



Επιστημονικό Σωματείο,
Έτος Ίδρυσης 1982, έδρα:
Κάνιγγος 27, 106 82 Αθήνα
(Ένωση Ελλήνων Χημικών)
<http://archaeometry.org.gr/index.php/en/>

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Πληροφοριακό Δελτίο της Ελληνικής Αρχαιομετρικής Εταιρείας

- Μάιος 2017 -

Newsletter of the Hellenic Society of Archaeometry

- May 2017 -

Nr. 194

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ΣΥΝΕΔΡΙΑ - CONFERENCES/WORKSHOPS

DIGITAL TOOLS FOR HERITAGE MANAGEMENT: 3D LASER SCANNING AND PHOTOGRAMMETRY FIELD SCHOOL, NAFPLION, PELOPONNESE, GRECE, 22 MAY - 16 JUNE, 2017

The digitization field school will introduce students to a broad range of 3D recording and mapping techniques. Students will be provided with hands-on instruction in these methods on site in the historical structures of Nafplion. Students will record the site's extensive architectural remains using terrestrial laser scanning, GIS and GPS. The skills learned should allow students to work in digitization of any other site thereafter.

The field school is a collaborative effort between the HMO and its partners: the Center for Advanced Spatial Technologies at the University of Arkansas, Fayetteville (CAST), and Leica Geomatics. The HMO has been asked by the municipality of Nafplion, the first capital of modern Greece, to document its historic city center and its most significant historical structures. Using professional-grade laser scanners, the objective of this project is to record the structural data of these buildings, properly orient them to one another in virtual space, and georeference the data collected to ultimately create a computer generated representation of historic Nafplion. This representation will be used as an essential tool in heritage management for any restoration, documentation or visualisation projects.

The field school will serve as the educational arm of a larger HMO research project in collaboration with CAST, ETH Zurich, Leica and other partners aiming to create and promote applications for the use of 3D documentation for universally applicable heritage management.

Field School Objectives

The field school will introduce students to a broad range of 3D recording and mapping techniques. Students will be provided with hands-on instruction in these methods using terrestrial laser scanning (Leica Scanstation C10), GIS and GPS. The skills learned will be universally applicable, allowing students to work in the digitization of any site around the world.

Prerequisites

There are no prerequisites. Students should be aware that this is an archaeological project and work will be done mostly outdoors; weather conditions, therefore, will have an impact on work and students should come prepared for any weather conditions, especially hot, dry, and sunny.

The language of instruction is English.

Program Fees & Course Credit

The participation cost for this program is \$5000. This covers all course costs including: registration; tuition; program materials; shared accommodation; one meal per day (excluding free days). Airfare and optional trips on free days are not included in the program cost.

There is a number of post-graduate tutorial half-fellowships available for this field school– they are awarded after acceptance into the program, so please apply early for eligibility. Please contact us for more information

If you would like to take this course for credit, the suggested credit amount for this program is equivalent to one nine credit semester / term course, based on contact hours, field work, and course content. We prefer to allow students' home institutions to calculate credit hours and award credit accordingly. We will support your request for credit by supplying any relevant documentation and or supporting materials.

Accommodation

Students will be housed in rooms at the Maria Radou Foundation in Nafplion's center. Rooms are shared and full board meals are catered (some special dietary needs may be accommodated, please contact us for details).

Project Directors

- Dr. Cornelis Stal, University College Ghent, Belgium
- Dr. Michele Curuni, Leica Geosystems HDS, Italy
- Dr. Evangelos Kyriakidis, The Heritage Management Organization

Find an indicative [Syllabus here](#).

Application Deadline (for 2017): 14 April, 2017

Please [apply for 2017 or 2018](#) and visit again for updates!

You may fill out an application form [here](#)!

For further information please feel free to write us at info@inherity.org

3D IMAGING FOR UNDERWATER
CULTURAL HERITAGE SPECIAL SESSION
WITHIN METROARCHAEO2017, 23-25
OCTOBER 2017, LECCE, ITALY

Dear colleagues,

I would like to invite you to contribute to and attend the 3D imaging for underwater cultural heritage special session **within METROARCHAEO2017, 23-25 October 2017, Lecce, Italy.**

METROARCHAEO2017 is conceived to foster exchanges of ideas and information, make connections and collaborations, innovation on “measurements” suitable for Cultural Heritage among material scientists, chemists, physicists, engineers, archaeologists, conservators, restorers, etc..

The **special session** gathers contributions related to techniques, methods, sensors and systems used for surveying, digitizing, documenting and monitoring **underwater cultural heritage.**

The deadline for **abstract submission** is **June 30th, 2017.**

Check out <http://www.metroarcho.com/> for farther information.

Also, if you want to stay updated with [ISPRS WG II/9: Underwater Data Acquisition and Processing working group](#) upcoming events, contacts and more, please [SUBSCRIBE as member](#) .

We look forward to meeting you in Lecce next autumn,

On behalf of the organizing committee,

best regards,

Fabio Menna

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THE CONNECTED PAST 2017: THE FUTURE OF PAST NETWORKS? AUGUST 24-25TH 2017, BOURNEMOUTH UNIVERSITY, UK - AUGUST 22-23RD 2017 PRACTICAL NETWORKS WORKSHOP

The Connected Past 2017 is a multi-disciplinary, international two-day conference that aims to provide a friendly and informal platform for exploring the use of network research in the study of the human past.

It will be preceded by a two-day practical workshop offering hands-on experience with a range of network science methods.

Deadline call for papers: May 21, 2017

Notification of acceptance: May 29, 2017

Conference registration (includes coffee breaks and lunch): £35

Workshop registration (includes coffee breaks): £20

Keynotes: Eleftheria Paliou and discussant Chris Tilley (tbc)

Organisers: Fiona Coward, Anna Collar & Tom Brughmans

Call for Papers

Five years have passed since the first Connected Past conference (Southampton 2012) brought together scholars working in archaeology, history, physics, mathematics and computer science to discuss how network methods, models and thinking might be used to enhance our understanding of the human past. Much has happened in these intervening years: applications of network analysis have expanded rapidly; a number of collected volumes dealing explicitly with network analysis of the past have been published (e.g. *The Connected Past*, OUP 2016; Special Issue of the *Journal of Archaeological Method and Theory* 2015; *Network Analysis in Archaeology*, OUP 2013); and several dedicated groups of scholars are thriving, including the Connected Past itself which hosted conferences in Paris and London, but also the Historical Network Research group, Res-Hist and others. The Connected Past 2017 will provide an opportunity to take stock of the developments of the past five years and to discuss the future of network research in archaeology and history. How will new network models, methods and thinking shape the ways we study the past?

We welcome submissions of abstracts that address the challenges posed by the use of or apply network approaches in historical/archaeological research contexts, welcoming case studies drawn from all periods and places. Topics might include, but are not limited to:

- Missing and incomplete data in archaeological and historical networks
- Networks, space and place
- Network change over time

- What kinds of data can archaeologists and historians use to reconstruct past networks and what kinds of issues ensue?
- Categories in the past vs categories in our analysis: etic or emic, pre-determined or emergent?
- Formal network analysis vs qualitative network approaches: pros, cons, potential, limitations

Please submit your abstract limited to 250 words before midnight (GMT) of May 21st 2017 to connectedpast2017@gmail.com

NB. If there is sufficient demand, we will endeavour to organise a crèche for delegates' children (under 3). An extra fee may be payable for this, although fee-waivers may be available in certain circumstances. Further details would be provided in due course. In order to allow us to assess demand, please let us know in advance if this would be useful for you.

Best wishes from the organisers,

Anna Collar, Fiona Coward and Tom Brughmans

Dr A. C. F. Collar

Assistant Professor of Classical Archaeology: Aarhus University, Denmark

**INART 2018, 3RD INTERNATIONAL
CONFERENCE ON INNOVATION IN ART
RESEARCH AND TECHNOLOGY, MARCH 26-
29, 2018, PARMA, ITALY**

Dear Colleagues,

we are pleased to invite you to attend the 3rd International Conference on Innovation in Art Research and Technology (inArt 2018). The conference is open to Chemists, physicists, geologists, art historians, restorers, archaeologists, etc. to create a wide community and a common environment for a fruitful discussion. The Conference scope is to create a bridge of communication between interdisciplinary units in the field of archaeometry.

The conference welcomes all contributions on archaeometry and conservation science, in particular if focused on innovative aspects, including new technological developments, experimental set-ups, degradation mechanisms, in situ experiments and mobile instrumentation, non-invasive analysis, imaging techniques, environmental issues, preservation of art and archaeological objects. A special attention will be devoted to contemporary art.

Venue: the conference will take place in Parma (Italy), March 26-29, 2018, in the Aula Magna of the historical building of the University, in the heart of the city.

A special session on contemporary art will be held at the Centro Studi e Archivio della Comunicazione (CSAC - www.csacparma.it) in the beautiful Valserena abbey, hosting a very important collection of contemporary art , photography, fashion and design.

Call for abstracts: You are invited to submit one or more abstracts, according to the instructions that will soon be available on the conference website, before November 6, 2017.

On the occasion of inART 2018 conference, a special issue of an ISI indexed Journal will be published.

Please, refer to the website www.inart2018.unipr.it for topics, fees, accommodation, deadlines, and to obtain further details. In future updates we will add information about the registration and the scientific and social programs.

For more information:

Danilo Bersani

University of Parma

Department of Mathematical, Physical and Computer Sciences

Parco Area delle Scienze, 7/a,

43124 Parma –Italy

www.inart2018.unipr.it

inart2018@unipr.it



ΘΕΣΕΙΣ ΕΡΓΑΣΙΑΣ/ΥΠΟΤΡΟΦΙΕΣ –
JOB VACANCIES/FELLOWSHIPS
FITCH FELLOWSHIPS AND BURSARIES

Dear Colleagues,

The Fitch Laboratory, British School at Athens, invites applications for two full-time fixed-term research positions in Ceramic Petrology, as well as short-term bursary awards. For further information, please check attachments or visit the BSA's website (<http://www.bsa.ac.uk/index.php/index.php>).

Many thanks for your help in circulating the information and sincere apologies for any cross-posting.

Best wishes

Zoe Zgouleta

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ΑΝΑΚΟΙΝΩΣΕΙΣ - ANNOUNCEMENTS

ATHENS UNIVERSITY REVIEW OF ARCHAEOLOGY (AURA)

Dear friends and colleagues,

It is with great pleasure that we announce the inauguration of the Athens University Review of Archaeology (AURA), an international, peer-reviewed archaeological journal published biannually by the Department of Archaeology and History of Art of the National and Kapodistrian University of Athens.

Our aim is the publication of original papers in Greek or English about archaeology, art and material culture of the broader Hellenic world, from early Prehistory to Modern times, as well as about Environmental Archaeology, Archaeometry, Museology, and Computer Applications in Art and Archaeology. The range of studies varies, including synthetic works, reports on excavations and field surveys, studies of archaeological material or works of art, various case studies, as well as preliminary publications of on-going research projects dealing with the scientific areas described above.

Also, part of the AURA journal is the AURA Supplement series, comprising monographs in Greek or English. The series share the same areas of interest with the journal. The range of publications varies, including monographs, edited volumes, conference proceedings, and publications of excavations, archaeological material or works of art. The studies submitted for publication are peer-reviewed by two anonymous referees, even in the case of doctoral dissertations, which have been successfully defended in universities, in Greece or abroad.

Both AURA journal and AURA Supplements are open-access publications. They are published electronically as a PDF file, with printing restrictions. All papers receive a DOI number and are available on the internet to all users immediately upon publication and free of charge, according to Creative Commons CC BY-NC-ND 4.0.

AURA issues and AURA Supplements can also be distributed on a print-on-demand basis and posted or collected from the bookstore of Kardamitsa Publications, 8 Ippokratous str, Athens. The costs of printing and posting are covered by the customer.

For further information and for author and submission guidelines you can visit our webpage aura.arch.uoa.gr, or send an email to aura@arch.uoa.gr.

The Editors

Konstantinos Kopanias and Yiannis Papadatos

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INTERNET SITES

PLANTCULT - INVESTIGATING THE FOOD CULTURES OF ANCIENT EUROPE: AN INTERDISCIPLINARY INVESTIGATION OF PLANT INGREDIENTS, CULINARY TRANSFORMATION AND EVOLUTION THROUGH TIME

Welcome to PLANTCULT, our ERC funded project (Consolidator Grant, Horizon 2020 Research and Innovation Program, Grant Agreement No 682529) that aims to explore prehistoric cuisines of Europe, in particular their plant ingredients and their transformation into meals. Our five year project (2016-2021) brings together plant remains, food remains, cooking pots and installations, grinding equipment and cooking processes, from the Aegean to Central Europe, in an attempt to decipher culinary practices and identities from the first farming communities to the first cities that emerged at the end of the Iron Age. Our approach will be enriched by considering together with the archaeological record a wealth of ethnographic observations, experimental replication and ancient texts.

Principal investigator:

[Sultana Maria Valamoti](#)

*Associate Professor, Dept of Archaeology, School of History and Archaeology,
Aristotle University of Thessaloniki, Greece*

My interest since a very early age in the interaction of people and their environment led my research steps to Archaeobotany, while my passion for cooking found an exciting field for exploration among the numerous and various plant foods that I was lucky to encounter among the archaeobotanical assemblages I was invited to study: pressed grapes, pre-cooked ground cereals, split pulses and mysterious 'breads'. My research has greatly benefited from the interaction with my undergraduate and postgraduate students who have constantly provided feedback, especially when it comes to traditional recipes their grandmothers prepare, reminiscent of the prehistoric recipes we discuss during classes. Thanks to funding by the ERC Consolidator Grant awarded to me in 2016, I am able to pursue my research interests in prehistoric cuisine which, I hope, will enrich with added value traditional foods still surviving in modern Europe.

Host institution

Aristotle University of Thessaloniki

The PlantCult Project

Food preparation techniques, the selection of ingredients and their transformation into meals, as well as the etiquette of consumption correspond to complex choices resulting from the interaction of human culture and natural resources. The powerful sensory

experience of food preparation and consumption transforms nature into culture, collective memory and identity.

PLANTCULT project focuses in a nuanced way on the role of culinary traditions and innovations into shaping the social landscape over long time periods, in some cases culminating in hierarchical societies.

Our project aims to achieve a new understanding by developing a novel, rigorous methodology for the study of plant food remains and the exploration of culinary practices in prehistoric Europe, through the integration of end products (food) and associated equipment. New multi-disciplinary methodologies and integrative approaches to the study of ancient plant foods and related transformation technologies will be developed by the PLANTCULT team that will be applicable not only to the food studied by the project but also to other materials, too.

Study Area

Rather than generalizing from a single region or archaeological site, our aim is to identify culinary cultures and their change over time in a large part of Europe, from the Aegean to Central Europe, for example exploring the interface between wine and beer regions, focusing on several [key sites](#), rich in remains of plant foods such as bread, beer and wine.

Different parts of this region present different trajectories of social development, receiving influences from the Eastern Mediterranean and Central Asia and we wish to understand the role of culinary practice and innovation, in shaping these trajectories. The selected study area allows us to explore an East-West dynamic in a wider geographical scale.

Research Questions

How did cuisine shape and modify cultural identities in past European societies over time?

The project focuses on plant foods with an integrative new approach that combines actual plant food remains, related processing equipment, ancient written sources, experimentation and ethnography.

Our approach will allow mapping of culinary trends and their change through time among variable cultural and environmental settings. Our project attempts for the first time to approach plant food remains from a large area and time-span, dealing with a large dataset, integrating various lines of evidence on plant foods

To identify culinary identities and their change over time we will address the following questions:

- A.** What were the plant ingredients used and how were they transformed into meals?
- B.** Why do specific food choices, in staples and special food substances like alcohol and oil, change over time?
- C.** How and when does culinary practice and food identity relate to the emergence of transeurasian societies in the study region?

Please visit the site: <http://plantcult.web.auth.gr/index.php/en/>

PRELIMINARY RECONSTRUCTION VIDEO **OF THE ARCH OF TITUS SPOILS OF** **JERUSALEM PANEL**

We are pleased to announce that our preliminary reconstruction video of the Arch of Titus Spoils of Jerusalem panel is now live online at <https://www.yu.edu/cis/activities/arch-of-titus>.

This video includes the reconstruction of the menorah, and-- for the first time-- the table of showbread; the heads of several of the Roman soldiers who bore the vessels in Titus' triumphal parade of 71 CE, and other features of this impressive bas relief. All of this, of course, in living color!

Stay tuned for our cover article on this work in the next Biblical Archaeology Review, our academic discussion in Images: A Journal of Jewish Art and Visual Culture 10 (2017), and best of all, Yeshiva University Museum's -The Arch of Titus: From Jerusalem to Rome-- and Back-, September, 2017. There you will see a full sized and fully reconstructed polychrome 3-D printout of the Arch of Titus Spoils Panel!

ΝΕΕΣ ΕΚΔΟΣΕΙΣ – NEW PUBLICATIONS
DATING KNOSSOS AND THE ARRIVAL OF
THE EARLIEST NEOLITHIC IN THE
SOUTHERN AEGEAN, ANTIQUITY, VOLUME
91, ISSUE 356, APRIL 2017, PP. 304-321

Katerina Douka, Nikos Efstratiou, Mette Marie Hald, Peter Steen Henriksen and Alexandra Karetsou

DOI: <https://doi.org/10.15184/aqy.2017.29>

Abstract

Knossos, on Crete, has long been famous both for its Minoan period remains and for the presence, at the base of the stratigraphy, of an early Neolithic settlement. The chronology and development of the Neolithic settlement, however, have hitherto been unclear. New light is now thrown on this formative period by combining new and older radiocarbon dates with contextual information in a Bayesian modelling framework. The results from Crete and western Anatolia suggest that an earlier, small-scale Aceramic colonisation preceded the later Neolithic reoccupation of Knossos.

Please visit the site:

<https://www.cambridge.org/core/journals/antiquity/article/dating-knossos-and-the-arrival-of-the-earliest-neolithic-in-the-southern-aegean/F4EEDD8990178B742BCD339CB8ABD02E>

NEAR EASTERN ARCHAEOLOGY VOL. 80,
NO. 1, APRIL 2017 ARTICLE, "GRAPHITE-
TREATED POTTERY IN THE
NORTHEASTERN MEDITERRANEAN FROM
THE CHALCOLITHIC TO THE BRONZE
AGE," BY SHANNON MARTINO (SCHOOL
OF THE ART INSTITUTE; MORTON
COLLEGE)

The practice of painting graphite onto pottery in southeast Europe began ca. 5000 B.C.E. The use of graphite as a slip on vessels from the Chalcolithic to the Bronze Age, however, has remained a side note in discussions of ancient pottery, and is often mistakenly identified. The author offers a synthesis of what we know about the presence of graphite on ceramics in the eastern Mediterranean from the Chalcolithic to the Early Bronze Age, and presents the results of a preliminary macroscopic and microscopic study of sherds from across the region. She places a special focus on the various ways in which graphite was incorporated into vessels, the technological complexities implied by the application of graphite to the surface of pottery, the ensuing difficulties in identification, and the need for further study and recognition of graphite application on pottery.

Article Link: <http://bit.ly/2odV6TR> [The article is free to download using your email address.]

EΙΔΗΣΕΙΣ - NEWS RELEASE

FOUND: FRESH CLUES TO MYSTERY OF KING SOLOMON'S MINES ANALYSIS OF 3,000-YEAR-OLD ANIMAL WASTE CONFIRMS THAT AN ANCIENT MINING COMPLEX IN ISRAEL DATES TO THE GOLDEN AGE OF THE BIBLICAL MONARCH

Manure preserved for millennia by the arid climate of Israel's Timna Valley is adding fresh fuel to a long-simmering debate about the biblical king Solomon and the source of his legendary wealth.

Archaeologists discovered the 3,000-year-old dung in an ancient mining camp atop a sandstone mesa known as Slaves' Hill. The area is dotted with copper mines and smelting camps-sites where the ore was heated and turned into metal.

University of Tel Aviv archaeologist Erez Ben-Yosef began excavating the site in 2013. Last year he and his team were uncovering the remains of several walled structures, including a fortified gate, when they discovered what appeared to be animal excrement of relatively recent origin.

"We thought maybe some nomads had camped there with their goats a few decades ago," Ben-Yosef said, noting that the dung still contained undecayed plant matter. "But the [radiocarbon] dates came back from the lab, and they confirmed we were talking about donkeys and other livestock from the 10th century B.C. It was hard to believe."

3,000-YEAR-OLD DONKEY DUNG: A CLUE TO KING SOLOMON'S MINES?

While the dung's extreme age and extraordinary condition were stunning, the implications of the radiocarbon results were even more jarring.

"Until we started the project in 2013, this was considered to be a late Bronze Age site related to the New Kingdom of Egypt in the 13th and early 12th centuries B.C.," Ben-Yosef says. There's clear evidence of an Egyptian presence during those centuries, and modern-day visitors to nearby Timna Valley Park are greeted by signs depicting ancient Egyptians.

But high-precision radiocarbon dating of the dung, as well as textiles and other organic material, showed that the mining camp's heyday was the 10th century B.C.-the era of the biblical kings David and Solomon.

According to the Hebrew Bible, King Solomon was renowned for his great wisdom and wealth, and his many building projects included a temple in Jerusalem lavishly appointed with gold and bronze objects. Such a structure would have required large amounts of

metal from industrial-scale mining operations somewhere in the Middle East, but the scriptures are silent as to their location.

In the 1930s American archaeologist Nelson Glueck (pronounced Glick) announced that he had found the famous mines while exploring the copper-rich Arabah Valley, a geological rift that stretches from the Dead Sea south to the Red Sea and straddles the border of modern Israel and Jordan.

"It is now known that along the entire length of the Wadi 'Araba there are deposits of copper and iron," Glueck wrote in an article entitled "On the Trail of King Solomon's Mines" in the February 1944 issue of National Geographic. "These were intensely worked in ancient times, particularly during the time of King Solomon."

Many archaeologists who followed in Glueck's footsteps, however, argued that David and Solomon weren't the powerful kings depicted in the Bible. Instead, they were small-scale chieftains incapable of organising a major mining operation and orchestrating long-distance trade.

Critics also took issue with the traditional biblical chronology, which places the reigns of David and Solomon in the 10th century B.C. As a result, "Glueck became a laughingstock in the scholarly world," says Thomas Levy, professor of archaeology at the University of California, San Diego, and a National Geographic Explorer.

But discoveries made in recent decades may turn the tables and vindicate Glueck's faith in the Bible's record of events.

In 1997 Levy began a multi-year excavation at Khirbat en-Nahas, a site in southern Jordan that Glueck suggested was an ancient centre of copper production. Levy and his team dug through more than 20 feet of copper slag waste to reach virgin soil, indicating that metal had been produced there on a massive scale. "Our excavations are providing support for many of Glueck's insights," Levy wrote in 2006.

The recent find in Israel's Timna Valley may score more points for Glueck, who discovered and named the Slaves' Hill site in 1934. The mining operation there is not yet linked to Solomon himself, but it does suggest that the region was home to a complex society—most likely the Edomites, the ancient Israelites' antagonists.

The accuracy of biblical passages claiming that King David marched his armies deep into the desert to engage the Edomites has long been debated. But Ben-Yosef says the fortified walls he's found around the smelting camp indicate it was very likely a military target.

If the Bible's claim that David brought the Edomites to heel is accurate, he may have been in a position to demand tribute, Ben-Yosef says. "There's a serious possibility that Jerusalem got its wealth from taxing these mining operations."

EVIDENCE OF LONG DISTANCE TRADE

The dung samples included seeds and pollen spores so intact that Ben-Yosef's team was able to determine the animals' diet, which yielded another surprise: The feed was imported from an area more than 100 miles to the north, close to the Mediterranean coast.

The distance to Jerusalem is about 300 kilometres, a two-week trip by donkey in ancient times.

Long distance trade was key to survival at this remote site surrounded by barren desert. Every necessity had to be hauled in on donkeys-even the nearest water source was 12 miles away-making this a complex and costly undertaking.

"Metal in this period was an essential product, similar to the oil of today," Ben-Yosef says. "So it was worth these peoples' while to invest so much in this operation in the middle of the desert."

More than 1,000 tonnes of smelting debris have been uncovered on Slaves' Hill, Ben-Yosef says, indicating industrial-scale production worthy of an ancient state or kingdom. Whether the Israelites or Edomites achieved such a level of development during the 10th century B.C. remains a hotly debated question, but Ben-Yosef is encouraged by the new finds, which were published in the Journal of Archaeological Science: Reports.

"Until recently we had almost nothing from this period in this area," he says. "But now we not only know that this was a source of copper, but also that it's from the days of King David and his son Solomon."

Please visit the site: <http://www.nationalgeographic.com.au/history/found-fresh-clues-to-mystery-of-king-solomons-mines.aspx> [Go there for pix and better format]

EGYPTIAN BLUE: THE FIRST SYNTHETIC PIGMENT - THE FIRST HUMAN-MADE BLUE PIGMENT EMERGED IN ANCIENT EGYPT, THEN DISAPPEARED FOR CENTURIES UNTIL IT WAS REDISCOVERED IN POMPEII, BY ALLISON MEIER

In a series for the first day of each month, Hyperallergic is exploring some firsts in art, from the earliest known depictions of things to pioneers in the visual fields.

The Virgin Mary is often depicted in Renaissance paintings draped in a robe of blue, chosen not just for its heavenly tones, but for the rarity of the lapis lazuli pigment that colored her clothing. Yet long before this hue of ground semi-precious stones, there was a synthetic blue pigment widely used in ancient Egypt. This blue's creation, loss, and rediscovery cover centuries of human history, from the tombs of Egyptian kings, to the 19th-century archaeological digs at Pompeii, to the modern forensics lab.

Egyptian blue is the earliest-known synthetic pigment, meaning it was not a color already found in nature (such as the precious lapis lazuli, which was mined in today's Afghanistan). It was formed by heating quartz sand, copper, an alkali, and lime (or lime-heavy sand) into calcium copper silicate, a highly stable chemical compound.

The Pigment Compendium: A Dictionary of Historical Pigments states that it was “used extensively from 4th dynasty Egypt until the end of the Roman period in Europe, as well as in certain other rare exceptions.” So after such a long use, including tomb ceilings as the night sky and the blue skin of the god Osiris, why did such an innovative hue disappear?

Partly it was the fall of the Roman Empire, but even before then it had gone slightly out of favor. Roman Egyptian artists tended to use more reds, yellows, and whites, sometimes even painting over preparatory blue drawings. Egyptian blue is believed to have vanished during the Dark Ages, except for strange, sporadic survivals, like in the blue of a 1524 painting by Giovanni Battista Benvenuto. Finally, as the Royal Society of Chemistry explains, samples of the pigment were found in 1814 at Pompeii, leading researchers to link the Roman ruins to this rediscovered Egyptian invention.

The reason it's easily identified is it has a distinct optical property. According to Yale University, Egyptian blue “fluoresces in the near infrared region of the electromagnetic spectrum when irradiated with visible light.” The unique quality has resulted in scientists considering contemporary applications, like as an ink for use at a nanometer scale, or as a luminescent dusting power for forensics on complex surfaces. A couple of centuries after its retrieval from history through Pompeii, this blue may have its own scientific significance as a material of discovery.

Please visit the site: <https://hyperallergic.com/366307/egyptian-blue-the-first-synthetic-pigment/> [Go there for pix]

POTENT POTABLES OF THE PAST: BEER AND BREWING IN MESOPOTAMIA TATE, BY PAULETTE AND MICHAEL FISHER

In ancient Mesopotamia, people knew how to appreciate a good beer. They appreciated their beer often and often in large quantities. They sang songs and wrote poetry about beer. Sometimes they got drunk and threw caution to the wind.

Beer was a gift from the gods, a marker of civilization, a dietary staple, a social lubricant, and a ritual necessity. It was produced on a massive scale and was consumed on a daily basis by people across the socio-economic spectrum. It was indeed “liquid bread,” a fundamental source of sustenance. But what gave beer its distinctive power and appeal was its inebriating effects.

Beer in Mesopotamia

The earliest solid evidence for beer in Mesopotamia dates to the later part of the fourth millennium BCE (the Uruk period). Our first glimpses of Mesopotamian beer, therefore, appear during the period of rapid and radical change that produced the world’s first cities and states and the world’s first writing. Indeed, in the earliest “proto-cuneiform” documents, beer was already being produced and distributed in large quantities.

Excavations at the Uruk-period site of Godin Tepe in western Iran have also uncovered traces of calcium oxalate or “beerstone” within ceramic vessels. As things currently stand, though, we know next to nothing about the prehistory of beer in the region, that is, about the origins and development of beer during preceding periods. Given the scale and sophistication of brewing activity during the Uruk period, we can expect that future work will push beer’s backstory thousands of years further into the past.

Brewing beer in Mesopotamia

What exactly was Mesopotamian beer? Known as *kaš* in Sumerian or *šikaru* in Akkadian, it was a barley-based fermented beverage, typically brewed using two key ingredients: malted barley and a special kind of barley bread (or a looser barley product) called *bappir*. Many beers also included emmer wheat, date syrup, and other flavorings, but there is no evidence for the use of hops. Although the beers were sometimes referred to as “filtered” or “strained,” most probably included a significant amount of solid matter. Cuneiform documents refer to a number of different types of beer. In the earliest documents (c. 3000 BCE), nine different types are mentioned but are difficult to translate. During the Early Dynastic period (c. 2500 BCE), at least five types were recognized: golden, dark, sweet dark, red, and strained. By the Ur III period (c. 2100 BCE), beer was being categorized primarily in terms of its quality or strength: ordinary, good, and very good – or, perhaps, ordinary, strong, and very strong.

Beer appears on thousands of cuneiform tablets, most produced by scribes working for powerful palace and temple institutions. Most of these tablets are economic documents, including delivery orders, receipts, monthly accounts, production estimates, and ration lists.

Through the eyes of the institutional administrator, however, brewing was a black box. The details of the process mattered little, as long as inputs and outputs could be measured, monitored, and recorded. Only rarely do administrative texts have anything explicit to say about how the beer was actually made. They do, however, provide invaluable information about brewing ingredients, the organization of production, and the distribution of beer to consumers. The best description of the brewing process itself can be found in a literary document, the famous Hymn to Ninkasi, goddess of beer. Although it is definitely not a set of instructions for the brewing of beer, this poem or song appears to include a step-by-step, if enigmatic, description of the brewing process.

Archaeologists have uncovered few physical traces of large-scale, institutional breweries in Mesopotamia. The best candidate is a building excavated at the site of Tell al-Hiba (ancient Lagash) in southern Iraq, dating to the Early Dynastic III period (c. 2600–2350 BCE). This building included a variety of vats, fireplaces, and ovens and, fortuitously, a cuneiform tablet that mentions the *é-lunga* (Sumerian for “brewery”). Thanks to scattered references in the written record, we know that beer was also brewed on the household level, and recent excavations at Tell Bazi in north-central Syria have provided vivid confirmation. Among approximately 50 houses excavated at the site, dating to the Late Bronze Age (c. 1400–1200 BCE), many included a standardized set of brewing vessels containing residue evidence for beer. The excavators argue that nearly every household was producing its own beer or, in some cases, wine.

There have been a number of efforts to recreate Mesopotamian beer. In the late 1980s, for example, the University of Chicago’s Oriental Institute teamed up with Anchor Brewing Company to brew a beer called “Ninkasi,” inspired by the Hymn to Ninkasi but brewed using modern equipment. More recently, the excavators of Tell Bazi have used replica ceramic vessels to recreate the beers once brewed at the site. Since 2012, we have also been involved in a collaborative brewing effort, joining the Oriental Institute of the University of Chicago with Great Lakes Brewing Company in Cleveland, Ohio. Drawing on written and archaeological evidence, we have done our best to employ authentic ingredients, equipment, and techniques – resulting in a beer that we call “Enkibru,” always tasted alongside “Gilgamash,” a companion beer brewed with the same ingredients but modern brewing equipment.

Experimental brewing of Mesopotamian beer using replica ceramic vessels. Oriental Institute of the University of Chicago and Great Lakes Brewing Co.

Beer was consumed in a wide variety of contexts in Mesopotamia – at feasts, festivals, and ritual ceremonies, for example, but also at home, on the job, and in neighborhood taverns. It was often consumed from a communal vessel through long, reed straws, as shown in numerous artistic depictions; another common image shows a woman drinking beer from a vessel through a straw during sex. The ubiquitous “banquet scenes” that show seated individuals drinking from cups also suggest that beer (or, alternatively, wine) may sometimes have been consumed from cups.

What kind of effects did beer produce? There is significant disagreement about the alcohol content of Mesopotamian beer. Some argue that this “beer” was not really beer at all but a low alcohol (or alcohol-free) barley beverage analogous to modern kvass, a fermented drink made from rye bread. While it is possible that the Sumerian and Akkadian terms that we translate as “beer” encompassed a broader semantic range than

our own term, we see no reason to ignore the fact that in Mesopotamian literature the consumption of beer often led to intoxication. Beer made people happy; it lightened their mood; it muddled their senses; and sometimes it made them angry and belligerent.

As in many (perhaps most) other societies, both past and present, beer occupied an ambiguous position in the Mesopotamian social world. It was consumed and enjoyed by many people on a regular basis, but there was also a fine line between enjoyment and overindulgence, between acceptable and unacceptable levels of inebriation. The tavern, in particular, provided a distinct space within which this line (and others) could be crossed. The very existence of this conflicted stance toward beer and its potential effects provides some indication of the power of beer and its unique capacity to transform individual people, groups of people, places, and occasions. Over the past few decades, numerous studies have highlighted this dynamic dimension of alcoholic beverages, placing them at the center of social, political, and economic life in societies widely separated in space and time. It is time to follow suit and give beer its proper place in ancient Mesopotamia – treating it as an active and potentially transformative force, whose potency was fundamentally grounded in its inebriating effects.

Tate Paulette is Postdoctoral Fellow in Archaeology at Brown University. Michael Fisher is a graduate student at the University of Chicago.

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ANCIENT HORSE DNA SHOWS SCYTHIAN WARRIORS WERE ADEPT DOMESTICATORS, BY KENNETH CHANG

Horses sacrificed by fierce nomads living in Central Asia more than 2,000 years ago have provided new insights into how people tamed the wild animals and bred them to their needs.

The Scythians roamed over a vast swath of this region, from Siberia to the Black Sea, for about 800 years beginning about the ninth century B.C. They were known for their equestrian battle skills, including the ability to shoot arrows while riding, and for the brutal treatment of those they defeated. Herodotus, an ancient Greek historian, wrote that the Scythians blinded their slaves, and the warriors drank the blood of the first enemy they killed in battle.

In a study published Thursday by the journal *Science*, an international team of researchers deployed the latest genetic tools with 13 stallions that were buried in a mound in what is now Kazakhstan, well-preserved in the permafrost. (The Scythians appear to have only sacrificed male horses.)

The decoded DNA not only provides insights into the ancient horses, but also suggests the Scythians were more than warriors.

“Here we see them as breeders,” said Ludovic Orlando, a professor of molecular archaeology at the University of Copenhagen in Denmark, who led the research. “We reveal part of their management strategy and part of their knowledge 2,300 years ago.”

The findings also fit an emerging theory of how domestication in general changes animals as they become intertwined with humans.

“It’s great stuff,” commented Greger Larson, director of the paleogenomics and bioarchaeology research network at the University of Oxford in England, who was not involved in the research. “It demonstrates the power of ancient whole genomes to understand the pattern and the process of domestication.”

Among the farm animals whose lives have become entwined with people, horses were a late addition.

Dogs were the first animal friends of humans — wolves that scavenged for food among garbage piles and turned docile about 15,000 years ago, or possibly much earlier. Cattle, chickens and pigs were domesticated by people in different parts of the world between 8,000 and 11,000 years ago.

It was only about 5,500 years ago that people in Central Asia started catching and keeping wild horses for meat and milk. Riding horses came later.

In the new research, the scientists used a bit of bone from the horse skeletons — less than half a gram in most cases — to extract DNA. They were able to decipher the genomes for 11 of the 13 horses from the Scythian mound. They also analyzed the DNA of two stallions from a royal Scythian tomb 400 years earlier, and one mare, dating to 4,100 years ago, that belonged to a nearby, earlier people, the Sintashta, who had already figured out how to use horses to pull two-wheeled chariots.

From the DNA, the scientists found that the Scythians bred for certain characteristics: stockier forelimbs that were thicker. The horses also had genes for retaining water, perhaps indicating that the mares were milked for human consumption. Many, although not all, of the horses possessed genes associated with racing speed that are found in today's thoroughbreds.

The genes also showed a variety of colorings — cream, black, spotted, bay and chestnut.

Many of the genetic changes were related to the “neural crest” — a line of cells along what becomes the spinal cord during embryonic development, but which migrate to various parts of the body. That fits in with an idea proposed in 2014 of how domestication and the initial goal of breeding tamer animals able to live and work with people also led to a series of other traits commonly observed among domesticated animals: smaller brains, floppy ears, curly tails, varied colorings.

“Most of them have a neural crest derivation,” said Adam S. Wilkins, a visiting scientist at Humboldt University in Berlin and one of the authors of the hypothesis.

The genetic changes may slightly reduce the number of neural crest cells, and that may lead to smaller adrenal glands, which produce “fight-or-flight” hormones. The result may be animals that are less likely to startle, and are more amenable to being handled by people.

“This begins to support a sort of grand unified theory of domestication,” said Daniel Bradley, a professor of genetics at Trinity College Dublin in Ireland.

What the researchers did not find is the gene that enables certain horse breeds today to “amble” — a gait that is faster than a walk but slower than a gallop.

Unlike modern horses, the Scythian horses' DNA showed no signs of inbreeding. “This is extremely surprising in horses,” Dr. Orlando said.

The Y chromosome tells the genetic story of males of a species. The mitochondria — energy factories within cells — contains DNA passed down only from mothers. In modern horses, the Y chromosomes in stallions are almost identical, reflecting the breeding technique of using a single stallion with desired characteristics to father many offspring.

That indicates that the Scythians maintained the natural herd structure of horses, Dr. Orlando said. He said additional studies had revealed when and where the genetic diversity of stallions crashed later, but he would not say publicly until he finished the scientific paper that laid out the answer.

For Melinda Zeder, a Smithsonian Institution scientist who studies domestication, that fits in with other research that indicates the narrow genetic variation among many domestic animals — which sometimes leads to prevalent diseases — is a recent development, not an inevitable consequence of domestication.

“I think that’s a very important lesson for the future,” she said. “A red-flag warning we would do well to pay attention to.”

The findings also point to the profound impact that humans have had on the environment and the evolution of other species for millennia. “It is something humans have been doing for a long time,” Dr. Zeder said. “It’s not always detrimental.”

A version of this article appears in print on April 28, 2017, on Page A11 of the New York edition with the headline: Ancient DNA Hints at How Horses Were Tamed.

Please visit the site: <https://www.nytimes.com/2017/04/27/science/horses-genetics-domestication-scythians.html>

ARCHAEOLOGISTS FIND ROMAN EMPEROR'S 1900-YEAR-OLD SUMMER HOME IN TURKEY, BY PHILIPPE BOHSTROM

Kibyrtis in the Turkish mountains was a pastoral retreat for the Roman elite, who didn't miss the opportunity to make money while about it

The lifestyle of Rome's imperial and elite families is little known beyond their triumphs in war, monumental legacies and gossip about their extravagances. Now the discovery of 1,900-year-old rural estates that they owned in today's southwestern Turkey shows how they lived in pastoral retreat, surrounded less by sycophants than slaves, and making money in the Eastern Provinces of the Roman Empire by exporting wine and manufacturing pottery.

One of the estates uncovered in the Kibyrtis mountains belonged to the family of Emperor Marcus Aurelius (161-180 C.E.), say the researchers from the Austrian Archaeological Institute.

The inland region of the Kibyrtis had been relatively unexplored until an extensive archaeological survey began in 2008. The digs revealed large rural estates by the city of Kibyra that had hitherto only been known from inscriptions.

Four of them belonged to local and Roman nobles, including the imperial family, according to the analysis by the institute.

The archaeological remains were heavily damaged, but the buildings clearly featured mosaics, marbled wall decorations and clay water pipes. The agricultural focus of the estates is clear from the remnants of metal working, and marble press weights, almost certainly used in wine-making.

These agricultural enterprises seem to have not only generated wealth for their owners, but served as vacation homes.

A votive altar found near one of the estates bears a poem describing a high-class hunting party. In the mid-2nd century C.E., Marcus Calpurnius Longus, a member of the honorable senatorial family of the Calpurnii living in Attaleia (today Antalya) travelled from the coast to the Kibyrtis mountains to visit his rural property. During a hunting party he killed an ibex with spectacular horns and sacrificed it to the gods for the protection of his land and livestock.

In the later decades of the 2nd century C.E., the Calpurnii lost their estate in the Kibyrtis. It was given to the Imperial family, for reasons unknown.

We do know that one of the new owners was Annia Cornificia Faustina, sister of Marcus Aurelius. From the little known about her, she was raised in Rome with her brother, the

future Emperor Marcus Aurelius, the last of the so-called "Five Good Emperors", who would rule for nearly two decades, from 161 to his death in 180 C.E.

Finding the archaic settlement

As a city, Kibyra goes back millennia, but it only became an important regional trading hub after the Roman conquest of the region in the 1st century C.E..

Writing during the reign of Emperor Augustus around 2,000 years ago, the geographer Strabo mentions Kibyra specifically, "which could provide 30,000 foot-soldiers and 2,000 horsemen" (Strabo, Geography, 13.4).

Austrian scholars have also identified the archaic-classical pre-settlement dating to the 7th and 6th centuries B.C.E. This town was situated about 10 km from the later Hellenistic city on a small peninsula of Lake Gölhisar (fig. 02). At this time, the land was called Kabalis and belonged to the southern periphery of the Lydian empire, which was ruled by the legendary king Croesus. (It is not rare for cities to "move.")

A still open question to archaeological purists is whether there was rural pottery production in Asia Minor. It sounds trivial, but actual factories have been hard to pin down.

Clearly pottery was being made in the city of Kibyra itself, and at Sagalassos, 100 kilometers away. Otherwise, rural potters were unmentioned and unfound, barring a 2nd century C.E. inscription uncovered in Lycia, a region to the south of the Kibyris.

However, at the foot of Asar Tepe, a small hill that belonged at least in part to the Calpurnii estate, the researchers found a surprisingly high concentration of fragmented ceramic vessels, along with the remains of around a dozen ovens. They were so ruined that their function could only be deduced based on traces of fire and residues - and the large number of pottery shards. They had to have been kilns.

In addition, the remains of "mold bowls" were discovered, which were used to make ceramic vessels with low-relief designs impressed onto the interior surface. Clearly ceramics were being produced in the countryside of Kibyra in connection with one of the rural estates - and not only cooking ware but fine tableware.

The fields at the foot of the hill are still in use, and probably then also produced grain, olives and wine. The Romans were also making wine, going by the sheer number of press weights the archaeologists found in the region.

The agricultural produce was probably both sold locally and exported. In fact, the Roman economy was based on agriculture and most of the rural estates in the Empire served for this purpose. At the Calpurnii estate, they combined their mixed farming with pottery production.

Protected by Cybele

The evidence the archaeologists found for animal husbandry consists of farmsteads with ring walls, obviously built as corrals for sheep or goats. Near one of them a rock-cut relief of the goddess Cybele seated on a throne was discovered by the researchers.

A second relief shows a man, wearing a specific coat of the local shepherds, attacked by a wolf. Evidently the man survived this attack and subsequently dedicated the reliefs to the goddess in thanks for her ostensible protection.

While Marcus Calpurnius Longus went on a lucky hunt for ibices in the mountains of the Kibyratis, at about the same time, a shepherd celebrated his lucky escape from wolves in the same area. Neither probably thought that some 2,000 years, later archaeologists and ancient historians would be puzzling over the reconstruction of their rural lives.

Please visit the site: <http://www.haaretz.com/archaeology/1.783703> [Go there for pix]

PRECISION CHRONOLOGY SHEDS NEW LIGHT ON THE ORIGINS OF MONGOLIA'S NOMADIC HORSE CULTURE

According to new research, nomadic horse culture – famously associated with Genghis Khan and his Mongol hordes – can trace its roots back more than 3000 years in the eastern Eurasian Steppes, in the territory of modern Mongolia

The study, published online March 31 in *Journal of Archaeological Science*, produces scientific estimates of the age of horse bones found from archaeological sites belonging to a culture known as the Deer Stone-Khirigsuur Complex. This culture, named for the beautiful carved standing stones (“deer stones”) and burial mounds (khirigsuurs) it built across the Mongolian Steppe, is linked with some of the oldest evidence for nomadic herding and domestic livestock use in eastern Eurasia. At both deer stones and khirigsuurs, stone mounds containing ritual burials of domestic horses – sometimes numbering the hundreds or thousands – are found buried around the edge of each monument .

A team of researchers from several academic institutions –including the Max Planck Institute for the Science of Human History, Yale University, University of Chicago, the American Center for Mongolian Studies, and the National Museum of Mongolia—used a scientific dating technique known as radiocarbon dating to estimate the spread of domestic horse ritual at deer stones and khirigsuurs.

When an organism dies, an unstable radioactive molecule present in living tissues, known as radiocarbon, begins to decay at a known rate. By measuring the remaining concentration of radiocarbon in organic materials, such as horse bone, archaeologists can estimate how many years ago an animal took its final step. Many previous archaeological projects in Mongolia produced radiocarbon date estimates from horse remains found at these Bronze Age archaeological sites. However, because each of these measurements must be calibrated to account for natural variation in the environment over time, individual dates have large amounts of error and uncertainty, making them difficult to aggregate or interpret in groups.

By using a statistical technique known as Bayesian analysis – which combines probability with archaeological information to improve precision for groups of radiocarbon dates– the study authors were able to produce a high-precision chronology model for early domestic horse use in Mongolia. Lead author William Taylor, a postdoctoral research fellow at the Max Planck Institute for the Science of Human History, says that this model “enables us for the first time to link horse use with other important cultural developments in ancient Mongolia and eastern Eurasia, and evaluate the role of climate and environmental change in the local origins of horse riding.”

According to the study, domestic horse ritual spread rapidly across the Mongol Steppe at around 1200 BC – several hundred years before mounted horsemen are clearly documented historical records (Figure 4). When considered alongside other evidence for horse transport in the Deer Stone-Khirigsuur Complex these results suggest that

Mongolia was an epicenter for early horse culture – and probably early mounted horseback riding.

The study has important consequences for our understanding of human responses to climate change. For example, one particularly influential hypothesis argues that horse riding and nomadic herding societies developed during the late second millennium BCE, as a response to drought and a worsening climate. Taylor and colleagues' results indicate instead that early horsemanship took place during a wetter, more productive climate period – which may have given herders more room to experiment with horse breeding and transport.

In recent years, scholars have become increasingly aware of the role played by Inner Asian nomads in early waves of globalization. A key article published this month in Nature argues that nomadic movement patterns shaped the early trans-Eurasian trade networks that would eventually move goods, people, and information across the continent. The development of horsemanship by Mongolian cultures might have been one of the most influential changes in Eurasian prehistory – laying the groundwork for the economic and ecological exchange networks that defined the Old World for centuries to come.

Please visit the site: <http://www.shh.mpg.de/398736/mongolias-nomadic-horse-culture>

CRACKING THE ORIGIN OF ANCIENT DECORATIVE OSTRICH EGGS

Archaeologists and scientists from the Universities of Bristol and Durham and the British Museum are using cutting edge technology to crack a conundrum surrounding the ancient trade in ostrich eggs.

Decorated ostrich eggs were traded as luxury items from the Middle East to the Western Mediterranean during the Iron Age (1200-300 BC).

Several beautiful examples -- both intact and in fragments -- have been part of the British Museum's collection since the nineteenth century.

The eggs were engraved, painted and occasionally embellished with ivory, precious metals and faience fittings. They were found in elite contexts from Spain to Iraq.

The research team wants to find out where the eggs were laid and whether the birds laying them were wild or captive.

Dr Tamar Hodos, Reader in Mediterranean Archaeology at the University of Bristol's Department of Archaeology and Anthropology, said: "Apart from noting their presence as unusual vessels in funerary and celebratory settings, surprisingly little is known about where they actually come from or who decorated them, much less how they circulated."

Using the British Museum's collection of ostrich eggs from the Mediterranean and Middle East, isotopic analyses of strontium, oxygen and carbon in the eggshells are being used to investigate where the eggs were laid and whether the ostriches were captive or wild, by detecting what and where the mother was eating and drinking during ovulation.

Detailed study of the eggshells' intricate decoration via scanning electron microscopy will allow the research team to compare carving techniques, helping them understand how they were created.

Dr Alexandra Fletcher, Curator in the Middle East Department at the British Museum, said: "We really want to find out more about how this trade worked. Were eggs gathered from nests in the wild, given that this was a potentially dangerous activity? Or is it possible that ostriches were kept in captivity to ensure the luxury trade had a supply of eggs readily available?"

The question of captivity is an important one. Images on objects such as cylinder seals from the same period show ostriches as dangerous and fierce creatures.

One has an ancient king strangling an ostrich while the bird kicks him in the stomach, for example. It seems, however, that some members of these ancient societies were adept at catching and handling dangerous beasts.

The famous Assyrian reliefs at the British Museum show that royal 'lion hunts' were staged affairs. Captured lions were released from cages directly into the path of their hunters. Could the ostriches also have been captive creatures?

It is hoped that the information held in the ostrich eggshells themselves will tell us more about how they were obtained, decorated and traded, which will in turn reveal more about both the people who supplied these luxury goods and those who coveted them.

Founded in 1753, the British Museum was the first national public museum in the world. From the outset it was a museum of the world, for the world, and this idea still lies at the heart of the Museum's mission today.

The collection tells the stories of cultures across the world, from the dawn of human history, over two million years ago, to the present. Objects range from the earliest tools made by humans and treasures from the ancient world to more recent acquisitions from Africa, Oceania and the Americas, the Middle East, Asia and Europe, as well as the national collections of prints and drawings, and coins and medals. In addition to work in London, the Museum takes part in an extensive programme of loans and tours, both across the UK and throughout the world

University of Bristol. "Cracking the origin of ancient decorative ostrich eggs." .
ScienceDaily, 12 April 2017.

Please visit the site:

<https://www.sciencedaily.com/releases/2017/04/170412091226.htm>

RADIOCARBON DATING GETS A POSTMODERN MAKEOVER, BY EMILY LITVACK

For decades, radiocarbon dating has been a way for scientists to get a rough picture of when once-living stuff lived. The method has been revolutionary and remains one of the most commonly used dating methods to study the past.

Charlotte Pearson says it's ready for a makeover.

Pearson, an assistant professor of dendrochronology at the University of Arizona, studies the past lives of trees to better understand the history of civilizations. Dendrochronology and radiocarbon dating have intertwined histories, she explains, with roots firmly planted at the UA.

A 1929 edition of National Geographic boasts, "The Secret Of The Southwest Solved By Talkative Tree Rings." The 35-page article, penned in whimsical prose, was written by Andrew Douglass, the UA scientist who invented tree ring science.

Douglass was a polymath. In addition to his work as an astronomer at the UA's Steward Observatory, Douglass was the first to discover that tree rings record time.

"Every year the trees in our forests show the swing of Time's pendulum and put down a mark. They are chronographs, recording clocks, by which the succeeding seasons are set down through definite imprints," he wrote in the pages of National Geographic.

In its most conventional form, dendrochronology works like this. A contemporary tree—that is, a tree that was either just cut down or still living—can tell you not just how many years it has lived, but which years in which it lived. If a Bigtooth Maple were cut down on Mount Lemmon in 2016 and it had 400 rings, you would know the tree started growing in 1616. Simple enough.

Tree rings just record. They are impartial recorders of change over time. They have no bias, and they have no political agenda; they just stand at locations all over the world," says Charlotte Pearson, an assistant professor of ...more But what if the wood is older? What if it's been used to build a home or a ship or a bonfire?

The rings could still tell how many years the tree lived, but not necessarily when. This didn't sit well with Douglass. He set out on a series of expeditions across the southwest to bridge the gap between contemporary wood and wood beams from the ruins of civilizations long gone.

He noticed that trees across the same region, in the same climate, develop rings in the same patterns. Douglass, with his knack for pattern-recognition, discovered that he could take younger wood with a known date, and then match its rings alongside the pattern of an older sample. In 1929, with a beam from Show Low, Arizona, Douglass was able to bridge the gap for the first time ever. Dates were assigned to Southwestern ruins with certainty.

But alas, pattern-matching in order to date when a tree was cut isn't always possible. Sometimes a wood sample doesn't have enough tree rings or rings with growth patterns that match an already dated sample. Sometimes important and large groups of matching samples, called "floating chronologies," remain undated. A decade after Douglass's big discovery, two Berkeley scientists took the first step towards an alternative way to date floating chronologies and indeed any other "once-living" thing.

They were studying a little atom called carbon-14. Also known as radiocarbon, carbon-14 is a radioactive isotope of carbon with an atomic nucleus of six protons and eight neutrons. Radiocarbon is in every living thing. They discovered its half-life, or the time it takes for its radioactivity to fall by half once the living thing dies, is 5,730 years (give or take 40). It's unusually long and consistent half-life made it great for dating.

Willard Libby from the University of Chicago put it to the test. By 1949, he had published a paper in Science showing that he had accurately dated samples with known ages, using radiocarbon dating. Douglass passed away just two years after Libby received the Nobel Prize for his work in 1960.

Today, dendrochronologists all over the world follow in Douglass' footsteps, and whenever it is not possible to use tree-ring dating to place wood samples in time, they use radiocarbon to date wood samples. All of this dating information comes together to produce a chronological backdrop for studying past interactions between people and their environment.

"We can use the annual precision of tree rings in combination with carbon-14 to underpin some big questions in terms of the rise and fall of civilizations," says Pearson. "We can look at the tree rings as a timeline and connect with people that lived in the past, and I think that gives us more of a sense of who we are, but also a sense of where we're going and perhaps ways to deal with some of the issues that we might collectively face.

"Radiocarbon dating has been a revolution in terms of the way stuff is dated in the past and is used by scientists all over the world," Pearson adds. "It can get us to within 20, 50, 100 years or so of dating accuracy."

On the scale of the universe, 20, 50 or even 100 years is, for all intents and purposes, nothing.

The universe is 13.8 billion years old. Our galaxy, the Milky Way, is slightly younger, at 13.2 billion years old. The Earth and our moon are both more than four-and-a-half billion years old. The first single-celled organisms on Earth did not appear until about a billion years later. Dinosaurs did not appear until 230 million years ago, and ruled the planet for 135 million years. The first modern humans did not evolve in Africa until about 1.8 million years ago. The time between then and now is just a single tick on the universe's clock.

In other words, life in the universe moves inconceivably slowly. But for individual humans-and entire civilizations-it does not. Fifty, 20, or 100 years is a lot of time, wherein a lot can happen.

Fifty years is the difference between Alexander Graham Bell's telephone and television. The 18-year space race between the Soviet Union and United States yielded the first moon landing. It took just short of 10 years for the Ancient Greeks to build the Parthenon on the Acropolis of Athens. Michelangelo spent only four years painting the ceiling of the Sistine Chapel in Vatican City. In 1887, Vincent Van Gogh had two ears. In 1888, he had one. Charles Darwin spent just five weeks in the Galapagos, a voyage without which he would have never written *On the Origin of Species*. In little more than a day, the entire population of Pompeii was wiped out by a volcanic eruption of Vesuvius in 79 A.D.

Human life moves fast, and because the 20- to 50-year ballpark of radiocarbon dating doesn't quite keep up with it, Pearson and collaborators are developing a new radiocarbon method to place floating chronologies in an exact point in time.

Her team at the UA includes: bristlecone pine expert Matthew Salzer; radiocarbon experts Greg Hodgins, Tim Jull, Peter Brewer, Richard Cruz and Todd Lange; dendrochronologists Tomasz Wazny and Peter Kuniholm; and archaeologist Steven Kuhn.

Charlotte Pearson studies the past lives of trees to better understand the history of civilizations. Credit: Mari Cleven "It's a really privileged situation to be in-the project is building on this fantastic legacy of the creation of tree ring research and its historic role in shaping the radiocarbon dating method and we also have this unique archive of tree-ring samples to work with," says Pearson.

A New Method

According to Pearson, recent discoveries of large-scale "spikes" of radiocarbon in certain years have led to a growing need to revisit the way radiocarbon dates are calibrated.

Radiocarbon dating, as of now, dates samples to within a few decades using a calibration curve made up of groups of ten tree rings plotted as series of single points on a graph. The points represent an average amount of radiocarbon present in those rings. This doesn't account for spikes in the data -individual rings with unusually high or low amounts of carbon-14. These spikes in radiocarbon can come from a number of short-term events, such as solar flares, volcanic eruptions and changes in oceanic circulation. By lumping 10 years' worth of radiocarbon data into a single data point, spikes in radiocarbon may inadvertently skew the curve, making dates less accurate.

"Spikes are a potential limitation to how well the current radiocarbon calibration curve works, and we want to investigate that for time periods of archaeological controversy. But they also offer enormous potential to act as a sort of chronological anchor for our floating chronologies," Pearson said.

With funding from the Malcolm Hewitt Wiener Foundation, Pearson is targeting a period in the Bronze Age from 2,400 to 1,400 BC, getting measurements of carbon-14 in single tree rings from a range of growth locations. What this reveals about yearly radiocarbon variation during this time period will then be applied to archaeological controversies and floating chronologies from the East Mediterranean and beyond.

"Tree rings just record. They are impartial recorders of change over time. They have no bias, and they have no political agenda; they just stand at locations all over the world,"

Pearson says. "They capture a moment. We still have many discoveries, I believe, to make about what they can teach us."

Please visit the site: <https://phys.org/news/2017-04-radiocarbon-dating-postmodern-makeover.html> [Go there for pix and video]

ANCIENT SKULLS TELL NEW STORY OF VIOLENCE AND BLOODY WARFARE IN MESOPOTAMIA VIOLENCE WAS LESS WIDESPREAD IN MESOPOTAMIA THAN IN THE REST OF THE NEAR EAST 5,200 YEARS AGO, BY LÉA SURUGUE

Between 5,200 and 2,500 years ago, violence was probably less widespread in Mesopotamia than in neighbouring regions, a study has revealed. Ancient craniums from the region bear little signs of trauma compared to those found in the Levant or in Anatolia.

A potential explanation is that the early emergence of state structures may have prevented outbreaks of violence between the inhabitants of Mesopotamia.

At many archaeological sites around the world, evidence of violence can be observed first hand on skeletal remains. While some indicators of violence are quite ambiguous (such as fractures of the arm bones), other signs are a clear testimony of deadly conflict between humans (projectiles embedded in the bones).

Another good proxy for violence is the presence of cranial lesions on skeletons, as these injuries can be the results of accidents but are more often attributed to interpersonal violence in the context of war.

Surprisingly, evidence for cranial trauma during the Bronze Age and the Iron Age is sparse in Mesopotamia compared to other regions, even though many human remains have been uncovered there in the last two decades.

"I have been active as an archaeologist in Mesopotamia for 20 years, and I was struck by the fact that there was a very low frequency of cranial trauma on the remains that I examined. I decided to investigate and see what had been discovered previously on the subject", archaeologist Arkadiusz Sołtysiak told IBTimes UK.

The archaeologist set out to investigate how widespread violence really was in Mesopotamia, especially in a context of increase warfare during the Bronze and the Iron Ages (between 5,200 and 2,500 years ago). His findings are now published in the Journal of Osteoarchaeology.

Literature review

Sołtysiak, a researcher at the University of Warsaw (Poland), conducted a review of the available scientific literature on the topic (both published and unpublished), thus gathering cranial trauma data from 25 archaeological sites located in Mesopotamia. Craniums from 1,278 individuals, spanning a long period from the Pre-Pottery Neolithic to modern times (from about 8700 BCE to 1500 CE), were analysed in these papers.

Sołtysiak's review of the data confirmed what he had observed previously - the frequency of cranial trauma was low in Mesopotamia, standing at 2.2%.

This may sound a little puzzling. Historical sources from Mesopotamia feature many records of bloody military conflicts and there is a lot of evidence available for large military actions taking place in the region at least since the mid-third millennium BC. A higher frequency of violence-related injuries would therefore be expected.

Human skull

Human skulls can tell us about violent events in the past. sethm/Flickr But Sołtysiak points out that men and women were similarly affected by cranial trauma and sharp-force trauma and evidence for injuries made with swords or axes was rare. These injuries were probably the result of accidents or small-scale conflicts between individuals rather than warfare.

There also seems to be a decline in cranial trauma from the Neolithic to later periods, suggesting a general decrease in the rate of violence in the Bronze Age and in the Iron Age.

The archaeologist believes that the early formation of state-like structures in Mesopotamia may explain both why violence declined when it did and why it was less widespread than in other regions.

"In the Levant and in Anatolia, states were created much later and the central authority was not as strong as in Mesopotamia. The early emergence of state-structures and the establishment of professional armies in Mesopotamia meant that most farmers and city dwellers became less involved in violent conflicts from the early Bronze Age. It helps explain why levels of violence at the time were low compared with other parts of the Near East", he said.

Please visit the site: <http://www.ibtimes.co.uk/ancient-craniums-tell-new-story-violence-bloody-warfare-mesopotamia-1615241>

DID A TSUNAMI HIT ANCIENT ISRAEL 2,800 YEARS AGO AND NOBODY NOTICED?

Anomalous layer of sandstone overlying Phoenician graves in Tel Achziv, Israel is otherwise hard to explain, archaeologists say, though there's no known record of the event Ruth Schuster

A tsunami slammed into the coast of northern Israel around 2,800 years ago, yet despite the violence of the event, no record of it is known, says an Israeli archaeologist. The evidence is physical: an anomalous 80-centimeter thick layer of sand with pottery fragments and stones where it doesn't belong - on top of a Phoenician cemetery which is meters above sea level at the site called Tel Achziv.

Written records of past tsunami events only exist where there was a population to witness the event that survived, the means to record it, and the resulting documentation was not destroyed, lost, or forgotten over time. Physical evidence is another matter.

"We can see signs of the wave from Achziv to Rosh Hanikra - sediment from the tsunami with bits of broken pottery," Avraham Ronen, professor emeritus of Haifa University, tells Haaretz.

Assuming it happened, the tsunami presumably hit the Israeli coast along a wider range, but the evidence has disappeared or not been noticed, though Ronen qualifies that tsunamis can be narrowly focused.

Tsunamis in the Mediterranean

Tsunamis travel with the water column, not on top of it like regular waves. Unlike smaller waves, they churn up and scar the sea bottom. Telltale signs on the seabed are, for instance, one way a massive tsunami in the Mediterranean around 8,000 years ago was detected, an event some think was precipitated by a slope of Mt. Etna collapsing into the sea, creating a massive landslide. Italian archaeologists claim to have found evidence in the form of an abandoned village found under water at Israel's Atlit-Yam, just south of Achziv, from the same time. Israeli archaeologists suspect the timeline doesn't quite work.

In the case of Ronen's postulated wave thousands of years later, any scarring left on the sea-floor would have been difficult to date and associate with this tsunami, as opposed to some other traumatic event, he says.

Nor is the cause of the Achziv tsunami known or even theorized at this point. But the layer of litter-strewn sand over the graves is difficult to explain otherwise.

Support for his theory is the fact that we haven't experienced one in living memory, but tsunamis in the Mediterranean Sea are not rare, based on core samples taken from the sea floor.

"According to the historical database alone, written records going back about 2,500 years on Israel coastline, there were at least 12 to 13 tsunami events," Beverly Goodman, an expert on tsunamis in archaeology, tells Haaretz. "Of these 12 to 13 tsunamis, we have actually found physical evidence for about seven."

Further south, in Ashkelon, the evidence indicates two more tsunami events independent of the ones in Caesarea, she adds. She and her people have collected cores from the northern part of the Israeli seabed too: when they analyze them, they might add to the body of evidence supporting Ronen's theory.

How big were these tsunamis that keep washing through the Mediterranean Sea, which is essentially a closed system, almost like a large bathtub?

"We have evidence of some up to nine meters high, and that's the deposits on land, not the water height," says Goodman. "That's from archaeological excavations. We are now taking data on preserved layers offshore and working with modelers to figure out how fast the water flowed, and how far inland the waves traveled."

Ronen believes the tsunami that may have hit Achziv was probably also about eight to nine meters in height. That's as much as a two- to three-story building.

Anomalous layer of sand

Tel Achziv is a Phoenician site in northern Israel, near Israel's border with Lebanon, as well as a favorite beach site for the contemporary hipster crowd. Achziv's south contains a cemetery with graves carved into the kurkar sandstone between the 10th century B.C.E. and the 7th century B.C.E., according to analysis of the ceramic assembly carbon-14 dating of remains.

On top of these Phoenician graves lies the strange loose aggregate of sand about 80 centimeters thick. That layer is about 3.5 to 4 meters above the present sea level in the Mediterranean, which has not changed much over the last 3,000 years.

Generally, the sandstone along the coast was created by wind-blown sand gradually hardening into stone over millennia. By the nature of things, wind does not carry heavy items like stones and ceramic fragments.

The anomalous layer contains something not found in any other layer of sandstone or kurkar along the Israeli coast - bits of stone and pottery fragments. The fragments are of the same type as the pottery in the underlying Phoenician graves. Their edges are not rounded and smoothed by water, meaning they had not been lying in the sea before being mixed with sand and deposited on land, explains Ronen.

While it cannot be categorically stated that the pottery fragments found in the anomalous sandstone layer came from the graves beneath, that is a likely hypothesis, says Ronen. By its location, the aggregate kurkar layer seems to be younger than the layer of graves below it. Indeed, carbon-14 analysis of remains found in it dates the layer to around the 8th century B.C.E., says Ronen.

At first the archaeologists considered that the layer might be a human artifact, Ronen explains: an attempt perhaps to imitate the surrounding kurkar in order to frustrate grave robbers, for instance. (They abounded in antiquity too.) But nothing like this layer has been found anywhere else in Israel, for one thing.

Also, the upper bit of the sandy layer is more consolidated, and harder, than the lower part, an effect humans couldn't achieve. Nature takes thousands upon thousands of years to damp down sand to the point where it becomes rocklike, he points out.

Geologists were equally foxed to explain the mystery layer, Ronen says. The only thing that answers the riddle is a tsunami, which mixes up heavy things like the stones and pottery fragments with sand.

And why didn't the ancients write down the story? For one, anybody living there on the coast would have likely drowned. For another, maybe they did, but we haven't found the record yet.

Please visit the site: <http://www.haaretz.com/archaeology/1.782460> [Go there for pix]

DIVERS TO SCOUR LAKE FOR EMPEROR CALIGULA'S 2,000-YEAR-OLD PLEASURE SHIP, BY AMY B WANG

Today, the serene waters of Lake Nemi make it a quaint getaway, one that is best known for its peaceful landscapes and the area's delicious wild strawberries.

But in ancient Roman times, the volcanic lake southeast of Rome was the anchor point for Emperor Caligula's pleasure ships - massive and ornate barges that were rumored to be the sites of wild orgies and other excessive indulgences.

For nearly 2,000 years, the sunken remains of Caligula's pleasure ships tantalized divers, who launched expeditions to recover them, with little success.

It wasn't until 1927, when Italian dictator Benito Mussolini ordered Lake Nemi drained, that two of the ships began to be fully revealed. Measuring 230 and 240 feet long, the "Nemi ships" recovered over the next several years astounded researchers with their advanced technology.

At the time, however, Lake Nemi was only partly drained - and in the decades since, rumors have persisted that the remains of a third, 400-foot-long pleasure ship lurk in the deepest part of the lake.

Local fishermen report getting their nets snagged in that area of the lake, only to bring up Roman artifacts, according to the Telegraph.

"We know from documents from the 15th century that one of the boats went down in an area of the lake different to where the other two were found during the Fascist era," Alberto Bertucci, the mayor of the town of Nemi, told the newspaper.

Questions about whether a third pleasure barge belonging to Caligula is sunken in Lake Nemi could be answered soon. Divers on Wednesday will begin scouring the muddy lake bottom for the legendary ship using sonar and other modern equipment.

"If it's down there, and it's that long, then we are talking about the world's first luxury cruise ship," Bertucci told the Times of London. "Every emperor had a villa - but Caligula demanded floating villas complete with columns, hot water, gold and mosaics."

Indeed, the pair of Caligula's pleasure ships found during Mussolini's time as prime minister revealed palatial furnishings and advanced naval mechanisms, including bronze statues, marble floors and lead pipes marked "Gaius Caesar Augustus Germanicus" (Caligula's full name) that would have carried hot and cold running water, according to a 2002 Films Media Group documentary.

"The Nemi ships are very important, partly because they are the most complete wrecks of their period ever found and because of their huge size," Italian archaeologist Marco Bonino said in the documentary. "No other wrecks, whether on land or at sea, have

provided so much useful information as the Nemi ships, both about construction techniques and about naval architecture."

The two ships were housed in a museum near the lake but were destroyed in a World War II fire in 1944.

The cruelty and debauchery of Rome's third emperor have remained legendary through the centuries, although scholars debate whether the more salacious details of Caligula's life were exaggerated. He came into power in A.D. 37 but fell ill in the fall of the first year of his reign and began exhibiting, by all accounts, signs of disturbing mental illness.

Historical accounts of his authoritarian rule, bizarre requests and grandiose lifestyle depict someone who showed traces of Joffrey Baratheon from "Game of Thrones," King Louis XVI and Scrooge McDuck.

Caligula spent untold sums of money on infrastructure projects, some on aqueducts and temples - but also once ordering hundreds of Roman merchant ships to create "a 2-mile floating bridge across the Bay of Bauli so he could spend two days galloping back and forth across it," according to the History Channel. The network describes Caligula's personal exploits as similarly strange and lurid:

He tormented high-ranking senators by making them run for miles in front of his chariot. He had brazen affairs with the wives of his allies and was rumored to have incestuous relationships with his sisters.

Caligula was tall, pale and so hairy that he made it a capital offense to mention a goat in his presence. He worked to accentuate his natural ugliness by practicing terrifying facial expressions in a mirror. But he literally wallowed in luxury, allegedly rolling around in piles of money and drinking precious pearls dissolved in vinegar. He continued his childhood games of dress-up, donning strange clothing, women's shoes and lavish accessories and wigs - eager, according to his biographer Cassius Dio, "to appear to be anything rather than a human being and an emperor."

Caligula often referred to himself as a god and had his enemies tortured and killed.

Throughout his reign, he continued to spend in excess, depleting the Roman treasury. The young emperor was assassinated in A.D. 41 by members of the Praetorian Guard, elite soldiers who were supposed to protect the emperor.

Please visit the site:

<https://www.washingtonpost.com/news/worldviews/wp/2017/04/04/divers-to-scour-lake-for-emperor-caligulas-2000-year-old-pleasure-ship/>

ARCHAEOGENETIC FINDINGS UNLOCK ANCESTRAL ORIGINS OF SARDINIANS HUDDERSFIELD'S SARDINIAN RESEARCHER DR. MARIA PALA INVESTIGATES THE ORIGINS OF HER HOMELAND ANCESTORS 8,000 YEARS AGO

THE island of Sardinia is remarkable for the fact that an exceptionally high proportion of the population is seemingly descended from people who have occupied it since the Neolithic and Bronze Age, between 8,000 and 2,000 years ago. For centuries after that, they had little interaction with mainland Europe.

Now, University of Huddersfield researcher Dr Maria Pala has taken part in a project that has helped to unlock the genetic secrets of her Mediterranean homeland. One of the findings is that some modern Sardinians could have evolved from people who colonised the island at an even earlier period, the Mesolithic.

Dr Pala - whose first degree was from the University of Sassari in her native Sardinia - is a Senior Lecturer at the University of Huddersfield and a member of its Archaeogenetics Research Group. The group is led by Professor Martin Richards and includes Dr Francesca Gandini as Research Fellow. They are all co-authors of a new article, titled Mitogenome Diversity in Sardinians: A Genetic Window onto an Island's Past, appearing in the journal Molecular Biology and Evolution.

It states that modern Sardinians are a "unique reservoir of distinct genetic signatures" and it describes how the research team, based at a number of UK, European and American universities and institutes, analysed 3,491 DNA samples from the present day population and compared them with 21 ancient samples taken from skeletal remains found in rock-cut tombs spanning from the Neolithic period to the Final Bronze Age.

Dr Pala explained that this new study focused on the mitochondrial genome - the maternal line from mothers to daughters - because it provided an unbroken line of descent, much less complex than the whole genome.

It emerged that 78.4 per cent of the modern mitogenomes actually cluster into "Sardinian-specific haplogroups".

"That percentage is extremely high," said Dr Pala. "If you look at Europeans as a whole, you cannot essentially distinguish an English person from an Italian or a French, because Europeans have mixed together for a long time."

Sardinia has always been an island, but it is believed that there was a time when a lower sea level meant it retained links with the continent, and through these links the first inhabitants reached the island from continental Europe. Then the sea level rose but, despite this, connections with the continent remained active through the Neolithic and

Bronze Age, possibly fuelled by the abundance of natural resources such as obsidian and metals present in the island.

Then, whether suddenly or gradually, these connections were severed or became sporadic so that for thousands of years Sardinians were isolated, developing their own language, culture, society and sense of identity.

To this day, Sardinians speak their own tongue and they remain genetically distinctive, as the new article co-authored by Dr Pala demonstrates.

It concludes that: Contemporary Sardinians harbour a unique genetic heritage as a result of their distinct history and relative isolation from the demographic upheavals of continental Europe. Whilst the major signal appears to be the legacy of the first farmers on the island, our results hint at the possibility that the situation might have been much more complex, both for Sardinia but also, by implication, for Europe as a whole. It now seems plausible that human mobility, inter-communication and gene flow around the Mediterranean from Late Glacial times onwards may well have left signatures that survive to this day.

Please visit the site: https://www.eurekalert.org/pub_releases/2017-04/uoh-afu040617.php

DIGGING UP TROY - HEINRICH SCHLIEMANN AND THE SEARCH FOR ARCHAEOLOGICAL EVIDENCE OF HOMER'S TROY, BY ERIC H. CLINE

Amateur archaeologist Heinrich Schliemann was wandering around an ancient mound in northwestern Turkey one morning in May 1873, observing his workers' digging. He was certain that they were excavating ancient Troy but had not yet been able to convince all of the doubters.

He suddenly noticed one of the workers unearthing a copper pot, behind which he could see the glint of gold. Dismissing the worker, he and his wife Sophia "cut out the treasure with a large knife," working quickly because a large section of earth above them looked like it was about to cave in on them at any moment.

Sophia gathered the objects together in her shawl and carried them into their house, where the two of them catalogued the objects and realized what they had just found—a king's treasure of gold necklaces, rings, and earrings, including two diadems, a headband, sixty earrings, and nearly nine thousand smaller ornaments. There were also cups, bowls, and other vessels made of gold, silver, and electrum, including a solid gold sauceboat, which is one of only two that has ever been found, and a golden vessel in the shape of a pomegranate. And there were other objects as well—a copper shield and vase; thirteen spearheads; fourteen battle-axes; daggers, a sword, and other objects of copper or bronze; stone hilts that probably belonged to bronze swords; and a multitude of other items, the like of which has never been found together elsewhere in the world.

They crated everything up, smuggled the treasure onto a boat, and sent it back to their residence in Athens. There, Sophia put on most of the jewelry that they had found, and they took a photograph of her wearing "Priam's treasure," which remains one of the most iconic images in archaeology to this day.

What we know about the Trojan War comes primarily from Homer's Iliad. Homer's story is rich in detail and yet scholars continue to question it. Was there an actual, historical Trojan War that served as a basis for Homer's epic? And could archaeological evidence for it be found? The ancient Greeks were divided on whether the Trojan War had taken place, and if so, when it had been fought. Most classical scholars of nineteenth-century Europe were convinced that the Trojan War had not taken place and that it was completely made up by Homer.

Schliemann was intent on finding Troy and proving that the Trojan War had taken place. Much later, Schliemann claimed that he first decided to do so in 1829, at the age of seven. He was in his mid-forties before he had earned enough of a fortune to retire and devote the rest of his life to finding evidence for Troy and the Trojan War. In 1868 Schliemann took a trip to Greece and then proceeded on to Turkey. He says that he traveled around northwestern Turkey with Homer in one hand, looking for a site that was small enough so that Achilles could have chased Hector around it several times and that had both hot and cold springs, to match the description given by Homer.

He looked at a number of sites that had been suggested previously, but none seemed to quite fit the bill. Then he met the U.S. vice consul to Turkey, Frank Calvert. Calvert had also been looking for Troy and thought that he had found it. In fact, he had already bought the ancient mound, which now had the modern Turkish name Hissarlik, meaning “Place of Fortresses.”

Calvert had begun some preliminary excavations at the site but didn’t have enough money to continue working properly. Schliemann, on the other hand, had plenty of money and was happy to join forces with Calvert. Once they began excavating and Schliemann convinced himself that the mound was indeed the site of ancient Troy, he deliberately left Calvert’s name out of all of his subsequent official announcements, lectures, and publications, thereby claiming the fame and glory for himself.

The first excavation season by Schliemann at Hissarlik began in April 1870. He didn’t yet have an official excavation permit from the Turkish authorities, but that didn’t stop him. He didn’t find much that season, or the next. So, in 1872, with the help of a large team of local workers, he launched his greatest assault on the ancient site. This took the form of a huge trench that his workers dug right across most of the mound and down to a depth of about forty-five feet. Today it is known as Schliemann’s Great Trench and is still visible as a huge gash in the middle of the site.

Archaeology was still in its infancy at that time. Even though excavations had been ongoing at Pompeii for more than a century, there wasn’t that much digging going on elsewhere in the 1870s. But there were people who were knowledgeable, including Calvert, who warned Schliemann that such reckless digging might result in catastrophe.

In the Great Trench, Schliemann and his workers went down, down, down; right through all sorts of buildings and stratigraphic levels. It turned out that there were nine cities buried one on top of another in the mound, although Schliemann thought at first that there were only six. He stopped at the second city from the bottom, which he called the “Burnt City.” He was convinced that this was the city that Priam had ruled in the Iliad. But he was wrong. We now know, on the basis of pottery analysis and carbon-14 dating, that this level of excavation, known as Troy II, dates to about 2400 BC, during the Early Bronze Age, more than a thousand years before the Trojan War would have been fought.

If one stands at the bottom of the Great Trench today, at the level where Schliemann and his workers stopped digging, and looks straight up, it is possible to see—way high above—a level that contains a building made out of huge blocks of stone. It’s just a few feet below the top of the mound, shaded from the sun by the limbs and leaves of a slender tree now growing on the modern surface. This is a palace that dates to the Late Bronze Age, the time period for which Schliemann was looking.

Most of that palace, however, is missing. In his haste, Schliemann and his workers dug right through the stone walls of Priam’s palace and threw most of it out on their dirt pile. If we were to dig in that spoil heap now, it is highly likely that we would find all sorts of things from the Troy of Priam and Hector, including perhaps clay tablets used by ancient scribes.

The story that he told about the day he and Sophia found the treasure has long been repeated in introductory archaeology textbooks, although it is unlikely to be true. Schliemann later admitted that he lied about Sophia's role in his story. She wasn't even at the dig on the day that he claims to have found the treasure. Some scholars have also suggested that Schliemann didn't find the treasure all in one place. Instead, they think he gathered the best of his finds from the entire season and announced to a gullible public that he had found them all together as a single treasure. Moreover, since the objects were found in Troy II, they are a thousand years too early to have belonged to Priam.

Schliemann continued to dig at Troy throughout the 1870s and 1880s, though he also was digging at Mycenae at that time, looking for material remains of King Agamemnon. To help him at Troy, he hired Wilhelm Dörpfeld, an architect with some previous archaeological experience, who eventually persuaded Schliemann that he had been wrong and that it was actually the layers called Troy VI or Troy VII at Hissarlik that he should have been investigating all along. Schliemann began to make plans for an additional attack on the mound, focused on these later levels, but on Christmas Day in 1890, he collapsed on a street in Naples and died the next day.

It was left to Dörpfeld to carry on. And so he did, with the financial assistance of Sophia Schliemann, who wanted him to continue her husband's work at the site. He concentrated on excavating the remains that Schliemann had left untouched, mostly around the edges of the mound. As it turned out, those remains were extremely impressive. He unearthed tall stone walls, each several meters thick, that would have stymied any attackers, and large gateways allowing entrance to the interior, but only after one got past the guards.

These were the remains of Troy VI, which seems to have lasted for nearly five hundred years, from about 1700 BC to 1250 BC. Dörpfeld found numerous phases of the city, which he labeled "a" through "h." The last phase, Troy VIIh, showed signs of an almost-complete destruction of the city. For Dörpfeld, this was the evidence for the Trojan War that they had been seeking. He ended his excavations and published his results.

In the meantime, travelers venturing elsewhere in Turkey, especially to the inland central plateau, had been finding the ruins of another ancient civilization. Back in 1879, while Schliemann was still excavating at Troy, a British Assyriologist named A.H. Sayce suggested a daring hypothesis—that the ruins belonged to the ancient Hittites. The hypothesis was daring because the Hebrew Bible seemed to place the Hittites in the region of Canaan.

In 1906 excavations began at what turned out to be the capital city of the Hittites—Hattusa, located by the modern-day town of Bogazköy, 125 miles to the east of Ankara. Within a year, the archives of the city began to be uncovered; thousands of clay tablets that included treaties, records, and royal letters. It turned out that the Hittites had been active across Anatolia from about 1700 to 1200 BC. They had even held territory in northern Syria, which is why the later biblical writers placed them in that region.

Among the tablets are a few that document the ongoing troubles that the Hittites had with a small vassal kingdom located in northwestern Anatolia, which they called Wilusa. Eventually, sometime early in the thirteen century BC, probably about 1280 BC, the Hittites signed a treaty with the king of Wilusa, a man named Alaksandu.

It was not long after this tablet was deciphered that some scholars began suggesting that this was a Hittite reference to the same man whom Homer calls Alexander (Paris) of Ilios and who was responsible for beginning the Trojan War because of his romance with Helen. Philologically, Wilusa is close to the Greek name (W)Ilios—the original “W” sound in Greek, known as a digamma, dropped out over time, so that by Homer’s time it was simply Ilios. And, of course, Alaksandu sounds very much like Alexander.

Although it is by no means clear that the two identifications are correct, at the very least these tablets show that the Hittites were involved with an area, and a city, in northwest Anatolia that they called Wilusa. The tablets also record that at least four wars were fought here, the last three of which were all during the thirteenth century BC, in other words the probable time of the Trojan War. For those scholars who believed that Wilusa is the Hittite name for Troy, this provided additional data that the Trojan War could very well have been an historical event, rather than simply the stuff of myth and legend.

Not everyone was convinced, however, by Dörpfeld’s argument that Troy VIh was Homer’s Troy. Archaeologist Carl Blegen examined Dörpfeld’s results and concluded that an earthquake caused the destruction of Troy VIh, not warfare. He decided as he did because a number of walls were found off-kilter, with large stones thrown about, which he thought could have been caused only by Mother Nature. On the other hand, it looked to him as if the first phase of the next level, known as Troy VIIa, was a city that had been besieged and then destroyed by an army. So he reopened the excavations at Hissarlik in the 1930s in an attempt to see whether he was right.

Now there was even less left for him to dig, since Dörpfeld had excavated much of what Schliemann had left untouched. But Blegen found enough to convince himself that Troy VIIa had been destroyed by humans, in a protracted siege. And his evidence is fairly convincing, including arrowheads buried in the walls, bodies left lying in the streets, and other indications that at least one major battle had taken place. And the timing was still consistent; this city had been destroyed about 1180 BC or so, which was still within the timeframe suggested by the ancient Greeks.

Blegen may well have been correct. But fifty years went by, a new generation of archaeologists emerged, and a new team decided to investigate the mound of Hissarlik all over again, beginning in 1988. This time it was an international team of archaeologists, led by Manfred Korfmann from the University of Tübingen, investigating the Bronze Age remains, and Brian Rose from the University of Cincinnati, investigating the post-Bronze Age remains.

In 1993, more than a century after the legendary excavations at Troy by Heinrich Schliemann, Korfmann announced that remote sensing images made using a cesium magnetometer indicated the presence of a huge buried wall that ran around Hissarlik, at a distance of about 1300 feet from the citadel. This, they announced, was probably the great wall of the city that had kept Agamemnon, Achilles, and the other Mycenaean Greeks out for ten years during the famous Trojan War.

When they went to excavate the wall, though, it wasn’t there. In its place was a ditch, measuring up to six feet deep in places. Over the centuries, the ditch had filled up with all sorts of junk, from broken pottery to stones to random bits of garbage. These had shown up on their remote sensing images as a solid mass running around the city.

Korfmann and his team soon realized that additional remote images indicated the existence of an enormous Lower City for Troy that lay beneath modern agricultural fields, which nobody had suspected was there. It turns out that all the previous archaeologists, from Schliemann to Dörpfeld to Blegen, had simply been excavating the citadel—or upper part—of the city, where the king and his direct family and retinue would have lived. The remains that Korfmann’s team found increased the size of the city at least tenfold, showing that it covered at least fifty acres with a population of between four thousand and ten thousand inhabitants at the end of the Late Bronze Age, which established it as a city that would indeed have been worthy of a ten-year-long siege, if Homer’s story has any truth to it. Korfmann began referring to the city in his scholarly publications as Troy/Wilusa—a nod to the Hittite records, which he believed were a reference to this city.

Other findings by Korfmann’s team seemed to confirm Blegen’s earlier work. For example, in both the citadel and the Lower City, they also found evidence for earthquake destruction in Troy VIh and human destruction—that is, warfare—in Troy VIIa. In one case, they found a house from Troy VIh that had been destroyed by the earthquake and then a house from Troy VIIa that had been built right on top of its ruins, only to be destroyed in war.

Korfmann’s work also confirmed Blegen’s earlier findings in other ways. After the Troy VIIa city was destroyed in about 1180 BC, the next one was occupied by what seem to be a completely new people. In this phase, which archaeologists call Troy VIIb, we see completely new types of pottery, new architecture, and other material culture, including an inscribed seal that has the first writing ever found at Troy.

These are all indications that the inhabitants of the previous city had been completely replaced by a new group. Therefore, it is possible to see the human destruction of Troy VIIa as being evidence of the stories of Homer about the Trojan War. In his story, though, Homer seems to have also added in elements from Troy VI, so that he described the beautiful buildings and high walls of the earlier city but the destruction of the later city, thereby compressing the two cities into one, which was his prerogative as an epic poet.

It may even be that the Trojan Horse is a poetic metaphor for the earthquake that leveled Troy VIh, for the Greek god of earthquakes was Poseidon. Just as the goddess Athena was represented by an owl, so a horse represented Poseidon for the Greeks. At least that’s what a German scholar named Fritz Schachermeyer suggested back in the 1950s.

As the Hissarlik digs continued, the post–Bronze Age team also found a lot of new material, including a larger-than-life statue of the Roman emperor Hadrian in 1993 and a large marble head of Augustus in 1997. The later Hellenistic Greeks and then the Romans had built upon the citadel and established a nicely gridded city down below, which Korfman had found in addition to the Bronze Age remains in this area.

These later inhabitants were also convinced that this was the site of ancient Troy and, in fact, they gave it the name “New Troy” in both Greek and Latin. Even Alexander the Great came to visit and pay his respects, as did Julius Caesar and others over the

centuries. It was initial discoveries from these later periods that first persuaded Frank Calvert, and then Heinrich Schliemann, that they were digging in the right place.

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