

Keywords: Eynan, Natufian, Hula Valley, Amphibians, Squamates, Paleoenvironment, Human exploitation

An Early Pathway to Sheep Domestication at Aşıklı Höyük (Central Anatolia, Turkey): Evidence from Age and Sex Structures

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This study investigates the behavioral and structural conditions of caprine domestication at Aşıklı Höyük, an early Pre-Pottery Neolithic site in Central Anatolia (Turkey). Recent research has established that caprines-mostly sheep-were held captive on site as early as 8.4 cal BCE (Stiner et al. 2014; Mentzer 2018). Significant changes in the nature and scope of caprine management unfolded over the ensuing millennium, based on evidence from caprine age and sex structures. Controlled comparisons of the Aşıklı caprine demographic data to that from



Paleolithic, Epipaleolithic and later Neolithic sites put the results in larger economic and evolutionary perspectives. Culling was very biased to immature stock during the earliest occupations at Aşikli, whereas caprines lived well into their reproductive years in the later levels. Substantial increases in harvesting efficiency are apparent with time, as well as greater optimization of fat yields in meat or milk. Thus by a distinct evolutionary pathway, later PPN folk returned to prey age preferences similar to pre-LGM foragers. The Aşikli data expose a major contradiction, however, in that zooarchaeological, phytolith, isotope and geoarchaeological evidence clearly demonstrate human manipulation of the caprines, while there was no significant change in mean body size. While strong artificial selection by humans is often accompanied by body size diminution in the managed population across generations, this did not happen at Aşikli (Buitenhuis et al. 2018). The peculiar age structures of the Aşikli caprines in Levels 5 and 4 suggest a distinct mode of animal recruitment, probably collecting live lambs and kids when hunters killed their mothers, that was gradually replaced by successful stock breeding. Even so, the practiced may have continued at lower levels, diluting human selection effects on caprine body size by maintaining heterozygosity in the captive population. These results contribute to our understanding of the endemic development of caprine management at Aşikli. Once considered to represent an early westward expansion of PPN communities from the Fertile Crescent, it is now clear that the Aşikli Höyük community was a formative part of Neolithic emergence.

Keywords: domestication, caprines, Central Anatolia, age and sex structure

Animal resource exploitation at Tell Qarassa North, an Early Pre-Pottery Neolithic B village in southern Syria

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Located near the Jabal al-Arab (southern Syria), Tell Qarassa North has yielded Neolithic occupation phases dated to the middle and the second half of the ninth millennium BC and corresponding to the Early Pre-Pottery Neolithic B and the Early/ Middle PPNB transition. This period is of great importance for understanding the economic and social changes that occurred during the emergence of farming since morphologically domesticated plants and animals are first attested at that time in the Levant and northern Mesopotamia. In this paper we present the main results of the study of the faunal assemblages from the area XYZ. More than 15 taxa have been identified where goats (*Capra format aegagrus*) composed the main part, followed by gazelles, boar, aurochs, carnivores, hares, various bird species and spur-thighed tortoises. Hunting activities around the nearby lake and in the surrounding steppe and rocky landscapes seem to have play a significant role in the subsistence of the village community. However, the issue of human management of goats arises in this context. Among other approaches, biometric comparison with other contemporaneous or later sites with goat-predominated economy like



Tell Aswad, Ain Ghazal and Kharaysin in the southern Levant, Tell Halula in the middle Euphrates Valley and Cafer Höyük in southeastern Anatolia, helps addressing the hypothesis of a local domestication of Capra.

Keywords: Neolithic, Syria, PPNB, hunting, domestication, goat, biometry

New work at Ganj Dareh: Initial results from the ongoing analysis of the faunal remains

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Tracking Cultural and Environmental Change: The Epipalaeolithic and Neolithic in the Seimarréh Valley, Central Zagros Project has revisited the site of Ganj Dareh since 2017. The site is well known with evidence for goat domestication paramount in any discussion of the settlement. Hence, whilst full analysis of the faunal assemblage from the 2018 season is ongoing, we will present some results from our work showing that there are other aspects to human-animal interactions that are of significant interest. The material analysed so far derives from Smith's Level D and later levels. Level D was destroyed by fire and the faunal assemblage from this phase of occupation has been heavily burnt. Displayed animal parts appear to have been common in this architectural phase and included the wings of birds (mainly chukar partridge but also some ducks), antlers and the bucrania of wild sheep. Goat dominate the bones from subsequent layers and hoof prints of these animals impressed into drying mudbricks are a clear indication that domestic livestock formed part of this assemblage. However, the wide size range of the goat bones suggest that wild animals were probably also hunted and perhaps more than one species of wild goat could have been present. Other wild animals include red deer, fallow deer, wild cattle, hare, boar and fox. The bones that were not destroyed by the fire are exceptionally well preserved. The surface of a significant number of bones bear traces of the way that bones, not necessarily modified into formal tools, were used. We have found fine scratches on ribs that perhaps formed some kind of smoothing implements and a number of bones display polish from handling.

Keywords: Goat, Ganj Dareh, Zagros, Domestication

Paleogenetics of the domestication of animals in SWA

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The first domestication processes in human history seem to have taken place in SWA around the beginning of the Neolithic. These events are studied using different approaches each of which has its specific advantages, biases and drawbacks. The approach undertaken by my group at the "Institut Jacques Monod" in Paris is the genetic study based on ancient DNA preserved in archeological bone. The advantage of this approach is that it informs on the genomes in individuals contemporary to the studied events providing information on the evolution of lineages and populations. The disadvantages are related to the degradation of DNA that makes its analysis difficult, in particular in the arid climate of a large part of SWA.



Therefore, our group has devised paleogenetic methods tailored to the chemical specificities of ancient DNA that improve the paleogenetic approach and render it more reliable. Using these approaches, we analyze the phylogeography of the wild ancestors of domesticates, the processes of their domestication and the spread of domesticates over time and space. In particular, we analyze these processes in aurochs and cattle, in horses and in cats. The aim of our studies is to produce data that are complementary to the archeozoological data in order to complete our knowledge of animal domestication in prehistoric societies. In my presentation, I will give an overview of our achievements.

Keywords: ancient DNA, paleogenetics, paleogenomics, domestication, SWA, cattle, aurochs, horse, cat

Tracking long-term human and pig relationship in Southwest Asia using geometric morphometrics

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The first evidence of pig domestication appeared ~8.500 BC in Southwest Asia, and the long history of pig domestication in the region has been the subject of growing attention. An increasing number of studies are using morphometrics and especially geometric morphometrics to explore the differences between wild and domestic populations or to track temporal



and/or geographic variation of the domestic pig stock. Here we analysed the chrono-cultural and geographic variation of ancient pig remains corresponding to ~500 archaeological teeth (upper and lower second and third molar) recovered at ~30 sites dating from the early Neolithic to the Roman period and located in modern-day Turkey, Syria, Iran, and northern Iraq. We used 2 dimensional geometric morphometrics approach to explore subtle variation within and between sites in order to better understand the long-term relationships between human and pigs in Southwest Asia.

Keywords: Domestication, Sus scrofa, diachronic evolution

A Biomechanical approach to understand Neolithic animal husbandry

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Animal husbandry is one of the primary steps toward the civilization as we know it today, which have had profound influence not only on our evolutionary pathway but also in larger scale on the biosphere. To understand the process of animal domestication, it is inevitable to investigate the initial human-animal interactions prior to the completion of speciation and consequently appearance of the domestic species. In the present study a new procedure is proposed to quantify the effects of human interference on animal lifestyle by inferring the level of physical activity of the animal in question. Framework of the procedure is based on the concept of bone adaptive remodeling, a regulatory process accountable for altering bone tissues (cortical and cancellous) to keep them functional under different loading environments. The methodology pipeline can be categorized in two major steps, 1- simulate bone mechanical behavior under certain magnitude of load using finite element analysis 2- predict the force which was applied on the bone when animal was alive using reverse finite element procedure. Results show that the biomechanical approach is able to successfully categorize specimens based on their level of physical activity, a quantity calculated after normalizing the predicted force against size of specimen. Normalization was carried out using power law regression fitting. Moreover, as a biproduct of reverse finite element analysis, direction of the predicted force was also defined. The direction potentially is helpful to investigate metacarpo / metatarsophalangeal joints disorders as well as characteristics of the habitat surrounded animals.

Keywords: Neolithic, Domestication, Biomechanics, Reverse Finite Element Analysis



Applying Geometric Morphometrics to Regional Questions on the Early Management of Pigs in Central Anatolia: The Results from Boncuklu Hoyuk.

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Processes of localised early pig management in Central Anatolia remain poorly understood compared to other domesticates (e.g. sheep and goats). Here we examine the zooarchaeological assemblages from Boncuklu Hoyuk through its deep (or long?) chronology, and places it in the broader regional context of Central Anatolia. The Neolithic site of Boncuklu Hoyuk (c. 8400-7500 cal. BC) in the Konya Plain provides evidence for the emergence of sedentary communities in Central Anatolia. The inhabitants of the site appear to have been indigenous hunter-gatherer-foragers, but it remains unclear whether they initiated herding or management of pigs, or received domesticated (?) imports from colonizing farming communities.

Studies of dental morphology have previously proven a useful tool for identifying domestication status of ancient suids. Building on previous archaeological research at the site, we use geometric morphometrics to track changes in pig tooth size and shape through time to identify whether changes in morphology corresponds with human activity. Here we present the results from these analyses.

Keywords: Key words: Wild boar, Pig domestication, Teeth, Molars, Geometric morphometrics, Zooarchaeology, Neolithic, Central Anatolia

A story of bone strength. Goat mobility through cross-sectional properties and geometric morphometrics of long bones in tell Halula

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Deepening our knowledge on animal mobility and activity patterns is a key step to develop and propose consistent hypothesis on the different animal management strategies that ancient societies might have adopted on the road to domestication. Animal health, feeding strategies and herd mobility are closely related questions of maintenance and management strategies which refer not only to the welfare of the animals but also to human knowledge, collective conscience and social organization. Nonetheless, this is a matter largely discussed from traditional archaeozoology for a long time and, more recently, also addressed from the stable isotope analyses perspective and other disciplines. In the recent years, geometric morphometrics have been an upcoming and outstanding methodology to register and study



physical changes in bone tissue related to the processes of domestication and, at the same time, a first step into documenting biomechanical features to differentiate between wild and domestic species while being mostly focused on tooth or complete bones. In this communication, we address bone adaptation and remodeling as a reaction to physical stress, thus registering and studying bone tissue differential growth as a consequence of the animals' activity levels and adaptation to their human controlled environment. In this sense, CT scanning was used to digitize a sample of goat long bones from the site of Tell Halula and obtain cross-sectional data. Image data was scaled through geometric morphometrics and physical properties of the bones cross-section were calculated to characterize bone resistances to compression, bending and torsional forces. Results support intensity and directional load-ing differences among wild and domestic populations and among domestic herds that might be related to concrete management strategies.

Keywords: Halula, bone growth, morphometrics, mobility patterns, goat management

Bone microstructure as a marker of sheep and goat management strategies during the Early Neolithic in the Middle Euphrates Valley

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Bone microstructure of archaeological animal bones can provide substantial information about the different ways humans used them in the past. Osteons, or haversian systems, are the building blocks of compact bone and they are the main responsible of its remodelling process. The result of the remodelling processes can be seen at a microstructural level and they relate to multiple life conditions of the animal specimens: mobility, stress, load weight, calving and milking. Cortical bone microstructure also reflect inherent features of the animals, such as sex or species. In this communication, the basic anatomical units of bone microstructure, osteons, are analysed in order to approach to the human management of some of the sheep and goat herds and specimens documented in Tell Halula throughout the Neolithic archaeological sequence. In this study, we present the results of the microscopic examination of the bone thin layers of these wild and domestic specimens in order to characterize the osteons hold in. The aim is to define how the human selective pressures related to reproductive and productive regimes of animals could have been reflected in the bone microstructure. With this work, we deepen our knowledge about the sheep and goat management strategies during Early Neolithic in the middle of the Euphrates Valley, as well as to provide solid evaluation of this methodology applied in the archaeological science.

Keywords: sheep, goat, osteons, bone microstructure, Neolithic, Tell Halula



Hidden hybrids: Camels and cultural blending in the Ancient Near East

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Two species from different domestication centers – the Bactrian camel from central Asia and the Dromedary from Arabia – are bred to create a new, more powerful, more resilient animal. Now called tu'lu's in most cultures, first generation hybrid camels are perfect embodiment of inter-species hybridization and displays of the hybrid vigor. More than a decade ago, researchers (Potts, Uerpmann) have hypothesized that hybrid camels existed already in the Iron Age. Indeed, linguistic and pictorial representations of both camels in Assyria and adjacent regions suggest that it is quite plausible. The Hidden Hybrids project tests this hypothesis using palaeogenetics and developing osteomorphological criteria for hybrid camels. In addition, it approaches to camels (hybrid and other) as more than 'ships of the desert', postulating that creating hybrid camels may have required ceremonial transfers of technological knowhow involving diverse audiences. In effect, the hybridization of camels led to accelerated cultural hybridization. As such, hybrid camels are phenomenal embodiments of biocultural evolution. The Hidden Hybrids project (funded by the Wenner Gren Foundation) investigates archaeological bone and tooth remains of potential hybrid camels primarily from 1st millennium BC contexts in Southwest Asia. More than 12 key sites (e.g., the Neo-Assyrian capital of Dur-Katlimmu in the Khabur Valley of Syria, the harbor site of Kinet H'oyu'k on the Turkish Mediterranean, Tell Jemmeh in the southern Levant) were probed for more than 200 camel specimens. Palaeogenetic analyses shed light on the ancestry of the specimens, while work on modern hybrid skeletons from Turkey and Iran help us understand the hybrid osteomorphology. In this paper, we report the current results of this on-going study.

Keywords: Dromedar, Bactrian, Iron Age, palaeogenetics, osteomorphology



Isotopic variation in early Neolithic sheep and goats from the southern Levant: Challenges in the use of tooth enamel $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ to detect mobility

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Taking advantage of predictable variation in the distribution of environmental isotopes associated with rainfall amount, aridity levels, and temperature, isotopic analyses of calcified skeletal tissues are increasingly used to trace animal mobility across diverse landscapes. Oxygen and carbon isotopes measured from incrementally sampled herbivore teeth are increasingly used by isotope zooarchaeologists in order to trace small- and large-scale movements of sheep, goat, and cattle in order to examine spatial shifts in ancient pasturing regimes. Here, we explore $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ variation in the teeth of sheep and goats recovered from numerous early Neolithic sites across the southern Levant, a region unique for sharp differences in precipitation levels, aridity, and vegetation composition over relatively short distances. Limited oxygen isotopic distinction in caprines with different geospatial origins strongly suggest that caution is required to infer mobility in semi-obligate drinkers such as sheep and goat.

Keywords: isotopes, Neolithic, sheep/goat, mobility

Neolithic Kfar HaHoresh: Contextualizing diet and disposal practices at a ceremonial center

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In Southwest Asia, fascinating changes in site use arose alongside the development of agricultural subsistence practices. This included the presence of more invested site features and locales used primarily for ritual activities. By the Pre-Pottery Neolithic period, more organized site use is reflected in the discrete middens evidenced at diverse types of sites, including Kfar HaHoresh (10,600–8,700 cal. BP)-the only Pre-Pottery Neolithic B site in the southern Levant that served a primarily ceremonial function. Contextual taphonomic analysis of faunal remains from midden areas at Kfar HaHoresh highlight an array of refuse deposition practices. This paper presents a comparison of animal selection, use, and subsequent deposition of remains in two middens at Kfar HaHoresh. Closer examination of the individual deposits that formed each midden reveals a more nuanced picture of how a ritualized space was organized across the Early, Middle and Late Pre-Pottery Neolithic B periods. Through combined analysis of social and spatial aspects of faunal contexts, this study highlights that ways in which wider regional changes in diet and disposal practices manifested in different ways at a ceremonial site.

Keywords: agricultural transition, ritual practice, Pre, Pottery Neolithic, refuse management



The Woolly Margin: Late Pre-Pottery Neolithic Settlement Patterns in Jordan and the Pastoralist Connection

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Sheep were introduced to the southern Levant by the 9th millennium cal BC and were relatively abundant in Late PPNB settlements east of the Jordan Valley. However, sheep do not appear to have been exploited west of the Jordan Valley until half a millennium later, after which their exploitation in the region progressively intensifies during the Chalcolithic and Early Bronze Age. Here we explore the possibility that the florescence of settlements in the Transjordan at the end of the PPNB (8th millennium BCE) was partly due to the introduction of domesticated sheep, and the consequent opening of a new, mobile human pastoralist niche exploiting the margins of the Mediterranean phytogeographic zone. We base our analysis on the diachronic and geographic distribution of sheep and goat abundance in the southern Levant, and on habitat preferences of the two caprine species.

Keywords: Neolithic, caprine, domestication

Birds of a feather flock together - early Neolithic avifaunas in Upper Mesopotamia

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The Pre-Pottery Neolithic bird remains from Göbekli Tepe (Euphrates basin) and Gusir Höyük (Tigris basin) are the starting point for this review of avifaunas from early Neolithic sites in Upper Mesopotamia. The taxonomic composition and abundance of certain species as well as body part representations will be evaluated and discussed in the light of seasonality, ecology and exploitation patterns.

Keywords: PrePottery Neolithic, Upper Mesopotamia, Göbekli Tepe, Gusir Höyük, avifaunas



SESSION 3: CONSOLIDATING EXPERIENCES, SETTLING BASES

A zooarchaeological history of the Neolithic occupations at Franchthi Cave and Paralia, Greece

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Franchthi Cave was first colonized, apparently by sea, ca. 7500-7000 cal BP. It was one of, if not the first Neolithic settlements in mainland Greece and a rare site to include much of the Neolithic sequence. This zooarchaeological study examines the developmental history of the Neolithic community and its relation to the land and sea. Domesticates formed the core of the economy throughout the history of the community. The colonists brought livestock and domestic plants with them, and they made little use of local wild resources. The community underwent periods of growth and decline as well as variable connectivity with other Neolithic communities and regional trade. Aspects of these phenomena are apparent from the faunal record, including in the content and diversity of the meat diet, caprine body sizes, the importance of fishing, and the ratio of sheep to goats. The caprines were intensively managed throughout the Neolithic to optimize meat production, and dogs seem to have served as guardian animals. There was no heavy emphasis on secondary products from livestock. Given the small number of Neolithic settlements in southern Greece and the rugged land separating them from one another, a marine trade network may have been essential for replenishing genetic variation in livestock at Franchthi. Low-level restocking may explain the divergent pattern in sheep body-size during the Early Neolithic.

Keywords: caprine management, fishing, Peloponnese, Argolid, domestication, seafaring

Human-Animal Relationships during the Late Neolithic period in the Southern Levant

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The Pottery Neolithic period of the southern Levant is known in the research, as a period of the establishment of livestock husbandry, agriculture, and possibly the emergence of the secondary products revolution. Toward the end of this period, a new ceramic type was developed and classified the Wadi Raba culture. At the same time, the appearance of bowls in the ceramic assemblages raises the hypothesis of a secondary products revolution development. Until not long ago, Wadi Raba strata were not commonly found in archaeological sites and therefore, not many Zooarchaeological studies of this period were made. By examining the human-animal relationships during this period, this study attempts to expand the current knowledge about the possible emergence of the secondary products revolution. The results should also shed light on whether the Wadi Raba culture should be associated with the Neolithic or Chalcolithic periods. Faunal assemblages from three sites, dated to sequential sub-phases of the Pottery Neolithic (Wadi Raba and earlier cultures), were examined with the aim to characterize the interaction between man and animal during this period. The assemblages



include Ahiud and Yiftahel in the Galille and Motza in the Judean Hills. These three sites allowed the construction of a broad research area of human existence, during the late Pottery Neolithic.

This Zooarchaeological study included a taxonomic study and examination of taxonomic abundance, demographic profiles, body size changes and pathological conditions. Results show that the animal economy in these sites relied on both livestock animals and wild game hunting, and that the focus was different in each site. Results do not support the hypothesis that secondary products were already utilized, but rather displays a focus on prime-aged animals. It further shows that some sites continued relying on wild game hunting, including gazelles and wild boars. The results of this zooarchaeological research demonstrate continuity in the relationship between man and animal in the PPN periods, into the Wadi Raba culture, and implies that it should be attributed to the Late Pottery Neolithic period and not to the following Chalcolithic period.

This research illustrates the varied economic and cultural development between regions and sites in the southern Levant during the late Pottery Neolithic. Thus, it extends the current knowledge of the human culture and economy during this period.

Keywords: Pottery neolithic, secondary products revolution, Levant, Wadi Raba, Ahiud, Yiftahel, Motza

Herds on their way to the pastures: Zooarchaeological results from Uçan Ağıl campsite (5th-3rd mill. BC / Nakhchivan – Azerbaijan)

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A vertical and seasonal mobility of the herds has been recently evidenced in faunal assemblages retrieved from Chalcolithic settlements in the South Caucasus. These peculiar pastoral strategies took place in the frame of a global increase in the interest of the Chalcolithic communities regarding mountainous areas. Due to the emergence of extractive metallurgy, the occurrence of copper ore in the Lesser Caucasus Mountains played a role in this “highlands’ rush”. However, pastoral practices have, so far, only been documented from settlements located in plains or valleys. Uçan Ağıl is located at 1200 meters above sea level in the vicinity of the village of Sirab in the Autonomous Republic of Nakhchivan (Azerbaijan). This small (less than 1ha) campsite was occupied several times from the 5th to the 3rd mill. BC. The interest of this settlement is to be located inbetween the plain/valley sites and the highlands. In particular, it is located on the way between Ovçular Tepesi (the main Chalcolithic settlement known in the area) and the closest copper ore deposits. The seasonal occupation of the site is attested by the nature of the architecture (post-holes and shallow subterranean huts). It is thus hypothesized that herders were temporarily settling at Uçan Ağıl on their way to/from the highland pastures. The aim of this paper is to discuss the subsistence strategies of the herders, the patterns of herd mobility and the composition of the herd by analyzing the zooarchaeological data retrieved from Uçan Ağıl. We will compare our results with the data already available from Ovçular Tepesi, a more sedentary settlement located in the Arpaçay Valley, in order to reveal the specificities of the camp site occupations.

Keywords: Pastoralism, Mobility, Caucasus, Chalcolithic



Early Uruk village economy in the Southern Kurdistan (Iraq): The faunal analysis of Girdi Qala (Qara Dagħ Project)

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Excavations undertaken at Girdi Qala in the frame of the Qara Dagħ Project (Southern Kurdistan) yield a small faunal assemblage (about 1100 bones remains) dated to the beginning of the 4th Millennium BC. The faunal remains come from Middle Uruk domestic contexts of Trench D of Girdi Qala northern mound. The domestic areas exposed in Trench D constitute the first evidence of a South-Mesopotamian Middle-Uruk settlement east to the Tigris River and north to the Hamrin basin. Few comparative sites have been studied in the area and the animal bone assemblage provides unique insight into local diet and economic activities. The animal remains analysis and the subsistence basis exploration provide also information that may be used to further our understanding of the socio-cultural situation of the Uruk settlement of Girdi Qala.

Keywords: Zooarchaeology, Uruk period, Iraqi Kurdistan, subsistence economy

Production and Consumption at Tell Surezha: A Picture of an Animal Economy on the Erbil Plain during the Transition to Complex Societies

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The Late Chalcolithic (4500-3000 cal. BC) period in northern Mesopotamia represents a key phase in the development of complex economic and political systems, providing some of the earliest evidence for ascribed leadership, heritable wealth, and economic specialization. Animal economies are long thought to have been an integral feature of this transition. By the end of the 4th millennium cal. BC, zooarchaeologists have documented a general transition to the targeted management of sheep and goats for secondary products. However, little is known about how animal management strategies helped shape the development of complex societies in the earliest phases of the Late Chalcolithic phases. The site of Tell Surezha, located just south of modern-day Erbil, provides evidence of evolving husbandry and animal consumption practices during the Ubaid through LC 3 periods (roughly 5000-3700 cal. BC). From 2013-2018, excavations at Tell Surezha have recovered faunal remains from a domestic area that was continuously occupied throughout this period. The data suggest stability in the animal economy over time, with an unexpectedly high proportion of pigs (> 30% in all phases) and cattle (10-15%). The consumption of dogs is also indicated. Caprine survivorship suggests little change in husbandry strategies over time. Overall, the faunal remains give an impression of conservatism in husbandry activities during a time of large-scale social and political change. However, the burial of complete juvenile animals (sheep/goat and pigs) and a large-scale consumption event ("feasting") involving at least four caprines suggest that, while production systems may have changed little, new uses of animals helped negotiate developing social boundaries in the first part of the 4th millennium cal. BC.

Keywords: Chalcolithic, Feasting, Erbil Plain, Tell Surezha, Animal Economy



Tale of a two deer cruise in the Eastern Mediterranean

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The complex and inter-related histories of fallow deer, both– European and Persian–with each other and with humans, is reaching back over millennia. A very special and ancient relationship with humans is evidenced by their deliberate and repeated translocation far outside their natural range and management as early as the Neolithic. The story begun somewhere on the Continent, east of the Mediterranean Basin. A story that tells a tale of two deer that can no longer be considered in isolation, as they were traditionally in the past. Indeed, there is increasing abundant evidence for interesting dynamics between the two fallow deer and human-deer relationships in many different places and times.

If we are to understand the long, multiple and close human-deer relationship that has followed many pathways whether they were different or similar through time and space, it is crucial to be able to separate the remains of *D. d. dama* from those of *D. d. mesopotamica* and possibly identify hybrids in the archaeological record.

This paper will focus on the results from the Eastern Mediterranean of the 3-years project “Fallow deer in Western Eurasia”. This project aimed at developing new methodologies to differentiate fallow deer subspecies and potential hybrids. We will present newly conducted geometric morphometric (GMM) and ancient DNA analyses, performed on both fallow deer subspecies bones – lower third molar and astragalus – from the Eastern Mediterranean.

Keywords: Fallow deer, Dama dama, 2D, 3D Geometric Morphometrics, ancient DNA, biogeographies, human, deer relationship, Eastern Mediterranean, Cyprus

Exploitation of animal resources and use of animal hard tissue in the Eneolithic period in the Balkans

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Exploitation of animal resources was long neglected topic when it concerns the Eneolithic period in the south-east Europe. However, in past few decades, new excavations with up-to-date methodology of recovery of the faunal material, as well as analyses of material stored in the museum collections, enabled detailed analyses of bone industries in the Eneolithic period in the Balkan area. Here will be presented the osseous industry from several sites belonging to the Bubanj-Salcu,ta-Krivodol cultural complex, widespread in the Balkans. The most im-



portant assemblage comes from the site of Bubanj near Niš, where excavations were carried out in 1950s and again in 2008-2014, and these last campaigns provided rich assemblage of osseous artefacts, including manufacture debris. Also was analysed the material from two sites situated in eastern Serbia, Lazareva cave near Zlot and Begov most, and compared with available results from the sites in Bulgaria. Predominant raw materials were bones, mainly sheep/goat and cattle metapodials and ribs, followed by red deer antlers. Rarely, teeth and mollusc shells may be encountered. Typological repertoire consists of different implements: pointed tools (awls, needles), burnishing tools and rarely heavy duty tools, handles or projectile points. Ornaments are not very frequent. Bone figurines are characteristic for the Bubanj-Salcuța-Krivodol cultural complex and recent find of a single fragment from the site of Bubanj showed their distribution was different than previously thought.

Keywords: Eneolithic, animal hard tissue, bone industry, southeastern Europe

Fishing strategies and adaptation to maritime environments during the Neolithic on Marawah Island, United Arab Emirates

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Fishing strategies and adaptation to maritime environments during the Neolithic on Marawah Island, United Arab Emirates. Kevin Lidour & Mark Jonathan Beech Recent excavations conducted on Marawah Island (Abu Dhabi Emirate, UAE) have revealed a unique stone-built architectural complex (site MR11) which has been radiocarbon dated to between the early 6th millennium to mid-5th millennium BC. A preliminary study of the faunal assemblage has outlined an economy principally focused toward the exploitation of marine life, including the food consumption of seashells, fish, marine turtles and marine mammals such as dugongs and dolphins. The recent discovery of stone sinkers confirms the use of fishing nets by the ancient inhabitants of the site. The assemblage consists mostly of small coastal fish such as grunts (Haemulidae), seabreams (Sparidae), emperors (Lethrinidae), silversides (Atherinidae), anchovies (Engraulidae), as well as small sharks. These are all commonly associated with shallow seagrass bed environments which are suitable for the use of non-selective fishing techniques and small-mesh devices like barrier traps and beach seines. This paper discusses the fishing strategies and techniques during the Neolithic within the Arabian Gulf, both from an archaeo-ichthyological perspective, as well as the study of fishing equipment from sites located between Kuwait and the United Arab Emirates.

Keywords: Arabian Gulf, Neolithic Archaeology, Maritime economy, Ancient Fisheries, Fishing strategies



Exploitation and use of marine invertebrates at the Neolithic site of Ra's al-Hamra 6 (Muscat, Sultanate of Oman)

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In Arabia, at the beginning of the Holocene, groups of hunters-fishers-collectors settled along the coasts to access a wide range of complementary resources. Exploitation of marine environments played a major role in the socio-economic systems of these populations and influenced their diet (malacological and ichthyofaunal food remains) and their technological culture (hooks, beads). This presentation focus on the marine malacological material from the neolithic site of Ra's al-Hamra 6 (RH-6). This is the first detailed study carried out on the Gulf of Oman, as previous malacological studies focused on the Arabian Sea. The RH-6 site is located in the heart of the Qurum mangrove, linked to the estuary, flowing into the Sea of Oman at the foot of a rocky promontory. The inhabitants thus had access to varied environments nearby for food and raw material procurement.

The results of the malacological study of trench Test-Z show that the marine shells discovered are mainly culinary waste. At least four species were consumed showing that Neolithic communities used diverse resources. This is confirmed by the exploitation and consumption of many fish and at least one crab species.

Culinary practices of the occupants of RH-6 could also be observed. The first examined marker is the fracturing of the two gastropods consumed, *Terebralia palustris* and *Strombus*, probably to recover the flesh of the mollusc, generating specific and standardized types of breaks. Experiments on *Terebralia* appear to confirm this hypothesis. Other markers of shellfish preparation include the opening marks and scratches. Another important result comes from the traces of heating visible mostly on consumed species. It is currently not easy to ascertain the exact contribution of shellfish to the diet, particularly when just a small part of a site has been studied. However, considering the quantity of shellfish at RH-6, this resource seems to have played a significant role in the subsistence.

Marine shells were also used as raw materials for manufacturing objects (beads and hooks). The taxa used for making decorative elements seem to be different to those collected for food purposes. The communities thus dissociated shell species used for corporal ornamentation from those that were consumed. Manufacturing waste from decorative elements, beads and hooks in *Isognomon* shell were also discovered.

The different uses of marine invertebrates in the diet and artisanal activities, and probably in funerary practices, emphasizes the implication of these marine animals in many domains of life in Arabian neolithic coastal communities.

Keywords: archaeomalacology, Neolithic, Arabia



SESSION 4: BRONZE PERIOD, GLEAMS OF LIGHT

The evolution of cattle management in the southern Levant

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A shift in cattle-human relationships was underway in the southern Levant by at least the early eighth millennium cal. BC when cattle exploitation increased in importance by the Middle Pre-Pottery Neolithic B. However, a more nuanced understanding of early cattle management trajectories and subsequent intensification in cattle husbandry for the region has eluded researchers due in large part to high fragmentation of recovered cattle remains. Here, we present new biometric and demographic data measured from relatively large faunal assemblages recovered from PPNA and PPNB settlements located east of the Jordan Valley along with re-analyses of previously published data sets spanning the Natufian to the Early Bronze Age. Using multiple zooarchaeological proxies (LSI, fusion timings and tooth wear) together with up-to-date statistical techniques such as mixture modeling and Bayesian analyses, we demonstrate a more complex picture of developing cattle exploitation in the region that involved prey pathways, local management, uptake of domesticates and, eventually, specialized production.

Keywords: cattle, Pre, Pottery Neolithic, Bronze Age

Cattle away from home: the Kura Araxes at 3rd millenium BC Tel Bet Yerah

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The Kura-Araxes – also known as the Early Transcaucasian phenomenon – is an archaeological complex, in which Early Bronze Age migrants from the South Caucasus expanded through southeastern Anatolia, the Iranian plateau, the Amuq plain and as far as the Southern Levant during the 3rd millennium B.C.E.

Tel Bet Yerah (Sea of Galilea) presents the most southerly point of expansion. Tel Bet Yerah is unique among all known Kura-Araxes sites in that it shows the side-by-side habitation of migrants and the local population at this Early Bronze Age urban center (2770 B.C.E – 2400 B.C.E). The plaza, SA-M, at Tel Bet Yerah has been identified to act as an occupation area for the Early Transcaucasian migrants (Kura-Araxes) reaching and settling the site in the Early Bronze Age III (2900-2700 B.C.E).

My research represents a zooarchaeological analysis of the faunal assemblage from the plaza. Insights into the subsistence strategies and the social and cultural processes, the Early Transcaucasian migrants had in place in the southern Levant in relation to cattle husbandry, are presented. This paper will explore the zooarchaeological and material evidence for the use of cattle for transportation and mobility among the Kura Araxes. Kura-Araxes subsistence strategies at Tel Bet Yerah gives key insights into the concept of ‘diaspora’ in prehistory.



The economy of Bronze Age societies in the Central Levant

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Faunal studies were conducted on new four sites from the coastal central Levant and compared to more than 95 sites of the Bronze Age in the Levant. This paper discusses the influence of the social and environmental factors on the animal economy of Levantine societies for the third and second millennium BC. The evolution of this economy over time is analyzed through the study of faunal spectrum, culling profiles and morphometric. We focus on the analysis of domestic and wild mammalian fauna since the study of non-mammalian remains is not systematic available at all sites. Analyzes of the factors influencing food choices and the animal economy highlight a decrease in the exploitation of wild animals and the increase in the specialization of livestock, primarily sheep and goats but also cattle and swine in the Bronze Age. The environment and climate seem to play a major role in the exploitation of animals in the 3rd millennium. In the Middle and Late Bronze Age, cultural choices and the response to the needs of urban centers as well as environmental and climatic conditions play a role in the animal economy and diet of the inhabitants of the Levant.

Keywords: Husbandry, dietary, Levant, Bronze Age

4000 years of food history at Dharih (Tafileh, Jordan)

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Khirbet edh-Dahrih is located 80 km north of Petra on the “Kings highwaty”. The remains of this mainly Nabataean and Roman site extend on a natural terrace overlooking Wadi Laaban. The sanctuary, major element of the site, was built at the beginning of the second century AD, at the time of Roman annexation. Excavations conducted by a French- Jordanian team evidenced major changes of the site from Roman times to Late Byzantine then Islamic times (e.g. transformation of the temple into a church, then a storage area and stable), but they also documented the presence of a village on a ridge, whose occupations date back to the Bronze Age and last till mid-4th century AD. About 22,000 bones (mammals, birds, fish, etc.) found in the various buildings (e.g. cistern, domestic context, triclinia, oil mill and bath) of the site and at all times will allow us to tell more than 4000 years of food stories.

Keywords: mammals, pisces, birds, Bronze Age to Islamic periods, village, South Jordan



The Herd and the Hunt in the Bronze Age South Caucasus

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This presentation focuses on the central South Caucasus in the Middle and Late Bronze Ages to ask how human-animal relationships impacted the construction of human political order. I examine two categories of evidence: representational art and faunal remains (from both mortuary and settlement sites), using these as evidence for the treatment of animals as both non-human persons, objects of subsistence and exchange, and symbolically representative. The case of the Bronze Age central South Caucasus demonstrates how approaching the thingly, personal, and symbolic identity of animals in combination, can expand our understanding of the social place of herded and hunted animals, revealing their role in the establishment of structures of economic inequality in the Middle Bronze Age and the institutionalization of political authority in the Late Bronze Age. As both things and persons, cattle were a transformative force in the Middle Bronze Age of the central South Caucasus. During life, pulled members of human groups into different patterns of mobility. At death, the bodies of cattle became instrumental in reconstituting broader human-animal communities, while their objectified bodies signified the wealth and mobility of the deceased. Their ability to personify relationships of kinship and obligation made them powerful social actants. The assemblage of cattle bodies, parts, and representations worked together to construct networks of obligation and ideologies of power. Meanwhile, social cohesion, in the face of the evident interpersonal violence and political disorder that characterized the Middle Bronze Age, resulted from the relationships humans had with and through cattle. Representations of hunting and the technologies used in its practice suggest that a certain kind of hunting had become an elite activity by the Late Bronze Age. I consider the treatment of wild animals in these contexts, to unpack the symbolic meaning of the hunt and wild animals in this cultural context. Ritual practices and artistic representations demonstrate that the ontological categories of human and animal were blended, and control over nature was a basis for political claims of control over people. There is certainly tantalizing evidence that there was an association of power over animals and power over people. The wild was a potent source of temporal power.

Keywords: Bronze Age, South Caucasus, pastoralism, hunting, animal personhood, materiality, human, animal relationships

Zooarchaeological and Stable Oxygen ($\delta^{18}\text{O}$) Isotope Analyses of Herd Management Strategies at the Early Bronze Age Kura-Araxes Settlement of Köhne Shahar in Northwestern Iran

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Pastoralism has long been considered a central pillar of Early Bronze Age subsistence economies in the Kura-Araxes cultural tradition (ca. 3500–2200 BC) of the South Caucasus. Historically, interpretations of Kura-Araxes herd management strategies were based on settlement patterns, the geographic distribution of sites, material culture, and the size and



internal structure of sites. Because these indicators suggest that Kura-Araxes populations were highly mobile, transhumance, nomadic pastoralism were assumed to be essential parts of Kura-Araxes economies. Although these archaeological indicators are important, they are insufficient for investigating the most fundamental aspects of animal economies: what animals were herded and what animal products were exploited. Likewise, animal herd mobility does not assume that these communities practiced transhumance or nomadism. Instead, meticulous zooarchaeological and stable isotope analyses are needed to reconstruct herd structure, exploitation, and mobility. While the number of published zooarchaeological studies is growing, stable isotope data is rare for this time period in the South Caucasus. In this paper we use zooarchaeological remains and tooth enamel carbonate oxygen ($\delta^{18}\text{O}$) isotope data to examine herd management strategies at the Kura-Araxes settlement of K'ohne Shahar (ca. 3200–2500 BC) in northwestern Iran. Zooarchaeological measures such as relative taxonomic abundance, sheep-goat ratios, and kill-off patterns reveal an animal economy characterized by a herd security management strategy and generalized exploitation of various sheep, goat, and cattle products. Preliminary $\delta^{18}\text{O}$ values from sequentially sampled mandibular teeth suggest that cattle were kept around the settlement year-round, while sheep and goat management was more mobile. A comparative assessment of data from contemporaneous sites demonstrates that Kura-Araxes animal economies were managed at the household-level with little evidence for specialized pastoral production, transhumance, or full-time nomadic pastoralism.

Keywords: Kura Araxes, pastoralism, herd management, mobility, zooarchaeology, stable isotopes, Iran, South Caucasus

From Sheperds to Farmers at Arslantepe (Eastern Turkey) During The Early Bronze II And III, From 2750 To 2000 BC

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After the collapse of the powerful early-state organization which was established at Arslantepe between 3400 and 3100 BC in connection with parallel Mesopotamian developments (Period VIA), which had led to a widening of the external relations of the site also towards pastoral populations of the mountains of Eastern Anatolia, Arslantepe was occupied by these groups of nomadic or semi-nomadic shepherds linked to the cultures of the southern Caucasus, who settled on the ruins of the palace with their seasonal settlements (Period VI B1, 3100-2900 BC) and their livestock, based mainly on flocks of caprines. In the following phase (Period VI B2, 2900-2800 BC) the site was reoccupied by populations of settled farmers from the plain and there began a period of great instability and conflict. The EBAI ended as it began, with devastating fires that put an end to this succession of settlements. Slowly, after a brief abandonment, a new history of the site begins with the EBA II (Period VIC), involving more local groups, less tied to external worlds. During the second half of the third millennium there was a progressive new sedentarization of the population and a gradual growth of the settlement. An initial nucleus with a single large housing complex (BA IIIA, Period VID1) started expanding, adopting a plan of large houses, squares, courtyards, roads and fortification walls (BA IIIB, Period VIB2-3). The changes detected in farming practices reflect these events. The phase characterized by nomadic customs and specialized pastoralism, was accompanied by the abandonment of pig breeding, which had been very common in the first half of the



fourth millennium. The phase of re-sedentarization, like the phases that had preceded it but more so, saw the development of the breeding of the cattle as well as goats. During this period there was an increase in wheat (*Triticum aestivum*) compared to barley, which had been the most frequent crop in previous periods. The increase in cattle breeding and the findings of wheat deposits testify to the intensification of agricultural practices. Cattle, which the nomadic populations used primarily as pack animals, as well as for milk and meat, began to play an important role in agricultural work.

Keywords: temporary settlements, caprine breeding, abandonment of pig breeding, permanent settlement, cattle breeding, agricultural work

Cultural and Economic aspects in Middle Bronze Age Tel Ifshar: Preliminary results of the faunal remains

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This paper provides preliminary results of our ongoing analysis of faunal remains from the Middle Bronze IIA site of Tel Ifshar (1950-1750 BCE). The site is located in the Sharon Coastal Plain region of Israel. Tel Ifshar offers a high-resolution sequence of five major phases with four destruction layers spanning over less than 200 years. The studied faunal assemblage (NISP=3,047) is dominated by sheep and goat (~50% throughout all occupation phases). Cattle and pigs vary according to the occupational horizons. Wild game, which comprise predominantly of mountain gazelle (*Gazella gazella*) and fallow deer (*Dama mesopotamica*), also fluctuate over time. The zooarchaeological research seeks to explore the socio-cultural changes at the site in a period with high social and political complexity that might derive from international trade and urbanization. Moreover, the abundance of destruction layers attests to a society living in an atmosphere of conflict and stress, but characterized by resilience. The observed faunal turnover show changes in mode of livestock exploitation in a response to that stress. In addition, the initial phase of settlement supports the hypothesis of migratory agricultural population from the northern Levant. The results of this research find good correlation between periods of intense occupation and livestock management. Further intra-site and intra-regional comparisons with contemporaneous sites highlight the importance of Tel Ifshar in fine-tuning changes in animal management decisions over time.

Keywords: livestock management, Middle Bronze Age, Tel Ifshar

A Woven Economy: Middle Bronze Age Sheep Economies at Zincirli Höyük

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Archaeological investigations at Zincirli Höyük have recently uncovered Middle Bronze Age levels with monumental architecture, and preliminary faunal results provide insight into the productive strategies employed by people once associated with these buildings. Middle Bronze contexts at Zincirli show a pattern of animal management geared towards the production of wool, with evidence of direct access between occupants of the monumental buildings and managed wool herds. This pattern parallels results from the faunal analyses of other prestigious MB contexts in Anatolia, the Levant, and Upper Mesopotamia. Our preliminary



results attest to links between large, centralized institutions, sheep herding, and, ultimately, wool and textile production. Occupants attached to elite spaces of MB Zincirli and their Near Eastern peers appear to be participants in similar supraregional political economies, in which elite institutions sought to directly involve themselves in the production of wool and woolen textiles.

Keywords: Middle Bronze Age, Sheep, Turkey

The old and the new: recent discoveries in the faunal aspect of Middle Bronze Age burial customs in the Levant

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In a series of publications in the late 1980s and early 2000s Horwitz delineated the contextual, taxonomic, anatomic and age structure-related characteristics of faunal assemblages found in Middle Bronze Age (MBA) burial contexts of the southern Levant. Those seminal works shed important light on ritual practices and the belief-systems of the time, highlighting the specific choices made repeatedly by MBA communities in species selection (mainly domestic sheep, *Ovis aries*) and its mortality profile (primarily immature individuals) in the context of burial offering. It also highlights the high degree of variation of animal burial practices within and across different burial types.

One recent example of this "high degree of variation" shown by Horwitz, was found in an MBA cemetery discovered near Jerusalem in 2014 that yielded uncommon finds testifying to the reaches of burial practices of the period. A study conducted on the microfaunal assemblage from one of the tombs has revealed that toads were beheaded and placed in a vessel as part of the burial offerings given to the dead.

Here I present the zooarchaeological finds from this tomb in addition to five other new MBA burial contexts recently studied, and review other assemblages newly published, in order to examine overall trends and tendencies. The findings seem to demonstrate that Horwitz's observations are still relevant today, more than 30 years after they were first published.

Keywords: Middle Bronze Age, Levant, Burial practices, Fauna



SESSION 5: FROM GLEAMS TO THE IRON LIGHT

The Faunal Remains from Saruq al-Hadid: an insight into human occupation of the desert fringes of southeastern Arabia during late prehistory

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Recent excavations undertaken at the archaeological site of Saruq al-Hadid, a Bronze- Iron Age site (c. 2000-800 BCE) located in the northern extent of the Rub al-Khali desert in southeastern Arabia, have recovered a large amount (1.5 tonnes) of animal bones. The study of these remains has been integral to our understanding of the site and has provided detailed insight into the nature of human occupation in this environment during prehistory. This paper will outline the principle findings from the study of this faunal assemblage, with particular regard to the exploitation wild animals, the transport and consumption of marine resources in the desert interior, and the relationships between humans and dromedary camels. The paper will also highlight questions that have arisen from the study of this faunal material, which should be explored further in future studies of Saruq al-Hadid and other late prehistoric sites in southeastern Arabia.

Keywords: Saruq al, Hadid, Bronze Age, Iron Age, Camel Domestication, Wild Animal Exploitation

Tell el-Burak (Lebanon): a look into agricultural developments during the Bronze and Iron Age in the Southern Levant

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The goal of this presentation is to have a closer look at the agricultural developments during the Bronze and Iron Age in the Southern Levant. First, we look at diachronic and syn-chronic developments and/or continuity regarding the management of domesticates. Second, we attempt to provide an answer as to why these developments occur. Finally, we want to see if it is possible to observe regional differences and similarities within the Southern Levant and find out what caused these: geography, cultural connections or both. To answer these questions, we will use a case-study of an ongoing excavation at Tell el-Burak (Lebanon). Tell el-Burak is a coastal site located approximately 9 km from the modern-day town of Saida. Faunal remains have been found from the Middle Bronze Age until the Mamluk Period, but the focus of our work will be the Iron Age which corresponds to the Phoenician period. This will allow us to gain valuable insights into the economy of the Phoenician territories during the Iron Age, which is currently an understudied area. The Iron Age is represented by material from several houses, storage rooms and installations, leading to the hypothesis that this site could be an agricultural domain. We will then put the finds of Tell el-Burak in the broader geographical



context of the Southern Levant, where we will first compare it synchronically with other Phoenician sites, and second will compare it synchronically and diachronically with other sites in the Southern Levant region.

Keywords: Bronze Age, Iron Age, Agricultural developments, Southern Levant

Bones never lie: Depositional pathways of food disposal at Çatalhöyük from the Bronze Age to the Phrygian, Hellenistic, and Muslim periods

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Çatalhöyük is a Neolithic archeological site located in Anatolia in Turkey, dated to between 7100 cal BC and 5900 cal BC. This range can be split into early, middle, late, and final phases of the site's occupation. From the Neolithic onwards, the settlement was focused on two mounds, now referred to as Çatal höyük East and West; this is indicated by research carried out in the various excavation areas (North, South, Istanbul, TP, TPC, and GDN). Archeological studies of Çatalhöyük's TP Area were conducted between 2001 and 2010, and showed Neolithic and post-Neolithic occupation of the East Mound. Faunal studies from Neolithic contexts show that major changes occurred in subsistence and social behavior between the late and final phases of occupation, and revealed demographic decline at Çatalhöyük (e.g., Pawłowska, 2014, 2015, 2018, in press).

Here focus is placed on the post-Neolithic occupation phase of the tell, based on the 2019 matrix data (Marciniak & Hordecki, 2019), presented from a zooarcheological perspective. The faunal assemblages associated with various archeological contexts, from the Bronze Age through the Iron Age (Phrygian period), the Hellenistic period, to the Muslim period were studied to determine their nature, which proved to be complex. The ultimate goal of the research was to examine the depositional pathways of food refuse and to assess of the usefulness of faunal material from late contexts for further research. The negative consequences of approaching material as whole samples-without considering in detail their origins in individual contexts-will also be discussed.

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Keywords: zooarcheology, taphonomy, postNeolithic, Çatal höyük, Turkey



New Kingdom Military-Administrative Centers along 'The Way of Horus', Northern Sinai

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'The Ways of Horus' in northern Sinai follows the Mediterranean coastal strip from the eastern Nile delta to Gaza. During the New Kingdom period (ca. 1550-1150 BC), it served as Egypt's imperial military and administrative network and a vital artery for commercial activity between Egypt and Asia. This study describes the archaeozoological finds recovered from four different Egyptian sites along this route that were excavated, between 1972 and 1982, under the direction of E. Oren on behalf of Ben-Gurion University. Site A-289 (Haruba cluster), which represents a military fort, while sites A-343, A-345 (Haruba cluster) and BEA- 10 (Bir el-Abd cluster) represent administrative centers along the Sinai corridor. Prior to the return of all archaeological remains to Egypt in 1994, as agreed under the terms of the Camp David Peace Accords, a cursory analysis of the terrestrial mammals, fish and malacological remains from these sites, were carried out by the first three authors. We describe here the species identified, for mammals and fish the skeletal element representation as well as age profiles for terrestrial mammals and origin of the shells. The impact of diagenesis on the finds is also discussed. We investigate site patterning and how this relates to site function. Finally, we explore whether there is any evidence that these military-administrative sites were provisioned with meat and fish rather than being self-sufficient.

Keywords: trade, Egypt, New Kingdom, provisions

Archaeozoology in the service of chronology: bone deposits from the Theban tomb complex of Mery (TT95) in Sheikh 'Abd el-Qurna, Egypt (15th century BC to present)

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As part of the the Life History of Theban Tomb project led by the University of Basel, an archaeozoological analysis was performed on ca. 550 faunal remains collected during excavations in the funerary chapel of Mery (TT95A) and its adjacent burial substructure (TT95B), both cut into the hillside of Sheikh 'Abd el-Qurna on the Westbank of Luxor, Egypt. Four main use phases of the complex were identified on the basis of the archaeological finds: the 18th Dynasty (mid 15th century BC), when the tomb complex was built and used for interments for the first time, the Third Intermediate and Late Period (9th – 6th century BC) when its funerary structures were reused, and the subsequent occupation of the tomb complex in the Coptic Period (6th to 9th centuries AD) and in Modern times. Since all structures of the Theban tomb were severely looted, the faunal assemblage recovered was mixed and did not derive from clearly separated chronological layers. Consequently, a taphonomic analysis was undertaken of the faunal remains to determine whether this type of examination could help in separating them by period. Features examined (per species) were skeletal element



representation, bone fragmentation, weathering, coloration and presence of gnawing marks or anthropogenic damage (cut marks, burning, resins deposit etc.). These data have enabled the distinction of at least four different events dating to different periods of use of TT95, associated with different agents and functions. This division was confirmed by the spatial distribution of the animal remains: (1) the funeral animal offerings associated with 18th Dynasty burials in substructure TT95B, (2) the later culinary remains of the Coptic monks who inhabited the funerary chapel TT95A, the prey of wild canids who used accessible burial chambers as caves, and, in the late 19th/early 20th century, the skull of a Barbary sheep *Ammotragus lervia* probably culled for sale by a local Arab family, whose members had made the funerary chapel to their living quarters.

Keywords: faunal analysis, taphonomy, tomb, New Kingdom, Coptic period, medieval, modern

SESSION 6: TELLING HELLENISTIC, ROMAN AND BIZANTINE ANIMAL HISTORIES

The Citadel and the Slaughterhouse: Faunal Remains from Hellenistic Jerusalem

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Examination of the animal remains from the glacis fills of the Seleucid citadel (Acra) allow for a unique glance into the construction techniques of Hellenistic Jerusalem (~175- 129 BCE) as well as contend with questions of the fills origin, urban provisioning, and Hellenization. The location of the citadel, in Area M4 of the Givati parking lot excavations, sits right in between the cultic and residential sectors of the city suggesting the refuse used for construction could have derived from a number of socially charged contexts. While the refuse contained within the fills depicts a subsistence strategy geared towards meat production and secondary products, the refuse collected likely derives from intense butchery practices. In fact, this assemblage has the highest frequency of butchery ever recorded in the history of Jerusalem. The standardization and style of the butchery along with the demographic profile of the assemblage in comparison to a neighboring assemblage leads to the assessment that the material must have derived, in part, from a slaughterhouse. The aim of this paper is to discuss aspects of the formation processes within the sub-phases of the citadel's glacis as well as the provisioning of urban Jerusalem with an assortment of goods such as choice meat cuts, leathers, sofars, and additional secondary products– in light of Hellenization.

Keywords: Butchery, Cut, Mark Analysis, Classical Periods, Urbanism, Animal Economy, Jerusalem, Secondary Products



Archaeozoological Evaluation of the Hellenistic Period at Tatarli H'oyu'k (Turkey)

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This paper presents the results of the zooarchaeological studies at Tatarli H'oyu'k during Hellenistic Period. The site is located 35 km. east of Ceyhan district of Adana (Southern Mediterranean) and placed at the entrance of the Tatarli district and is also placed on junction of important routes that have been used since the earliest times in history as well as today. The analyzed sample includes more than 2500 fragments retrieved during archaeological excavation. The animal exploitation in the site was largely based on pastoralism and rarely countered by hunting activities, which lead to discover of a much differentiated assemblage of wild animals. When we look at the mammalian fauna, the large number of sheep and goat bones have been found, followed by cattle and pigs. Furthermore, equids, carnivores, camel, deer and a small number of birds, fish, beaver and jaw remains of striped hyena are also represented in the Tatarli faunal assemblages. It is understood that main animal economy concentrated on sheep, goat, cattle and pig, and they were also the most important animals in the local food economy. In addition, fox and dog remains were recovered from Hellenistic pit number 11, cut marks were also observed on these bones. The function of pit number 11 is defined as for ritual activities, and associated with the cult of Zeus Olybris, known with Eastern Çukurova Region.

Keywords: Zooarchaeology, Animal bones, Tatarli Höyük, Anatolian Fauna

Of Fish and Donkeys: Faunal Remains and Industry in Early Roman Magdala on the Sea of Galilee

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Excavations in the archaeological site of Magdala have uncovered neighborhoods, shops, and an anchorage of the Early Roman town. It has long been accepted that the town's economy was based on trade in fish caught in the Sea of Galilee, which led to interpretation of a unique type of building plan in the site as a fish-salting facility. Analysis of the faunal remains, however, suggests that the industry in Roman Magdala is related to cloth-dyeing. This new of interpretation is supported by soil chemical analysis and by historical sources.

Keywords: Roman, industry



Corralled Cattle: Faunal Remains from the Late Roman and Byzantine Phases of Çadır Höyük, Turkey.

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This paper presents the results of the zooarchaeological studies conducted on the more than 5,500 specimens analyzed from the Late Roman and Byzantine Phases (4th-13th centuries CE) of Çadır Höyük, central Turkey. The faunal material comes from the mound summit and an off-mound habitation area known as the North Terrace. These new data from Çadır's North Terrace define a distinctive rural central Anatolian Byzantine animal economy characterized by mixed use of livestock species, differing considerably from both the Byzantine faunal assemblages from the southern Levant, where caprines are dominant and pigs poorly represented, and from the Byzantine remains at Sagalassos in SW Turkey where cattle dominate (Perry-Gal et al. 2015; Vionis et al. 2010). Summit contexts at Çadır Höyük reveal the remains of discrete eating events, as well as a unique assemblage: a discrete in situ deposit representing the catastrophic kill-off of a large number of animals associated with the abandonment of the Byzantine settlement in the eleventh century CE. Together, faunal data from the North Terrace and Summit contexts, provide a unique window into the use of animals in the Byzantine period in rural central Anatolia.

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Keywords: Byzantine, Anatolia, Central Turkey, höyük, consumption, husbandry, kill, off, abandonment, rural

A faunal analysis of Byzantine, Umayyad and Mamluk remains from the Northwest Quarter of Jerash, Northern Jordan

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Jerash located in northern Jordan, was one of the Decapolis cities, but also an important city during the Roman, Byzantine and Islamic periods. Earlier archaeological missions have focused mainly on large scale monumental architecture as well as the central part of the city. The Danish-German Northwest Quarter Project, directed by Rubina Raja and Achim Lichtenberger, began exploring the highest point of the walled city in 2011. The area lies behind the Sanctuary of Artemis, next to the city wall and has in previous decades gone largely unexplored. In 6 archaeological campaigns the project has significantly added to the knowledge of the city of Jerash and documented extensive occupation of this particular area in the Roman, Late Roman, Byzantine, Umayyad and Mamluk periods. The faunal collection represents material from a wide range of contexts, such as monumental buildings, houses, streets, occupation and waste layers. This paper will present a summary of the analysis of these faunal remains. The aim is to



identify the ways that the people within this quarter of Jerash were procuring and utilizing various animal populations and recourses, enabling the inhabitants to flourish over time and in multiple periods.

Keywords: Urban, byzantine, Umayyad, Mamluk, domesticated animals

SESSION 7: FROM LATE-MODERN TO CURRENT TIMES

The role of Red Sea Parrotfish (Scaridae) as Trade Indicators in the Negev Desert during the Byzantine-Islamic Transition Period

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The study of commerce has always been imperative to studying the ancient classical world and is of particular interest when coupled with extreme environments and periods of instability. We present unique first evidence for the role of fish, and Red Sea parrotfish (Scaridae) in particular, as traded goods during the transition between the Byzantine (4th-7th cent. CE) and the Islamic (7th-9th cent. CE) periods in the Negev Desert region of the southern Levant. The current study focuses on garbage dumps and abandoned houses excavated from three archaeological sites: Elusa, Shivta, and Nissana. These were uniquely positioned at the margins of the Byzantine Empire along the final stations of ancient trade routes linking the Red Sea to the Mediterranean Sea. Systematic fine scale sieving techniques were applied at the sites, allowing us to recover large, well preserved fishbone assemblages (N=13,674). Unique evidence of intensive trade systems comprising a large diversity of fish and representing diverse aquatic habitats, including the Mediterranean Sea, Red Sea, Nile River and possibly other freshwater sources, is presented. The discovery of Red Sea parrotfish (Scaridae) at all three sites was of particular interest. Although mentioned in ancient texts, references to Scaridae are often limited to gastronomic advice and esoteric ecological observations. Additionally, the anachronistic nature of these documents prevents determination of the original contexts and dates.

Analysis of the Scaridae remains revealed their role as flag species of the Red Sea and as essential trade goods in the Byzantine and Early Islamic economic systems. Furthermore, the presence of several Scaridae species, including *Cetoscarus bicolor* (Bicolor parrotfish), *Chlorurus gibbus* (Heavybeak parrotfish), *Chlorurus sordidus* (Daisy parrotfish), *Hipposcarus herid* (Candelamo Parrotfish), *Scarus ghobban* (Bluebarred parrotfish), and *Scarus niger* (Dusky parrotfish), was noted. The study of skeletal element representation indicated the presence of complete skeletons. Fragmentation patterns of various bones (cleithrum, lower pharyngeal) exhibited a pattern typical of fish butchered for drying and salting. These results demonstrate that preserved fish were transported to the sites.

Estimates of Scaridae standard length and body mass for the three studied sites displayed a wide range of values, ~23-59 cm, and ~164-2,293 gr, respectively. The wide range of estimated body sizes indicates the use of non-selective fishing methods, still carried out by traditional fishing communities. This study shows, for the first time, that the Red Sea played a key role in classical Middle East trade systems, revealing high demand for fish goods.

Keywords: Red Sea, Scaridae, Fish, Trade



Herding and Hunting on the Highlands of Transcaucasia and Ciscaucasia from the Sasanian to Late Medieval Periods. The Archaeozoology of the Dariali Gorge

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This paper will present the evolution of subsistence economies of the Dariali Fort located in the Kazbegi district in north-east Georgia, on the border of Russia's Republic of Ossetia– Alania. The lowest point in the Kazbegi region is around 1,200m above sea level (a.s.l.) and the highest point is over 5,000m a.s.l. The Kazbegi region has a very rich and diverse environment and natural resources. The relief around Dariali Fort is complex, mountainous and very rugged. As a result, the potential for agricultural activities is limited. Instead, the area is more suitable for sheep, goat and cattle breeding, together with the development of terrace field systems for pasture or growing animal fodder. The high altitude and harsh winter climate, with freezing temperatures from October to April, have favoured the development of transhumant pastoralism. During recent archaeological excavation of the last five years, approximately 80000 faunal remains were studied. This large assemblage constitutes a unique collection of domestic and wild mammals, birds and fish remains exploited by highland rural communities of medieval Georgia. It also allows a first description of the faunal remains of this region during approximately a millennia and characteristics of highlands agro-pastoralism.

Keywords: Georgia, Kazbegi, Antiquity, Medieval, Domesticates, hunting, agropastoralism



Cattle and temples. The meroitic butchery from Dukki-Gel (Northern Sudan) (100 BC-100 AD)

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The large meroitic temple from Dukki-Gel, in the Northern Sudan is linked with butcheries and bakeries dedicated to the preparation of offerings.

The butchery and its annexes delivered a large amount of animal bones. The waste of this workshop, near of the butchery, was also studied.

The fauna is only represented by domestic cattle, attesting the importance of this animal in this religious context.

Cattle are robust, with a wither's height around 1.40 m. They belong to the shorthorn type "brachyceros").

Individuals are clearly selected, with a high percentage of veals less than two years old, at the best of their form.

Some tracks testify of the preparation of various joints.

The faunal remains found in the butchery of the Dukki-Gel temple are a good illustration of the importance of cattle in the Napatan and Meroitic cultures, as well in religious contexts than in the economy.

Key words: Northern Sudan, Meroitic, temple, butchery, cattle

Caucasian Bison: Pages of History

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Up to the present date, the animals of Armenia of the Quaternary Era have been known with 6 species of fossils of oxen, which have been fairly widespread and prevailed in archaeological excavations. Even if members of the *Bos* genus were abundantly present everywhere, the Bison in Transcaucasia, apparently, have always been scarce. In any case, the number of bone remains of this species in the Pleistocene has been very limited, and its documentary evidence in the archaeological excavations of the Holocene is lacking. The fragment of the skull found in the burial of the faunal remains on the northwestern shore of Lake Sevan (belongs approximately to the late Bronze Age), had a right-side horn shaft with a frontal bone and an arched part of the temporal cavity. The fragment is rather heavy, compact, sufficiently mineralized and partially silicified.

Lake Sevan, or as they called it in ancient times, Geghama Sea, is one of the world's largest high-altitude lakes. It is situated in an active tectonic basin rimmed by mountain ranges and situated at 1900 m above sea level. The lowest part of the basin is filled with water.

A natural burial place of bones is concentrated on the southwestern coast of Lake Sevan near the Ayrivan monastery. The belt extends along the wave-cut zone all the way up to Cape Noraduz, extending over 500 m in length and about 50-60 m in width. The layers forming these strata relate to paleofluvial deposits of the Early Holocene. These rocks contain remains of animal bones within two strata that alternate with diagonally-layered sand. The faunal composition is rich and includes *Bison* sp., *Bos* sp., *Cervus elaphus*, *Canis lupus*, *Vulpes vulpes*,



Sus sp. and others of the type.

The skull described is more bound to be from the genus *Bison* by its morphological parameters. The *Bison* skulls and horn shafts discovered earlier and rock carvings in the Gegham Mountains also confirm the occurrence and wide distribution of *Bison* in the Lake Sevan basin.

Keywords: Bison, Lake Sevan, skulls and horn

Looking ethologically at the past: working donkeys and cattle in modern Africa and 4th-3rd millennium BC Mesopotamia

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Ethnography is an established interpretational approach for archaeologists; for zooarchaeology a mirror approach may be ethology – the study of innate animal behaviour and natural psychological responses to situations, which I have used to help in addressing the subject of working animals in the early times of their systematic employment, in 4th-3rd millennium BC Mesopotamia. Ethology can fulfil a valuable role in rectifying some of the unavoidable shortcomings of ethnographic field interviewing, through observation studies of animal-based traction and transport and assessment of the animals' own capabilities and responses to management, blended with the associated humans' corresponding activities. Discussions of Mesopotamia have typically been dominated by large-scale themes, with working animals categorised without further examination as participating in long-distance trade and ox-ploughing, with the implications for urbanisation. But it is equally valid to approach changes in human-animal relations at the micro scale, including both basic logistical matters of breeding, supply, training, grazing and foddering, and the impact of working animals on local economies through processes such as labour adjustments, hiring and lending.

Working animals are widely used today in Africa and in much of Asia and Latin America. (In the Near East, though, there is major mechanisation, with low usage now of donkeys in many regions.) In many regions of sub-Saharan Africa, cattle and donkeys were only adopted for work within the last 100 or even 50 years, with the process being actively tracked through a large body of NGO and official development studies. I have analysed these in detail to elicit the complex minutiae of daily life with working animals – using a ploughing ox year-round, keeping a multi-purpose working cow, developing new income sources and household labour systems from donkey ownership – which build up to a series of Mesopotamian model adaptations hardly proposed yet.

Keywords: donkeys, Mesopotamia, working animals

Ethnozooarchaeological study of caprine husbandry in mixed agropastoral systems: questions of scale

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Zooarchaeological interpretation inevitably relies on analogical reasoning. In many cases, the analogies employed as interpretative aids are of ethnographic nature. Zooarchaeology in particular has been heavily reliant on ethnographic studies to inform its interpretative framework, especially on animal husbandry practices. The majority of published relevant studies, however, concern highly specialised pastoralists in large-scale systems. Husbandry



practices on smaller scales, especially in mixed agro-pastoral systems, are less documented ethnographically. The scarcity of ethnographic analogies covering such practices is detrimental to zooarchaeological interpretation, as scale is a fundamental characteristic of any animal husbandry system that influences many other of its aspects. This paper constitutes an effort to address this gap through an ethnozoarchaeological study of, now extinct, medium-scale traditional caprine husbandry practices in 20th century Cyprus. Data collected through semi-structured interviews with sheep and goat herders are presented to illustrate how scale affects several aspects of animal management. Information on mobility patterns, the integration of pastoral and agricultural practices, as well as more technical information on sex ratios, age-at-death, fluctuation of herd numbers through the agricultural year and other aspects are presented and discussed. Besides providing information of practical use to zooarchaeologists working in Mediterranean, particularly insular, environments, this paper overall contributes another variant of sheep and goat husbandry that can be used as an analogy in relevant archaeological cases.

Keywords: Ethnozoarchaeology, Caprines, scale, analogical reasoning, agropastoral systems, Mediterranean

Identifying Accumulation and Post-depositional Taphonomic Processes on Reptile Bones Using Experimental Archeology

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The site of el-Wad Terrace, Mount Carmel, Israel, one of the major Natufian hamlets of the Levantine Mediterranean area, exhibits high percentage of herpetofauna (amphibians and reptiles) remains. These remains can provide valuable information regarding terminal Pleistocene paleoenvironments as well as human activity and subsistence at the site. However, to substantiate these reconstructions, both the underlying accumulation processes and the post-discard processes must be first deciphered, through detailed taphonomic studies. These, in turn, must be further verified by appropriate experimental studies that helps reconstruct the various post-discard processes. Taphonomic experimental studies regarding herpetofaunal remains in archeological sites are rare and are mostly centered on reptile and amphibian long bones and mandibles. In contrast, vertebrae are the most abundant element in our assemblage, mostly snake and legless lizard (*Pseudopods apodus*).

We examine three possible accumulation processes: natural death at the site, raptor predation and human consumption. Each process will ideally result in different taphonomic markers. Human predation on reptiles is hard to detect due to the lack of traditional taphonomic markers such as cut marks and burning resulting from cooking or roasting. Therefore, identifying human predation is mostly done by the lack of digestion marks on the bone and by quantitative and contextual studies. Identifying and testing post-discard processes on natural and digested bones will enhance our understanding of the accumulation agents in the site.



Four post-depositional taphonomic processes were experimentally tested: weathering, burning, sediment erosion and trampling. These processes were observed on three bone accumulations; fresh *Pseudopodus apodus* and *Vipera palaestinae* carcasses and digested squamate bones from an eagle owl (*Bubo bubo*) pellet. This paper will present the taphonomic markers identified in the experimental material and compare it to the Natufian reptile assemblage of el-Wad Terrace to identify the main accumulation agent at the site and the post-depositional processes that effected the reptile remains.

Keywords: *Herpetofauna, Experimental archaeology, Taphonomy, Post, depositional processes, Natufian*

SESSION 8: ANIMALS THROUGH TIME

Reassessing Late Pleistocene Hyenids in the Southern Levant: Taxonomy, Size Variability and Feeding Behavior

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Humans and hyenas were the most prominent cave users during the late Pleistocene Southern Levant. They share several common traits: top predators, social hunters and bone collectors, making their niches very similar. Their feeding preference, hunting mainly medium ungulates, could have brought them into strong competition, evidenced by the change in human diet (Orbach and Yeshurun, 2019). Consequently, the Levantine hyenids' taxonomic identity, osteological variability and dietary adaptations need to be studied and reassessed. The majority of the late Pleistocene Levant hyenids have been identified as *C. crocuta*. Based on size and proportions, Kurten (1965) assigned the Levantine *Crocutas* to two sub-species; *Crocuta crocuta dorotheae* and *debilis*. A few specimens were identified as belonging to the Hyena genus; by Bate (1937) as a distinct species (*Hyena prisca*) and by Kurten as a sub-species (*Hyena hyena prisca*). Subsequently, mostly *Crocuta* and few specimens of *Hyena* were identified in the Levant.

A core question in the *Crocuta* research is when they became hunters. This question is interesting by itself as it sheds light on the ecology of an extinct population, but also bears significance for paleoanthropology. Bone remains are a lot more abundant in Pleistocene hyena dens than in recent African dens. It been suggested that since recent African *Crocuta* populations hunt, they collect less bones than the scavenging Pleistocene hyenas, i.e. their hunting behavior evolved recently.

Change in teeth is an excellent indicator for dietary shifts. Kurten (1965) noticed slight differences in the proportions of the front and the back teeth between European and Israeli Pleistocene hyenas. Those can be attributed to feeding adaptations, namely hunting vs. scavenging.

New excavations of several caves during the last decade yielded numerous hyenid remains, enabling us to reassess the variability among hyenids and to check Kurten's hypotheses. Zooarchaeological, taphonomic and osteological analysis of the new finds as well as the old fossils and comparative materials will help us to explore the Levant hyenid taxonomy, size variability and feeding behavior.



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Keywords: Crocuta, Hyena, Taxonomy, Size Variability, Feeding behavior, Hunting VS scavenging, Dental morphology, late Pleistocene, Levant

Molluscs beyond subsistence: The mollusc assemblages from Dibba al Hisn (Sharjah, UAE)

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Molluscs play an important role within human societies that dates back to the Middle Palaeolithic. Subsistence has not been the sole cause for shellfishing as shell ornaments and tools appear in archaeological sites the world over since early times evidencing cultural practices that range from the economic to the symbolic spheres of society. This presentation provides a preliminary overview of the mollusc assemblages retrieved on the ancient (1st BCE-1st CE) port city of Dibba Al Hisn in the United Arab Emirate of Sharjah. The presence of imported pottery from Mesopotamia and India as well as Roman ware have already highlighted the strategic commercial role of the city as a trade outpost during Classical Antiquity. The shells derive from a complex multi-purpose building close to the shore postulated to represent a warehouse. This may partly explain the taphonomically diversified mollusc assemblage that, along with edible molluscs, includes a substantial collection of pearl shells (*Pinctada margaritifera* L. 1758 and *P. (imbricata) fucata*/*P. radiata*). Many pearl shells bear hints of manipulative traces and are concentrated in a room postulated to represent a workshop area. The dominance of non-food taxa, including species used as currency items, stresses the commercial context of the assemblage and lends weight to the hypothesis that Dibba al Hisn may have constituted a key outpost in the pearl trade routes of Classical Antiquity.

Keywords: Molluscs, Classical Antiquity, Sharjah, United Arab Emirates, pearl shell, pearl trade



Artistic evidence of the occurrence of two phenotypic varieties of horse in Bronze Age Egypt

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Many authors concur upon a division of all domestic horses into two main typologies. The definition of "oriental" or "eastern" indicates a large group of animals of which the Arab is the prototype, signifying type alone and not geographical origin. The other term "occidental" or "western" does not refer to all horses of European origin, but only to a certain group of animals distinguished from the oriental in terms of conformation. Several artistic documents dating to the Bronze Age testify the coeval occurrence in ancient Egypt of two different typologies of domestic horse, characterised respectively by the phenotypic patterns of the "oriental" and the "occidental" groups. This could suggest that the domestication of at least two different taxa of wild horse had already occurred.

Keywords: horse domestication, Egypt, Bronze age art, phenotypes

Armenia: The Horse in religion and Art

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The horse continuously inhabited the Armenian upland since ancient times. Osteological data testify to the constant persistence of the horse in this region from the late Pleistocene through the entire Holocene. The burial assemblages found within the country mainly in the chronological frame of the Bronze and Iron Ages and the Classical Period have yielded an exceptionally rich, diverse and uniquely-preserved material culture. Religious beliefs of the population living here are still little known, and therefore the materials from the Bronze and Iron Ages burial on the territory of Armenia complement our understanding of the spiritual life of the ancient people.

Since there is no hard correlation between the spiritual and material, reconstructions from the sphere of spiritual life are carried out in archeozoology on the materials of the burial rite, rock paintings, stone sculptures, etc.

The materials from the burials of the Bronze and Iron Ages give us the opportunity to improve our understanding of the religious cults of the ancient population.

In our opinion, a special place in the cults was occupied by the horse, which had played a large role since the middle Bronze Age. This is evidenced Horse burials, as well as finds in the graves of images of horses and horse attributes.

In ancient times, the rite of sacrifice of a horse was appropriate only to persons of the highest social ranks, first of all to the leader. The hypothesis of sacrificing horses to only the representatives of the clan aristocracy is confirmed by the large size of the burial pits, the special wealth and composition of the inventory (Lchashen, Nerkin Naver, Lori Berd). During the study of Aghavnatun burial complex, a burial of horse with a bronze ring attached to its mandible was found in the south part of the Burial pit. The remains belonged to an adult horse.



It is by far not a ploughman's draft horse, but either a war horse ready to walk its master out to battle, or most likely, a gala horse intended for special horse shows by a local kinglet.

Keywords: Horse, bronze and Iron ages burial, Armenia, sacrifice

The representation of doves (Columbidae Illiger, 1811) in the 2nd millennium BC Near Eastern and Aegean art

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In his book *Mari, une ville perdue* of 1937, Andr e Parrot defined the flying bird depicted on the upper left section of the painted scene of the "Investiture of Zimri-Lim" (18th century BC, Middle Bronze age) of the palace of Mari as *chasseur d'Afrique*, French nickname of the otherwise called *gupier d'Europe*, the bee-eater, *Merops apiaster* L., 1758. Parrot was, however, just an archeologist and any modern ornithologist would say that this is a wrong identification. The attempt to find the correct taxonomic attribution to this animal gives us the opportunity for a reflection on the artistic representation of doves and pigeons - and their significance - in the cultural relations between the Near East and the Aegean world during the 2nd millennium BC.

Keywords: Doves, Pigeons, 2nd millenium, Mari



ABSTRACT BOOK

Poster contributions



P1 Reconstructing the local environment of Neanderthals and Modern Humans: Preliminary zooarchaeological analysis of the micromammals of Shanidar Cave (Iraqi Kurdistan)

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The extinction of Neanderthals and the expansion of Anatomically Modern Humans (AMH), between approximately 50,000 to 30,000 years BP in Eurasia, is a transition that continues to spark debate amongst archaeologists and palaeoanthropologists. Various theories have been put forward to explain the replacement of Neanderthals by AMH, and in recent years there has been a particular focus on whether Neanderthals were less resilient to abrupt climate change in MIS 3 than AMH. Palaeoclimatic and palaeoenvironmental studies are important as they allow testing of these climatic theories and help to build our knowledge of the climatic resilience of each species and their probable ecological niche. A major methodological challenge for the debate about whether climate was a major driver in Neanderthal extinctions and AMH dispersals is that the best climatic records have tended to be distant from areas of hominin occupation - for example from marine sediment and ice cores. High resolution, independent climatic proxies, which can be closely mapped onto sites of known Neanderthal and AMH occupation are therefore required. The microfaunal deposits of Shanidar Cave offer such an opportunity for this research. Microfauna are a valuable source of environmental information due to their relatively small ecological niches, small home range, short life span and abundance in zooarchaeological assemblages. In this poster I present the preliminary zooarchaeological analysis of the micromammals of Shanidar Cave excavated in the latest series of fieldwork beginning in 2014. Material has been taken from Middle and Upper Palaeolithic sample columns allowing changes in the micromammal community to be tracked throughout the sequence. From this it is possible to make inferences about the local environment of Shanidar Cave throughout the sequence which can then contribute to the debate on the factors involved in Neanderthal extinction and the subsequent success of Modern Humans in the region.

Keywords: Micromammals, Palaeoecology, Palaeoenvironment

P2 Seasonality and paleoenvironmental of the last Neanderthals at Kabazi II (Crimea) using tooth microwear analysis

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The paleoenvironmental context of the Neanderthal occupation at Kabazi II (Crimea) (ca. 40 to



30 ka BP) is investigated through tooth microwear analysis to infer the diet of ungulates at the time of death. This proxy provides evidences about (1) the habitat where the ungulates were hunted but also can inform about (2) the duration of the events of occupation in each archaeological level. In this work, we have analysed the microwear pattern of 75 specimens of *Equus hydruntinus* belonging to the main archaeological levels of the site (levels 1, 2, 3, 4, 5, 7, 8, 8c, 8d, 9, 13, 13a).

(1) The tooth microwear pattern observed on the wild asses from Kabazi II is characterized by a high number of scratches and relatively low number of pits related to a highly abrasive diet based on grasses (which are rich in phytoliths). The bivariate distribution of the numbers of pits and scratches compared to extant species, places all the fossil samples from all levels in the grazing and grass-dominated mixed feeding ecospace.

(2) The duration of the events of occupation can be estimated using the variability of the microwear signal. By means of a Bayesian model established on modern ungulates, it is possible to distinguish seasonal events vs. long-term occupations in archaeological assemblages. The wild ass population of Kabazi II plot in area that indicating a short duration event for the accumulation corresponding to one season or less in all levels. Moreover, these occupations occurred at the same season in each of these levels.

These results fit in with the other archaeozoological interpretation which support that Kabazi II served as a kill and butchery site throughout its occupational history (short-term occupations) at which Neanderthals practiced the specialized hunting of *E. hydruntinus*.

Keywords: dental wear, habitat, seasonality, diet, Equus hydruntinus

P3 A Thought Fox: Late Manifestation of Animism in a Joint Burial of Humans and Foxes in Pre-Pottery Neolithic Motza, Israel

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Recent excavations at the Pre-Pottery Neolithic B (7,600-6,000 BCE) mega site of Motza, have revealed a unique finding of a joint burial of an adult human and two children in association with at least two fox individuals. The settlement of Motza is located in the Judean Hills west of Jerusalem and is one of the largest sites of this period in the southern Levant. The site is remarkable for its architecture, plaster floors, a large lithic assemblage, many graves and an extremely rich faunal assemblage. As one of the earliest and largest agricultural villages in the Mediterranean phyto-geographic zone, Motza has much to contribute to our understanding of the axial transformation from hunting-gathering to agricultural societies, in its economic, ecological and social dimensions. Here, we focus on a double burial of two children and an adult with dismembered fox carcasses, which we argue is important evidence to the symbolic world of the Neolithic, and the way by which this symbolic universe interacted with the



anthropo- formed natural environment of this period. Joined burials of humans with small carnivores are known from a few sites in the southern Levant and are major junctions where the natural and the social worlds meet. Of particular interest are such animal burials that are at the edge of the transition from hunter-gatherers to farmers and records the story of shifting relations between humans and their fellow animals. This finding demonstrates the broader socio-cultural perspective and the possibly still-animistic world-view of the Neolithic foragers at the onset of the agricultural revolution.

Keywords: Human Fox Burial, Animism, Small Carnivores

P4 Cattle husbandry as a potential proxy to climate change in the southern Levant

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Climate change has played a significant role in the history of human societies; this is especially true for the southern Levant (Israel, Palestinian Authority and Jordan), a marginal region between the Sahara-Arabia desert and the more temperate European-Mediterranean climate belt. The climate conditions at the area during the Holocene were relatively stable; however, evidences for drought episodes during that time are accumulating. We suggest that archaeozoological data can be added as an element in Holocene paleoclimatic modelling. The most common animals in the archaeozoological record of this period are livestock: sheep, goats, cattle, and pigs. We suggest that cattle (*Bos taurus*) can be used as a monitor to climatic changes as cattle husbandry is sensitive to changes in the availability.

We collected data of identified specimens (NISP) of cattle and caprine from published archaeozoological reports. Cattle frequencies were calculated using the number of identified specimens (NISP) of cattle, normalized by division by the number of caprines and cattle. We assume that this ratio is a general proxy to the intensity of cattle husbandry around each settlement. Data were collected from three regions based on today's climatic condition: the desert area (less than 200 ml annual rainfall), the southern Mediterranean area (300- 450 ml) and the northern Mediterranean area (above 450 ml). The data were divided by major archaeological periods in the southern Levant: Chalcolithic, Bronze Age, Iron Age, and Persian-Hellenistic to Byzantine periods. In total we compiled information from 105 temporally distinct zooarchaeological samples and from 50 sites. Two-Way ANOVA was used to test differences between the studied areas and periods.

A significant difference in cattle relative frequency was found between the regions but not between the periods. In all studied periods, cattle frequency was the highest at the northern Mediterranean area and lowest at the desert, reflecting the relatively high water requirements of the cattle in comparison with caprines. The only area that shows a relatively high, although no significant, decrease in cattle frequency during the dry spell at the end of the Bronze Age was the desert area. These result suggest that cattle frequencies may register the signal of a known aridification event at the end of the Late Bronze Age, but overall suggest stability in the location of the border between "the desert and the sawn" in the southern Levant throughout much of the mid-late Holocene.

Keywords: aridification, cattle



P5 Completing the Zooarchaeological Picture of Rural Responses to Urban Developments in the Early Bronze Age Khabur Basin of Syria

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Salvage operations undertaken in the 1990s at the request of the Syrian government documented numerous archaeological sites in the Khabur Basin of the northeastern part of the country. Threatened by flooding that would result from the completion of a large dam on the Khabur River to create an irrigation reservoir, surveys and subsequent excavations revealed a cluster of small settlements along the middle stretch of the river that were inhabited during the course of the Early Bronze Age (3000-2000 BC). Founded during the first half of the third millennium, the archaeological literature soon focused on the role that these rural communities may have played in the urbanization of the northern Khabur Basin around 2500 BC. Zooarchaeological analyses have now been published for many of these sites, with only two remaining to be completely described. This poster presents a summary of the most important faunal data from one of these two sites – Tell 'Atij – whose animal bone assemblage is of relatively large size and provides a diachronic profile. As such, the Tell 'Atij zooarchaeological dataset will significantly expand the existing picture of the region's Early Bronze subsistence economy and complete the available array of faunal information for comparative analyses. As the middle Khabur River is now inundated and further excavation of these sites is no longer possible, the zooarchaeological analysis for Tell 'Atij (and its sister site of Tell Gudeda, also now available but not detailed here) will permit the fullest possible zooarchaeological profile of the central Khabur Basin during the Early Bronze Age.

Keywords: Northern Mesopotamia, Syria, Tell 'Atij, Early Bronze Age, Urbanization

P6 Animals in pits: A case study from the Middle-Bronze Age 'Megaron' in Marathon, Greece

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In 2018 the University of Athens excavated a Middle Bronze Age 'Megaron' in Plasi, Marathon. A pit of animal bones was recovered inside this structure, close to its entrance. In this poster, I present the zooarchaeological remains from this pit. Parts of three sheep were rapidly deposited in a single burial episode, after building's abandonment, according to excavators and they were never been disturbed. The in situ articulated units and the presence of cut marks on bones in combination with the context of the animal remains constitute this structured deposition special. This pit requires close attention, as human burials were found under the 'Megaron' floor. Current research is investigating the correlation between these inhumations and the pit with the potential to assist with data interpretation. Furthermore, the analysis of other Bronze Age faunal assemblages in Greece has indicated that sheep was the most abundant taxon, highlighting its importance for human subsistence and social life. Finally, other similar cases in the wider context of the Aegean and the South Western Asia are investigated as well.

Keywords: MBA, Greece, pit, structured, sheep



P7 Local strategies and trends in the animal economy at Tell Madaba (Jordan) during the Iron Age

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The transition between the Bronze Age and the Iron Age witnessed political crisis that led to the fall of the Levantine kingdoms. This turmoil modified the political and economical aspects of the region and led to the emergence of a whole new cultural and social development located in southern Levant. This poster shows the results of the fauna analysis during the Iron Age period in Tell Madaba, located southern Levant, modern Jordan. The analysis is mainly concentrated on the frequency of species and animal herd management. The comparisons of these results with other Jordanian sites will provide a complete data of the regional context of Tell Madaba. It will also allow us to point out the similarities and particularities of the stock farming as well as determining the factors (socio-political, environmental...) that may have affected its development and breeding strategies.

Keywords: Tell Madaba, Iron Age, Herding

P8 Gazelle exploitation at Iron Age Salut (Oman)

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Archaeozoological research on the faunal remains of the Iron Age site of Salut in the Sultanate of Oman revealed that gazelles were present in antiquity and exploited by the human community. Salut is a complex site located in the piedmont of Al-Hajjar Mountains in eastern Oman, at the junction of wadi Saifam and wadi Bahla. During Iron Age (from 1300 BC to 300 BC) the site included a fortified citadel for communal gatherings as well as a settlement area. The faunal spectrum is dominated by domestic species, in particular goats and sheep (more than 90% in terms of NISP count), while gazelles are represented in a low proportion (less than 1% of the NISP count). Nevertheless, the evidence indicates they played a role in the life of ancient society. The poster describes the features of the presence and exploitation of gazelles on the basis of the anthropic marks observed on the remains.

Keywords: Iron Age, Oman, Arabia, gazelle



P9 Ectoparasites remains from Areni-1 (Birds Cave) cave in Armenia.

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Invertebrates' remains can be found in many different environments. They are the most significant source for paleoparasitological studies as well as for other paleoecological reconstruction. Preserved paleoparasitological remains are found from the driest to the moistest conditions. They help us to understand past and present diseases and therefore contribute to understanding the evolution of present human sociality, biology, and behavior. In this paper, the scope of the surviving evidence, that came out during Areni-1 cave excavations 2007-2010 will be briefly surveyed. The most common materials used to analyze ancient environment and emphasized ancient human disease. This paper also urges increased cooperation among archaeologists, paleontologists and paleoparasitologists. In this paper, we present ectoparasites eggs of *Polyplax* sp., which have been found on rodent remains from Areni-1 cave and *Ctenocephalides felis* remains which parasites on cats. In addition, bird tick (larvae) remains *Argas* sp. Previous mentioned are major vectors of important pathogenic virus, bacteria and protozoa threatening human and animals and describes some of the period disease.

Keywords: paleoparasitology, ectoparasites, ancient diseases – Areni, 1 cave – Armenia

P10 A Tick remains from Areni-1 (Birds' Cave), Armenia

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Ticks have been never participated in archaeological analytic studies. Here, we present the discovery of a tick from the finds of Systematic archaeological excavations at Areni-1 cave in the Republic of Armenia.

The well-preserved tick *Rhipicephalus bursa* provides important information about the prevailing ecology during the periods of habitation and usage of the cave by Late Chalcolithic and Medieval inhabitants and supports previous hypotheses, that ticks were a potential source of disease for human and other mammals especially cattle, sheep, horse and dog. This discovery has health, behavioural and ecological implications for the people that occupied the cave.

Keywords: Archaeozoology, Areni, 1 Cave, Armenia, Tick remains.

P11 Galatians in Gordion: animal husbandry practices during the Hellenistic period in central Anatolia

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The famous site of Gordion in Central Anatolia has been the center of archaeological interest for over 50 years. This includes a long tradition of bioarchaeological research in this region,



which portrays the economy and ecology of Gordion over a millennium of subsequent occupation phases spanning the Early Iron Age to the Roman period. Particular attention has been paid to how these practices influenced the local environment in Gordion in relation to overgrazing and wood clearance, and vice versa. However, animal husbandry practices during the Hellenistic period in Gordion, as well as in wider central Anatolia, remained relatively unexplored. We attempt to clarify animal husbandry practices during the Hellenistic period by firstly investigating whether the impoverished environment caused by prior overgrazing during the Middle Phrygian period lead to risk-mediating adaptations of agropastoral activity that continued in the Hellenistic period. Secondly, we investigate whether the visibly different hierarchical and organizational changes resulting from the arrival of the Galatians in Gordion around 235 BC, are reflected in changes in animal husbandry practices. To answer these questions, we unified legacy data collected by various analysts since 1988, with recent data from the 2014-2018 campaigns in Gordion into a single relational database. The additional use of legacy data allowed us to explore an increased faunal sample created by the efforts of various analysts. Based on our analysis, we find no direct evidence of adaptations to impoverished environmental conditions, however, we do observe differences in management practices that we suspect are related the cultural and hierarchical shift in the settlement after the arrival of the Galatians.

Keywords: Anatolia, Hellenistic, Gordion, Galatian, legacy data, overgrazing, castration, martial, diachronic, animal husbandry

P12 A review of recent archaeozoological investigations from the Islamic period in Iran

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Recent development of archaeological investigations on historical periods has provided the opportunity to work on faunal assemblages from Islamic period that spans over 1400 years. Meanwhile, the number of available assemblages is low compared to the length of this period. The earliest assemblages date back to the 8-9th century AD, and the latest to the 19th century. They all belong to urban contexts. According to written texts, Islamic rules for consumption, diet and hygiene have been fundamental in everyday life and have shaped the subsistence practices during this period. However local variations are also visible, in particular in coastal areas. The licit mammalian meats in Islamic rules are basically sheep/goat, cattle, dromedary and camel. Consequently, these herbivores and in particular bovids, constitute the main sources of meat supply and also by-products. In this paper we will present an overall view of the existing data with a focus on the characterisation of sheep and goat population during this period of time in relation to the market economy and agropastoral practices.

Keywords: Islamic period, Iran, urban sites, Bovid



P13 Mollusks from the Archaeological Excavations of Getahovit-2 Cave (Armenia)

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During 2010 survey in the Tavush region (the North-East Armenia) organized within the framework of the "Mission Caucasus", an Armenian-French joint project, two adjacent caves (Getahovit 1 and 2) were detected in the Aghstev River valley, both located on the same terrace of the Khachaghbyur River (the left tributary of Aghstev). Valley of the Kura River and its tributaries played an important role since the Neolithic to the native people living there, and were among the densely occupied areas in the system of the Lesser Caucasus. Besides serving as summer pastures, those landscape features could also serve as a refuge at different time periods, because of the Cretaceous limestone formations of the local relief, containing lots of karstic caves. Getahovit-2 cave was chosen for further investigations, because of having good deposition indicating prehistoric occupations.

The archaeological investigation of the cave started in 2011 and as a result medieval period (11-13th cent. AD) layers were discovered first introducing several horizons.

In 2014 the excavations of a stratigraphical trench were carried out at the western side of the cave in order to detect all the possible occupation stages. In addition, a new data on Neolithic (6-5 mill. BC) and Upper Paleolithic (22020-21685 cal BC) has been recorded.

During excavation, four species of terrestrial mollusks from three families were found.

1. Family Pomatiasidae Gray, 1852; genus Pomatias Studer, 1789; species Pomatias rivulare rivulare (Eichwald, 1829). (Level III) 2. Family Enidae Woodward, 1903; genus Napaeopsis Sturany et Wagner, 1914; species Napaeopsis hohenackeri (L. Pfeiffer, 1848). (Level V) 3. Family Helicidae Rafinesque, 1815; genus Helicella Ferussac, 1821; species - Helicella crenimargo (L. Pfeiffer, 1848); Helicella derbentina (Krynicky, 1836) (Level VI) Parallel to this layer, to the north, UF 17 was located, which was represented by decomposed bedrock sediment. It had reddish color in some parts because of the iron oxide accumulations. St. 72 was discovered in this part with a large colony of mollusk species Napaeopsis hohenackeri (L.Pfeiffer, 1848) (nearly 2 kg).

Keywords: Armenia, Getahovit, 2 Cave, Mollusks, Archaeozoology



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