



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 2019 -

*Κόσμον τονδε, τον αυτόν απάντων, ούτε τις θεών ούτε
ανθρώπων εποίησεν, αλλ' ην αεί και έστιν και έστε πύρ
αείζων.*

*This world, which is the same for all, has not been made
by any god or man, but it always has been, is, and will be
an ever-living fire.* (Heraclitus)

Newsletter of the Hellenic Society of Archaeometry

- May 2019 -

Nr. 218

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ΣΥΝΕΔΡΙΑ - CONFERENCES/WORKSHOPS

WORKSHOP ANNOUNCEMENT, THE MATERIALITY OF PURPLE DYE PRODUCTION AND USE IN CYPRUS AND THE AEGEAN FROM PREHISTORY TO THE LATE ROMAN PERIOD, 1-2 NOVEMBER 2019, ARCHAEOLOGICAL RESEARCH UNIT (ARU), UNIVERSITY OF CYPRUS, NICOSIA

The study of purple dye production offers a dynamic field for new research. Developments in maritime archaeology and the increasing application of specialized field methodologies and laboratory techniques have resulted in a wealth of new data and fresh approaches to older material. These results can now be added to the rich collection of ancient written sources describing the process; however, with the new evidence come particular challenges.

Concentrations of crushed purple shells are usually understood as evidence for the existence of a purple dye workshop at a particular location. Crushed shells, however, are found in a range of contexts, at different distances from the coast and in varying amounts. Purple shellfish are also edible and decorative. While traces of pigment can form an additional type of evidence, this is often found in contexts far removed from production sites. This plethora of possibilities has created a degree of confusion in the interpretation of such finds. The situation is further complicated by the fact that testimony from Greek and Roman sources is often used to interpret purple dye production in all periods.

In the last few years, interdisciplinary and historically situated analysis of several contexts in both the eastern and western Mediterranean have prepared the ground for a new attempt to examine the criteria used to identify installations for purple dye production in different chronological periods. Careful analysis of the same data also appears to offer an opportunity to distinguish primary and secondary uses of the products and by-products of these installations (workshops), thus uncovering the embedded nature of purple dye production and a more nuanced appraisal of its social, economic and cultural meanings.

The Workshop on the materiality of purple dye production, which is jointly organized by the Institute for Aegean Prehistory Study Center for East Crete (INSTAP-SCEC) and the Archaeological Research Unit (ARU), University of Cyprus, will place primary emphasis on the archaeological remains of purple dye production and use and the importance of context when interpreting these remains. It is also an opportunity to promote detailed presentations of new or little-known case studies from Cyprus and the Aegean spanning a broad chronological scope from prehistory to the Late Roman period.

Within these parameters the event will make a meaningful contribution to contextualizing the form and development of this major craft in the eastern Mediterranean.

The Workshop is open to scholars and laymen alike (no registration fees are required). It will take place on the 1st (Friday afternoon) and the 2nd (Saturday morning to late afternoon) of November 2019 in the premises of the Archaeological Research Unit, University of Cyprus (12, Gladstone street, Nicosia, tel.22893560).

The Organising Committee

Tom Brogan (INSTAP Study Center for East Crete)
Maria Iacovou (University of Cyprus)
Vasiliki Kassianidou (University of Cyprus)
Dimitra Mylona (INSTAP Study Center for East Crete)

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CALL FOR SUBMISSIONS, 4TH
ARCHAEOLOGICAL STUDIES
CONFERENCE, 21ST-23RD AUGUST, 2019,
INSTITUTE FOR CULTURAL HERITAGE
AND HISTORY OF SCIENCE &
TECHNOLOGY, UNIVERSITY OF
SCIENCE AND TECHNOLOGY, BEIJING,
CHINA

The Institute for Cultural Heritage and History of Science & Technology, University of Science and Technology Beijing is delighted to host the 4th Archaeological studies conference in August 2019. As a pioneer in the scientific study of ancient materials, the Institute founded this conference series in 2016, which gradually becomes an important gathering for researchers in China interested in the investigations of archaeological artefacts and museum collections with various scientific approaches and theoretical considerations. The last three episodes of this conference series focused on archaeometallurgy, spectral analysis of ancient artefacts and ancient ceramics and porcelains.

With the previous successful experience, we would like to promote this conference to an international level and invite participants from all over the world. The aim of the conference is to bring together scientists, archaeologists and conservators, and generate discussions on the scientific characterization, interpretation and preservation of ancient materials. Participants are encouraged to submit to one of the following four themes:

- Ancient metals and production remains
- Ancient silicate materials including ceramic, porcelain, glass and lithic
- Ancient organic materials including textile, lacquer, and organic residues
- Conservation of ancient materials

The official language of the conference is English. Following two days of conference time, a visit to the Palace Museum and its conservation lab will be organized on 23rd August.

Conference time: 21st-22nd August, 2019

Post-conference visiting: 23rd August, 2019 (the Palace Museum)

Abstracts due date: 30th June, 2019

Registration: Free

Venue: Zhongyou Hotel (中油宾馆海淀分部) (close to the university campus)

Visa and accommodation: Please contact us if you need help on visa application and booking a hotel close the venue

Contact: Kunlong Chen kunlong.chen@ustb.edu.cn

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**2ND INTERNATIONAL CONGRESS ON
ARCHAEOLOGICAL SCIENCES IN THE
EASTERN MEDITERRANEAN AND THE
MIDDLE EAST (ICAS-EMME 2): 12-14
NOVEMBER 2019, THE SCIENCE AND
TECHNOLOGY IN ARCHAEOLOGY AND
CULTURE RESEARCH CENTER (STARC),
CYPRUS INSTITUTE, NICOSIA**

The Science and Technology in Archaeology and Culture Research Center (STARC; <http://starc.cyi.ac.cy/>) of the Cyprus Institute (<http://www.cyi.ac.cy/>) is pleased to announce the dates for the 2nd *International Congress on Archaeological Sciences in the Eastern Mediterranean and the Middle East* (ICAS-EMME 2): **12-14 November 2019**.

This international congress aims to highlight recent advances in natural, material and computational science applications to archaeology and cultural heritage in the broad region of the Eastern Mediterranean including the Balkans and the Middle East, and to provide an international academic forum for dissemination of results of current research in these fields across the region. The congress is addressed to the international scientific community of archaeologists, archaeological & heritage scientists, and researchers applying natural, material and computational science methods to archaeology and cultural heritage in the wider Eastern Mediterranean and the Middle East.

Congress remit: Papers (podium or poster presentations) **on all aspects of research on natural, material and computational science applications to archaeology and cultural heritage in the wider Eastern Mediterranean and the Middle East** are welcome. Problem oriented, comparative studies, as well as papers addressing advances, problems and potential on regional and local scales are welcome. The geographical scope of the workshop is inclusive, encompassing the Balkans, Eastern Mediterranean and Black Sea region, the Middle East including Egypt and Libya, and Southwest Asia including Iran and the Gulf. The chronological scope ranges from the earliest prehistory to medieval and historical periods.

Sessions within the congress will include the following: **Archaeological Materials; Art Characterisation; Computation in Archaeology; Crops, Food Choices and Landscapes in the Bronze Age; Data Management, Open Data and Data Mining; Human Osteoarchaeology; and Open Sessions**. A special session on the **SESAME Synchrotron** http://www.sesame.org.jo/sesame_2018/ and related research potential for archaeology and cultural heritage will also be organised.

More details will follow shortly.

Thilo Rehren on behalf of the Organisation Team

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THE 10TH INTERNATIONAL CONFERENCE **ON THE BEGINNINGS OF THE USE OF** **METALS AND ALLOYS - BANGKOK,** **THAILAND, 7-10 SEPTEMBER 2020**

Faculty of Archaeology, Silpakorn University and the Princess Maha Chakri Sirindhorn Anthropology Centre (SAC) are delighted to host the upcoming 10th International Conference on the Beginnings of the Use of Metals and Alloys at the Princess Maha Chakri Sirindhorn Anthropology Centre in Bangkok from 7-10 September 2020.

The international conference on “the Beginnings of the Use of Metals and Alloys” (BUMA) is the interdisciplinary gathering of scientists, engineers, archaeologists, and historians with a focus on production and use of metals and an emphasis on cultural interactions and developments over time and space especially between the West and the Asian region.

This 10th anniversary of the BUMA conference will be held at the Princess Maha Chakri Sirindhorn Anthropology Centre which is less than 20 minutes from Bangkok’s historic centre. This gives an access to wider ranges of food and accommodation as well as transportation to other parts of Bangkok.

A call for paper and poster proposals will be released between July and December 2019. More information will also be released soon at the Faculty of Archaeology and SAC website.

Sincerely,

Pi Venunan

Pira Venunan PhD

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**CONFERENCE: CONTRIBUTIONS OF
EXPERIMENTAL ARCHAEOLOGY TO
EXCAVATION AND MATERIAL STUDIES, 25
SEPTEMBER - 1 OCTOBER 2019, SORBONNE
UNIVERSITÉ LETTRES & UNIVERSITÉ MSH
PARIS-SACLAY, FRANCE**

Dear colleagues,

We have the pleasure to invite you to the conference: “**Contributions of Experimental Archaeology to Excavation and Material Studies**”.

The conference will take place from **25 September to 1 October 2019** in France. The first part encompasses thematic paper and poster sessions (at the Sorbonne Université Lettres & Université MSH Paris-Saclay, in Paris) from 25 to 27 September, while the second part consists of four days of field experimentation (in Melle).

This second meeting of the International Conference on Archaeometallurgy (ICA II) aims to highlight the value of experimental archaeology as a scientific tool to address specific research questions relating to archaeological excavation techniques and the understanding of archaeological sites and artefacts.

We welcome contributions on all archaeological subjects where a clear interaction between experimental work and either excavation or laboratory practice is demonstrated. **The deadline for abstracts is 16 May 2019.**

The organisers look forward to welcoming you for these three days of conference and four days of experiments.

For more information, abstract submission and conference registration, please visit the conference website: <https://metallurgy-ica.wixsite.com/ica2/>.

For specific questions, please contact us at infoica2@gmail.com.

Finally, we would like to draw your attention to the recently published volume resulting from the first ICA meeting, which is now available for purchase at *éditions Mergoïl* ([website](#)).

Kind regards,

On behalf of the organising committee

Georges Verly - Musée Art et Histoire de Bruxelles, section antiquités égyptiennes
Florian Téreygeol and Jean-Charles Méaudre - Laboratoire Archéomatériaux et Prévision de l'Altération : LMC IRAMAT UMR5060 CNRS et NIMBE UMR3685 CEA/CNRS - Université MSH Paris-Saclay

Claire Somaglino and Adeline Bats - Sorbonne Université Lettres - CNRS Orient & Méditerranée (UMR 8167), équipe Mondes Pharaoniques
Frederik Rademakers - KU Leuven, Department of Earth and Environmental Sciences
Johannes Auenmüller - Institut für Ägyptologie und Koptologie, Westfälische Wilhelms-Universität Münster
Roeland Paardekooper - EXARC
Jean-Philippe Marnais - Mines d'argent des Rois Francs de Melle

ir. Frederik Rademakers, PhD

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HISTORICAL METALLURGY SOCIETY 2019
AGM, POWER AND CONTROL OVER
METALLURGY PRODUCTION, SATURDAY
THE 8TH JUNE 2019, WATERHOUSE
CHAMBER, READING TOWN HALL

This meeting will explore how metal production was controlled in different societies, in the UK and further afield. The plan is to explore control in a range of periods, including how the Roman military controlled iron production in the UK and beyond, the Anglo-Saxon elites control and use of precious metals in Anglo-Saxon workshops and even exploring Chinese control over iron production during the Warring States period.

The registration fee is £35 for members and £45 for non-HMS members includes all tea/coffee breaks and lunch (£25 for all students). The HMS AGM is being held at 1pm and is free for all members. General enquiries can be directed to Eleanor Blakelock at events@hist-met.org and for our online booking service, the latest news and updates please visit our [webpage](#).

**SUMMER SCHOOL ON ENVIRONMENTAL
INFORMATICS IS CO-ORGANIZED BY THE
DEPARTMENTS OF INFORMATICS AND
ENVIRONMENT OF THE IONIAN
UNIVERSITY IN ZAKYNTHOS, GREECE,
JULY 8-12, 2019**

(Arrival Day: 7 July / Departure Day: 13 July)

Applications are accepted on a rolling basis.

Please use the following form to submit your application:

<https://goo.gl/forms/vdCAvy5P0ETPkuXr1>

Venue

Island of Zakynthos, Department of Environment, Ionian University

Main theme

The environment as a complex system generally requires the analysis of a number of parameters directly related to its functions. Furthermore, the plethora of hardware and software technologies support accessible data retrieval and analysis tools, which enrich environmental information. Consequently, the branch of Environmental Informatics provides the capabilities to process and disseminate information in the interdisciplinary field of environmental science with the aim of integrating data, information and knowledge and applying computational intelligence to environmental data. The Summer School's programme focuses on modern environmental monitoring methods and includes theoretical courses and applied workshops. which are divided into four areas / sessions and are potentially available in English to attract an international audience.

Topics / Sessions

The Summer School is divided into 4 thematic areas / sessions:

- Environmental Data Acquisition
- Data Analysis in Environmental Decision Making
- Ubiquitous Environmental Sensing
- Knowledge Acquisition

The aforementioned subjects concern a broader view of environmental studies that is related to the following branches of Environmental Science:

- Study of ecosystem changes and services,
- Procuring and restoring natural disasters and
- Analysis of spatio-temporal evolution of phenomena.

Speakers

- Pantelis Apostolopoulos, Department of Environment - Ionian University
- Charilaos Akasiadis, Postdoctoral Researcher, Institute of Informatics & Telecommunications - NCSR Demokritos
- Eleni Charou, Researcher, Institute of Informatics & Telecommunications - NCSR Demokritos
- Katerina Kabassi, Associate Professor, Department of Environment - Ionian University
- Anastasios Kalimeris, Assistant Professor, Department of Environment - Ionian University
- Dionissios Kalivas, Professor, Department of Natural Resources Management & Agricultural Engineering - Agricultural University of Athens
- George Kefalas, PhD Candidate, Department of Geography - Harokopio University of Athens
- Roxanne Suzette Lorilla, PhD Candidate, Department of Geography - Harokopio University of Athens
- Phivos Mylonas, Associate Professor, Department of Informatics - Ionian University
- Konstantinos Poirazidis, Assistant Professor, Department of Environment - Ionian University
- Natasa Sofou, Research Associate - National Technical University of Athens
- Evaggelos Spyrou, Assistant Professor - TEI of Central Greece / Research Associate - NCSR Demokritos
- Yorghos Voutos, PhD Candidate, Department of Informatics - Ionian University

What to expect ?

- An academically challenging program consisting of lectures, seminars and hands-on workshops in a highly interactive and vibrant setting contributing to the personal and academic development of each participant.
- Meeting fellow students from all over the world interested in a joint multi-perspective examination of the topics addressed.
- Participation in working groups according to the specific interest of each participant in order to work on a small-scale group project before, during and after the Summer School. The working groups will work on a fixed topic and present their progress during the last day of the event to fellow participants. This enables the participants to find academic exchange and allows them to share their knowledge and ideas with other participants.
- Access to a learning platform with key readings for the school and beyond, but also additional facts, figures and slides provided.
- Exploring Zakynthos and surroundings as well as a variety of social events (incl. documentary screenings, common lunches, reading circles and informal get-togethers).
- What else to expect? Much more to come over the next weeks!!!

Participation Fees

The admission fees for the summer school include participation, coffee breaks and meals during sessions and all learning materials.

- Full registration - 5 days / all sessions: 300 euros
- Student discount registration (-15%) - 5 days / all sessions: 255 euros
- Special(*) student discount registration (-30%) - 5 days / all sessions: 210 euros
- Single session pass: admittance to 1 session: 100 euros

- Double session pass: admittance to 2 sessions: 200 euros

(*): student must be a member of supporting universities:

- Ionian University
- Harokopio University of Athens
- Agricultural University of Athens
- University of the Aegean

Important Dates

- May 1st, 2019 - Deadline for early registration
- June 1st, 2019 - Deadline for tuition payment
- July 8th, 2019 - Welcome to Summer School!

Organizing Committee

- Eleni Charou, Researcher, Institute of Informatics & Telecommunications - NCSR Demokritos
- Katerina Kabassi, Associate Professor, Department of Environment - Ionian University
- Anastasios Kalimeris, Assistant Professor, Department of Environment - Ionian University
- Dionyssios Kalivas, Professor, Department of Natural Resources Management & Agricultural Engineering - Agricultural University of Athens
- Phivos Mylonas, Associate Professor, Department of Informatics - Ionian University
- Konstantinoss Poirazides, Assistant Professor, Department of Environment - Ionian University

Katerina Kabassi
Assoc. Professor,
Head of the Department of Environment,
Ionian University,
Greece



ΘΕΣΕΙΣ ΕΡΓΑΣΙΑΣ/ΥΠΟΤΡΟΦΙΕΣ –
JOB VACANCIES/FELLOWSHIPS

POSTDOCTORAL RESEARCH FELLOWSHIP
IN RADIOCARBON DATING, DEPARTMENT
OF ARCHAEOLOGY AT THE MAX PLANCK
INSTITUTE FOR THE SCIENCE OF HUMAN
HISTORY (MPI-SHH)

The Department of Archaeology at the Max Planck Institute for the Science of Human History (MPI-SHH) is a leading global centre for archaeology that combines expertise in field and laboratory methods. Our research is focused on developing and implementing cutting-edge new methods for exploring our species' past. To do this, we work at the interface of multiple disciplines, including archaeology, ecology, biology, and evolutionary studies. We are interested in how a deep time perspective can shed new light on contemporary issues ranging from climate change and anthropogenic environmental impacts to migration, inequality, and food security.

Our community and working environment

Our student and post-doctoral community is international and diverse. We are a lively, friendly, and active department that hosts a broad variety of projects, workshops, conferences, meetings, speakers and other events. We prioritise training students and postdoctoral researchers not only in research methods and skills, but in all aspects of academic life, providing professional development training to ensure our students and postdoctoral researchers reach their best potential, and are fully prepared for the job market, for applying for funding, and for dealing with the challenges of academic life. The success of this approach is reflected in our placement rates. Although we are a young department, we have a strong record of placing postdoctoral researchers in tenure-track and other academic positions.

We are committed to encouraging diversity and actively challenging biases based on gender, nationality, ethnicity, sexual orientation, religion and other components of identity. We strive to undertake ethical research, and to foreground training and capacity building as a core part of our international research. To this end, we have established the International Application of Archaeological Science training programme, which is held annually in our Department, and welcomes scholars from around the world for intensive training in archaeological science methods.

Our working language is English.

Our facilities

We have world-leading facilities for archaeological science. These include extensive facilities for bulk and compound-specific stable isotope studies, lipid and alkane

analyses, Zooarchaeology by Mass Spectrometry (ZooMS), proteomics, SEM and light microscopy, and microfossil studies, as well as laboratories for archaeobotany and zooarchaeology. We are in the process of expanding our laboratory facilities to include amino acid and metabolite capabilities, and AMS radiocarbon dating. We also have extensive equipment for digital field archaeology, as well as laboratory facilities for 3-D scanning and analysis, photography and geospatial modelling. Our work is supported by expertise in database management, statistical analysis and bioinformatics, as well as central facilities for media outreach and third party funding applications. Our institute is home to an International Max Planck Research School that supports student activities and teaching.

We have active projects around the world, particularly in Africa and Asia.

Our offer

We are currently offering a **2-year funded Postdoctoral Research Fellowship in Radiocarbon Dating**. The suitable candidate will develop a programme of research in collaboration with their supervisors, will take leadership of that programme, and will see the research through to publication. Postdoctoral Research Fellowships in the Department of Archaeology are extendable in exceptional circumstances, such as when postdoctoral researchers demonstrate significant success in terms of their research programme, publication output and commitment to the building and success of the department.

We offer a flexible start date, ideally between 1 November 2019 - 1 February 2020. The successful applicant will be provided with intellectual, technical and resource support for the development of world-leading research, and will have the opportunity to work with a multidisciplinary team of PhD students, postdoctoral researchers and group leaders. The pay scale is according to the German pay grade system for public employees (TVöD).

Our expectation

The Max Planck Institute for the Science of Human History provides a research-focused environment for scholars to develop innovative, world-leading projects. We seek Postdoctoral Research Fellows with a passion for cross-disciplinary, team-oriented research, and an ability to work efficiently and complete projects in a timely manner. Postdoctoral researchers are expected to publish findings in top-tier, international research journals, and to support media interest in their research. Candidates should demonstrate an ability to finish projects to the publication stage, and to formulate research articles that fill key gaps and answer central questions in their fields of study.

The successful candidate will develop projects collaboratively with supervisors in the Department of Archaeology, and work in an interdisciplinary fashion. Research projects should address the Department's core interests, including the anthropogenic shaping of environments and species; the impacts of past climate change on human societies; the co-evolution of humans and domesticated species; human dispersals and migration; and the effects of increasing complexity, urbanisation and globalisation on human populations and societies. Preference will be given to candidates proposing projects focused on Asia and Africa.

We expect our postdoctoral researchers to play an active role in department life, and to contribute to supporting the department in a variety of ways. Our postdoctoral researchers help teach, train and supervise students, run committees, organise research, professional development and social events, and create a supportive environment for all staff members and visitors.

Position-specific details: Radiocarbon Dating

A Postdoctoral Research Fellow in Radiocarbon Dating is sought to join the new radiocarbon laboratory at the Max Planck Institute for the Science of Human History. The successful applicant will play an active role in setting up and improving protocols for the preparation of organic archaeological samples for radiocarbon measurements, collaborate with ongoing projects at the institute to address a wide variety of chronological issues, and develop new chronological projects. The applicant is expected to work cooperatively within a team environment involving members of the Max Planck Institute for the Science of Human History and the Max Planck Institute for Biogeochemistry in Jena, Germany.

The successful candidate will have a strong record of lab experience in pre-treating samples for radiocarbon dating, chronological modelling, and publication relating to radiocarbon dating and chronologies. The candidate is expected to demonstrate experience in interdisciplinary research and the application of radiocarbon methods to investigate a variety of sample types, archaeological cultures, and time periods.

The successful applicant will work in concert with his/her supervisor and the research teams in the Department of Archaeology. Research topics addressed by the Department of Archaeology include the dispersal of peoples, animals, and plants, the relationship between climate and human societies, and the impact of humans on past ecosystems. The successful candidate will also provide support to other researchers and students in the department, assisting in the planning and implementation of chronological projects.

Your qualifications

Essential:

- Have or be about to obtain a PhD degree or qualification equivalent in radiocarbon dating, archaeological sciences or a closely related field.
- A strong record of peer-reviewed publication.
- Experience in Bayesian modelling.
- Experience in the pre-treatment of organic samples for radiocarbon dating.
- Absolute reliability and a strong sense of responsibility.
- Candidates should demonstrate experience of working as part of a research team and a willingness to help build up and develop the new radiocarbon laboratory at the Max Planck Institute for the Science of Human History.
- Ability to multi-task, find creative solutions to problems when necessary, and meet tight deadlines.

Advantageous:

- Previous archaeological experience within the main research themes of the department of Archaeology.
- Experience in dating methods other than radiocarbon dating.

- Knowledge of a variety of archaeological science methodologies, including their different potentials and flaws.

Application

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https://lotus2.gwdg.de/mpg/mjws/perso/shh_p017.nsf/application

Submissions will only be accepted if they are sent through the online application portal and are received in full by **24 May**.

Please note that while the research proposal offers the evaluation committee an opportunity to assess the candidate's ability to design an interdisciplinary field research project, and may feed into the final research programme, the research project undertaken by the successful applicant will be designed and decided in concert with the Postdoctoral Researcher's supervisors in the Department of Archaeology.

Shortlisted candidates will be informed by 31 May, 2019 and should be available to attend our recruitment workshop and interviews in Jena, Germany 12-13 June, 2019.

If you have any questions about the application process, please contact dasecretary@shh.mpg.de. For questions about the research and position, please contact Dr. Ricardo Fernandes, (fernandes@shh.mpg.de), and/or Dr. Patrick Roberts (Roberts@shh.mpg.de).

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Please see our website for further details: <https://www.shh.mpg.de/1274332/da-postdoc-radiocarbon-dating>

ΝΕΕΣ ΕΚΔΟΣΕΙΣ – NEW PUBLICATIONS

SURFACE CHROMIUM ON TERRACOTTA ARMY BRONZE WEAPONS IS NEITHER AN ANCIENT ANTI-RUST TREATMENT NOR THE REASON FOR THEIR GOOD PRESERVATION, SCIENTIFIC REPORTS, VOLUME 9, ARTICLE NUMBER: 5289 (2019)

Marcos Martín-Torres, Xiuzhen Li, Yin Xia, Agnese Benzonelli, Andrew Bevan, Shengtao Ma, Jianhua Huang, Liang Wang, Desheng Lan, Jiangwei Liu, Siran Liu, Zhen Zhao, Kun Zhao & Thilo Rehren

Abstract

For forty years, there has been a widely held belief that over 2,000 years ago the Chinese Qin developed an advanced chromate conversion coating technology (CCC) to prevent metal corrosion. This belief was based on the detection of chromium traces on the surface of bronze weapons buried with the Chinese Terracotta Army, and the same weapons' very good preservation. We analysed weapons, lacquer and soils from the site, and conducted experimental replications of CCC and accelerated ageing. Our results show that surface chromium presence is correlated with artefact typology and uncorrelated with bronze preservation. Furthermore we show that the lacquer used to cover warriors and certain parts of weapons is rich in chromium, and we demonstrate that chromium on the metals is contamination from nearby lacquer after burial. The chromium anti-rust treatment theory should therefore be abandoned. The good metal preservation probably results from the moderately alkaline pH and very small particle size of the burial soil, in addition to bronze composition.

Please visit the site: <https://www.nature.com/articles/s41598-019-40613-7>

THE TOWER OF THE WINDS IN ATHENS: GREEKS, ROMANS, CHRISTIANS, AND MUSLIMS: TWO MILLENNIA OF CONTINUAL USE, PAMELA A. WEBB

Bryn Mawr Classical Review 2019.04.31

Memoirs of the American Philosophical Society, 270. Philadelphia: American Philosophical Society, 2017. Pp. xviii, 172. ISBN 9780871692702. \$65.00.

Reviewed by Nassos Papalexandrou, The University of Texas at Austin
(papalex@austin.utexas.edu)

In the last two decades visitors to Greece and other Mediterranean countries have been confronted with the proliferation of the now ubiquitous and unavoidable wind farms. The towers of these aeolic parks have punctuated cherished landscapes—once impenetrable and accessible only to the admiring human gaze—that now, totally, and perhaps irreversibly, have been surrendered to the quest for cheap and sustainable energy. The hardware of these towers exceeds any sense of measure: stilt-like supports carry turbines equipped with humongous rotor blades of ca 80 feet in length. Always craftily shaped like swords aimed for fights with superhuman giant beings, these blades provide a contemporary standard for assessing the power of the invisible forces of the winds, by contrast, the ancient conceptualization of these divine beings was graphically expressed on the elegant Athenian structure that is the monographic subject of Pamela Webb’s book. Vitruvius and Varro, our extant ancient textual sources on the octagonal Horologion, assumed their readers’ familiarity with it. Likewise, in this review I assume that the monument is well-known to BMCR readers. Unlike the oversize wind machines of today, throughout its life the Tower was integrally embedded in a vibrant civic space whereas in the beginning its functions were cognitive and aesthetic. Webb weaves an engaging and often insightful narrative of its rich biography.

The Tower dates from an era when weather phenomena were predictable in their recurrence, behavior, intensity, and effects. This is no longer the case. The last few decades have witnessed the disruption of age-old weather patterns. As everywhere in the world, in Greece storms have grown so ferocious and unpredictable that weather authorities have been giving them names—as I type these lines an “Okeanis” is ravaging the country. It is perhaps ironic that the last decade has also witnessed a remarkable wind of change in scholarly attention to the Tower of the Winds in Athens. In 2014 Herman Kienast published an admirable archaeological study that is commensurate to the quality of the Tower and its original technological sophistication. This will be the standard source of reference for a long time. Meanwhile the monument underwent systematic conservation and opened—for the first time ever!—to the public in 2016. This momentous development yielded new evidence (e.g., remnants of medieval frescos) and coincided with the similar handling of the Fethiye Mosque (“of the Conqueror” but also known as “mosque of the grain market”) slightly to the northeast of the Tower and immediately to the west of the latrine building northwest of the Tower’s north façade.

Like the Tower, this seventeenth-century mosque had been used as storage space by the Greek Archaeological Service since the foundation of the modern Greek state. Now its domed interior is accessible and affords visitors a rare and very instructive comparison with that of the Horologion.

Webb's book provides a careful assessment of the Tower that often takes issue with or expands upon Kienast's and other scholars' interpretations of various aspects of the monument. More importantly, it attempts to assess its social life on a programmatically diachronic basis. Separate chapters scrutinize the evidence for the Christian and then the Muslim usage of the Tower until the establishment of the modern Greek state when, as Webb argues, the structure ceased to be functionally operational and became an archaeological site. Her analysis is careful, clear and eloquent and pivots around a main argument: at its very beginning (ca 140 BCE), the octagon also served a cultic function that somehow remained constantly ingrained in its operational DNA until the nineteenth century. Despite the severe lacunae in the available evidence and Webb's tendency to overstress circumstantial or insufficient evidence, this bold and interesting argument is well presented and worthy of scholars' attention. It will surely generate discussion and debate within the wider framework of the long overdue attention to the post-antique life of classical monuments and sites in Greece and elsewhere.

The first chapter (pp. 9-50: "The Hellenistic and Roman Tower") contextualizes the building during its earliest phase when an east-west street on its south side directly connected it with the Athenian Agora. The construction of the Roman Agora in the first century BCE and the so-called "Agoranomion" a century later surely altered our understanding of the original setting of the building. Webb stresses its relationship with an important but poorly known Hellenistic stoa at a slightly higher elevation to its southeast. A thorough analysis of all main aspects of both the exterior and interior of the tower includes Webb's points of contention with previous interpretations which will surely reinvigorate discussion.

For example, she disagrees with Kienast on the dating of the chancel screens that once surrounded the centrally placed mechanism of the interior. Kienast wants it contemporary with the original construction whereas Webb finds it discordant with the consistent attention to "exactitude" of its geometric design (19-20). In the same chapter, of more import is Webb's iconographic and stylistic analysis of the sculptural complement of the Tower. Following Karanastasi, she stresses the affinities of the reliefs with the Altar of Zeus at Pergamon and suggests for them the rather high date of ca 140 BCE—a chronology connected to her argument that the patron of this building was Attalus II of Pergamon. This is an interesting and plausible suggestion and it will remain so until more corroborating evidence comes to light.

Webb's discussion of the Tower's interior water-run mechanism is fascinating but by necessity inconclusive given that the surviving evidence is sadly incomplete. Scholars have proposed a water-powered chronometric device or, as Kienast proposes, a celestial globe ("orrery")—the latter interpretation is definitely more in harmony with current understandings of the building as a wondrous cosmographic planetarium of sorts. Webb argues that this complex building also accommodated a religious function "...as a cult site of Boreas (and to a lesser extent his brothers) and commemorated his role in the Athenian defeat of the Persian Navy in 480 BC" (38). The supporting evidence, however, is circumstantial at best. The representation of the winds per se does not necessarily point

to a cultic function. Webb discusses in detail the affinities between the type and morphology of the exterior and interior of the Tower vis-à-vis other centrally planned structures of Hellenistic date whose function was “cultic and commemorative” (42). These comparisons show only that the Athenian building conformed to the most sophisticated design traditions of the Hellenistic koine. Neither its civic context, however, nor its surviving apparatus point to anything more than a civic function.

Webb’s reconstruction of a boat-shape support of the mechanism in the interior of building (44) rests on very tenuous evidence and does nothing to strengthen the argument for a cultic function. The same holds true for the two boat-shaped graffiti in the interior—the longest is substantial in size (126 cm long: see Kienast 2014, 150)) and points perhaps to moments of fanciful story-telling inside the Tower, somewhere between the second and the fourth centuries CE. One can’t help but agree with Webb’s assessment of these graffiti as “...another curiosity in this monument rife with curiosities” (46).

After the Tower suffered some damage during Sulla’s attack, it was restored but yet again the contents and precise function of its interior remain elusive. The construction of the Market of Caesar and Augustus in the late first century BCE largely affected the physical accessibility and visibility of the Tower. The subsequent addition of the latrines northwest of the Tower undoubtedly impacted the sensory ambience of the space that the Tower inhabited as long as the latrines functioned. A cultic usage of the Tower, as proposed by Webb, would have been incompatible with the presence of the latrines right at its northern foot. This book should have tackled this important problem face on.

Webb argues throughout that the Tower continued to function until its conversion to a Christian building. However, there is no evidence about the nature of this function. Neither is there any evidence about the date and nature of its conversion to a Christian use, the subject matter of chapter 2 (“The Christian Tower,” pp. 51-76). Webb proposes that it functioned as a martyrion, perhaps in unison with the early Christian phase of the “Agoranomion” at some point in the early seventh century CE. In this early phase, however, the Christian usage would have been incompatible with the bold figural apparatus of the building, which does not bear any signs of intentional mutilation (e.g. the Parthenon’s east, west, and north metopes). In a footnote Webb tentatively suggests that in this period the figures of the winds could have been interpreted as angels—one would have expected a rather lengthier discussion of the interesting possibility of a Christian interpretatio for these bold and powerful images. What responses did they generate in the local community around it? It may not be a coincidence that just a block to the east of the Fethiye mosque stands the parish church of the Taxiarchs, the archangels Michael and Gabriel. The Taxiarchs may be a successor of the three aisled church underneath the Fethiye mosque, an edifice now dated to the middle Byzantine period—was this cult localized here as a response to the appeal of the ancient reliefs? However this may have been, there is archaeological evidence (e.g. remnants of frescos that have yet to be dated precisely) and textual testimonies, amply discussed by Webb, that by the 15th century the Tower was used as a church. Webb accepts Evliya Çelebi’s testimony for the cult of a certain “saint Philip the Greek” inside the building. The evidence she uses for reconstructing the characteristics of this cult draws from models of the first millennium that would not necessary apply to 17th century Athens.

By the time Stuart and Revett witnessed and studied the Horologion (1751), the Christian usage had been abandoned and the octagonal edifice served as a tekke for the Mehlevis, a Sufi sect of whirling dervishes (chapter 3, “The Muslim Tower,” pp. 77-86). The two Dilettanti excavated the significant amount of debris that had been brought inside by the Muslim users. Their report of human bones inside this fill prompts Webb to associate them with Christian saints’ relics—this is very problematic as the bones could have been mixed in the fill, especially if this soil had been collected from the immediate vicinity of the Tower, which has yielded a number of archaeologically documented graves. On the basis of this questionable evidence Webb argues that it was the memory of the Tower as a martyrdom that attracted the Sufi ascetics to this significant building.

The book is complemented with three useful appendices (on the first Christian churches in Athens, on their conversion of Classical structures for Christian use, and on the conversion of Classical heroa) that will enable readers to contextualize the long life of the Tower under Christianity. Despite the criticisms expressed above, this study deserves attention and close reading. The medieval and post-medieval archaeology of Athens have yet to catch up with that of its antique past. One hopes that new discoveries and continuous scrutiny of the building and its context will enhance our understanding of the Tower and its life throughout the ages.

Please visit the site: <http://bmcr.brynmawr.edu/2019/2019-04-31.html>

EΙΔΗΣΕΙΣ - NEWS RELEASE

ARCHAEOLOGISTS IDENTIFY FIRST PREHISTORIC FIGURATIVE CAVE ART IN BALKANS

An international team, led by an archaeologist from the University of Southampton and the University of Bordeaux, has revealed the first example of Palaeolithic figurative cave art found in the Balkan Peninsula.

Dr Aitor Ruiz-Redondo worked with researchers from the universities of Cantabria (Spain), Newfoundland (Canada), Zagreb (Croatia) and the Archaeological Museum of Istria (Croatia) to study the paintings, which could be up to 34,000 years old.

The cave art was first discovered in 2010 in Romualdova Pećina ('Romuald's cave') at Istria in Croatia, when Darko Komšo, Director of the Archaeological Museum of Istria, noticed the existence of the remains of a red colour in a deep part of the cave.

Following his discovery, the team led by Dr Ruiz-Redondo and funded by the French State and the Archaeological Museum of Istria, with the support of Natura Histrica, undertook a detailed analysis of the paintings and their archaeological context.

This led to the identification of several figurative paintings, including a bison, an ibex and two possible anthropomorphic figures, confirming the Palaeolithic age of the artworks. Furthermore, an excavation made in the ground below these paintings led to the discovery of a number of Palaeolithic age remains; a flint tool, an ochre crayon and several fragments of charcoal.

Radiocarbon dating of these objects show an estimated age of around 17,000 years and other indirect data suggest the paintings date to an even earlier period – at around 34,000-31,000 years ago. Further research will be conducted in order to establish the precise age of the rock art.

Findings are published in the journal *Antiquity*.

This discovery expands the so far sparse register of Palaeolithic art in south east Europe. It makes Romualdova Pećina the first site where figurative Palaeolithic rock art has been discovered in this area. Together with Badanj in Bosnia and Herzegovina, the two are the only examples of rock art from the Palaeolithic period in the Balkans.

Dr Aitor Ruiz-Redondo, a British Academy-funded Newton International Fellow at the University of Southampton and postdoctoral researcher at the University of Bordeaux, said: "The importance of this finding is remarkable and sheds a new light on the understanding of Palaeolithic art in the territory of Croatia and the Balkan Peninsula, as well as its relationship with simultaneous phenomena throughout Europe."

A new project started by Dr Ruiz-Redondo and his team, funded by the British Academy, will develop further research at these two sites during the next few years.

Please visit the site: https://www.heritagedaily.com/2019/04/archaeologists-identify-first-prehistoric-figurative-cave-art-in-balkans/123317?fbclid=IwAR2C4YB7kS9k_gnr9VcbN_3NIzmQyQ89pg_IuP8V4rqrcGXKYBiKxLCcYUo [Go there for pix]

'EXTRAORDINARY' 500-YEAR-OLD LIBRARY CATALOGUE REVEALS BOOKS LOST TO TIME, BY ALISON FLOOD

The Libro de los Epítomes was a catalogue for Hernando Colón's 16th-century collection, which he intended to be the biggest in the world.

It sounds like something from Carlos Ruiz Zafón's *The Shadow of the Wind* and his *The Cemetery of Forgotten Books*: a huge volume containing thousands of summaries of books from 500 years ago, many of which no longer exist. But the real deal has been found in Copenhagen, where it has lain untouched for more than 350 years.

The Libro de los Epítomes manuscript, which is more than a foot thick, contains more than 2,000 pages and summaries from the library of Hernando Colón, the illegitimate son of Christopher Columbus who made it his life's work to create the biggest library the world had ever known in the early part of the 16th century. Running to around 15,000 volumes, the library was put together during Colón's extensive travels. Today, only around a quarter of the books in the collection survive and have been housed in Seville Cathedral since 1552.

The discovery in the Arnamagnæan Collection in Copenhagen is “extraordinary”, and a window into a “lost world of 16th-century books”, said Cambridge academic Dr Edward Wilson-Lee, author of the recent biography of Colón, *The Catalogue of Shipwrecked Books*.

It's a discovery of immense importance, not only because it contains so much information about how people read 500 years ago, but also, because it contains summaries of books that no longer exist, lost in every other form than these summaries,” said Wilson-Lee. “The idea that this object which was so central to this extraordinary early 16th-century project and which one always thought of with this great sense of loss, of what could have been if this had been preserved, for it then to just show up in Copenhagen perfectly preserved, at least 350 years after its last mention in Spain ...”

The manuscript was found in the collection of Árni Magnússon, an Icelandic scholar born in 1663, who donated his books to the University of Copenhagen on his death in 1730. The majority of the some 3,000 items are in Icelandic or Scandinavian languages, with only around 20 Spanish manuscripts, which is probably why the Libro de los Epítomes went unnoticed for hundreds of years. It was Guy Lazure at the University of Windsor in Canada who first spotted the connection to Colón. The Arnamagnæan Institute then contacted Mark McDonald at the Metropolitan Museum of Art in New York, who passed it on to Wilson-Lee and his co-author José María Pérez Fernández, of the University of Granada, for verification.

“They sent me the photos. I was sitting on a beach at the time and I said ‘you've got to be flipping kidding me’. It's *the* major missing piece from the library,” said Wilson-Lee. “It's an amazing story. Instead of being a needle in a haystack, it was a needle in a bunch of other needles.”

After amassing his collection, Colón employed a team of writers to read every book in the library and distill each into a little summary in *Libro de los Epítomes*, ranging from a couple of lines long for very short texts to about 30 pages for the complete works of Plato, which Wilson-Lee dubbed the “miracle of compression”.

Because Colón collected everything he could lay his hands on, the catalogue is a real record of what people were reading 500 years ago, rather than just the classics. “The important part of Hernando’s library is it’s not just Plato and Cortez, he’s summarising everything from almanacs to news pamphlets. This is really giving us a window into the entirety of early print, much of which has gone missing, and how people read it – a world that is largely lost to us,” said Wilson-Lee.

Wilson-Lee and Pérez Fernández are currently working on a comprehensive account of the library, which will be published in 2020. They are also working to digitise the manuscript, in collaboration with the Arnhamagnæan Institute.

“It’s always thrilling as a scholar and a biographer to realise there is still stuff out there,” said Wilson-Lee. “It’s a question of getting out there, [and] looking in unobvious places.”

Please visit the site:

https://www.theguardian.com/books/2019/apr/10/extraordinary-500-year-old-library-catalogue-reveals-books-lost-to-time-libro-de-los-epitomes?CMP=Share_iOSApp_Other&fbclid=IwAR3SPkr5mkqyvg99xWBWaVMHCvc2hd_K-cRrfU6Dz9lsTBvpMbeLmq0xFsQ

100 ANCIENT EGYPTIAN INSCRIPTIONS **FOUND AT AMETHYST MINING SITE,** **BY OWEN JARUS**

Archaeologists have uncovered more than 100 ancient inscriptions carved into rock at Wadi el-Hudi, where the ancient Egyptians mined amethyst.

In addition to the carved-rock inscription, the researchers also found 14 stele (inscriptions carved on a stone slab or pillar) and 45 ostraca (inscriptions written on pieces of pottery).

Analysis of the newfound inscriptions is underway. So far, archaeologists can tell that many of the inscriptions date back around 3,900 years, to a time that modern day archaeologists call the "Middle Kingdom." Many of the ostraca date back around 2,000 years, to around the time that Rome took over Egypt. [See Photos of the Ancient Egyptian Mining Site & Inscriptions]

Amethyst became widely popular in Egypt during the Middle Kingdom, a time when the pharaohs of Egypt learned that Wadi el-Hudi is a good source for the material. "Once the [pharaohs] found it, they kind of went bonkers to go get it," Kate Liskza, the director of the Wadi el-Hudi expedition, told Live Science. During the Middle Kingdom, "they were bringing it back and making it into jewelry and doling it out to their elite and their princesses."

Though Wadi el-Hudi was surveyed in the past by other scholars, little excavation has been done and the surveys missed many inscriptions.

"The site is just so full of inscriptions behind every boulder and around every wall that they missed a lot of them" Liskza said.

The team is using 3D modeling, reflectance transformation imaging (RTI) and photogrammetry, among other techniques, to help find new inscriptions, map archaeological remains and reanalyze inscriptions discovered by scholars who surveyed Wadi el-Hudi in the past. This work has taken on a greater urgency as modern-day gold mines have opened in the area, causing damage to archaeological remains.

Many mysteries

The team is hoping that the inscriptions, along with other discoveries made during the excavations, will shed light on the many mysteries surrounding Wadi el-Hudi.

For instance, it's not clear if the miners were working at the site of their own free will. "I don't know if I'm excavating a legitimate settlement where people were treated well or if I'm excavating a prison camp," Liskza said. Some of the inscriptions say that the miners were proud of their work, suggesting that they may have been there of their own free will. Also, so far, no bodies have been found, suggesting that anyone who died was brought back to the Nile Valley for burial rather than left out in the desert, researchers said.

The inscriptions also show that there are places where groups of soldiers were looking down at the mines, leading researchers to wonder if these soldiers were protecting the miners or making sure the miners kept working. One inscription shows two soldiers wrestling each other while passing time.

Another mystery: How did the ancient Egyptian government get water to the miners? The nearest possible well is 1.9 miles (3 kilometers) away from Wadi el-Hudi, and it's possible that it wasn't in use long ago.

"Best-case scenario, they were carrying water for 1,000 to 1,500 people a minimum of 3 km, but possibly in from the Nile [River]," which is about 18.6 miles (30 km) away, Liszka said.

During the excavation, the team found a mysterious, 3,400-year-old stela written in the name of a senior official named Usersatet, who was viceroy of Kush, a region to the south of Egypt. It dates to a time when there was no mining activity at Wadi el-Hudi and the site had been abandoned. This leaves archaeologists with the question of why someone bothered to drag the stela 18.6 miles into the eastern desert and leave it at Wadi el-Hudi.

Please visit the site: <https://www.livescience.com/65068-ancient-egyptian-inscriptions-amethyst-mine.html> [Go there for pix]

ANCIENT POMPEII 'FAST-FOOD' SPOT LURED CUSTOMERS WITH SEXY LOGO, BY LAURA GEGGEL

Before Mount Vesuvius blasted Pompeii to smithereens in 79, it was possible to grab a bite to eat there at a "fast-food" joint decorated with a handsome sea nymph.

Archaeologists recently uncovered this ancient eatery, known as a thermopolium — a snack bar that served drinks and hot, ready-to-eat food — during an excavation in the ancient city.

And it's far from the only thermopolium. In fact, archaeologists know of about 80 such eateries in Pompeii already — showing that the folks of ancient Pompeii enjoyed munching on easily accessible, savory goodies, just as we do today. [Preserved Pompeii: Photos Show a City in Ash]

"Even if structures like these are well-known at Pompeii, discovering more of them, along with objects which went hand in hand with commercial and thus daily life," helps researchers learn more about daily life in ancient Pompeii, Alfonsina Russo, the interim director at the Archaeological Park of Pompeii, the group that did the research, said in a statement.

This particular thermopolium sits at the intersection of two alleys: Vicolo delle Nozze d'Argento (Silver Wedding Alley) and Vicolo dei Balconi (Alley of the Balconies), which were excavated only recently.

The excavation is part of the Great Pompeii Project, which is uncovering and studying a poorly examined area within the city.

A painting on the thermopolium of a scantily clad sea nymph, known as a nereid, immediately caught the eye of archaeologists during the dig.

This nereid, who is riding a horse with a sea dragon-like tail, likely served as the eatery's shop sign, the archaeologists working on the project said.

Next to the nereid are paintings of a plant and a man working in a cafe, likely an illustration of a busy day at the snack bar.

Archaeologists also found clay jugs, known as amphorae, in front of the counter. These amphorae look just like the ones in the thermopolium illustration, the excavators noted.

The discovery of this thermopolium "transport[s] us to those tragic moments of the eruption," Russo said.

Life didn't end after Mount Vesuvius erupted. The catastrophe likely killed about 2,000 people, but new research indicates that the rest of the city's 15,000 to 20,000 inhabitants

likely settled in nearby cities, including Naples and Cumae. Hopefully, these refugees found more thermopolia in their new neighborhoods.

Please visit the site: <https://www.livescience.com/65146-ancient-pompeii-fast-food.html> [Go there for pix, and see also http://www.xinhuanet.com/english/2019-03/29/c_137934825.htm]

EMPEDOCLES DIDN'T MAKE A PERIODIC TABLE, BUT IDENTIFIED BASIC CONCEPTS OF MATTER AND FORCE, BY TOM SIEGFRIED

This Greek philosopher had the right idea, just too few elements.

Long before there was a periodic table of the elements, there was no need for a table — just four chairs.

From ancient through medieval into early modern times, natural philosophers could count the known elements with the fingers of only one hand (with no need for the thumb). All material reality, nearly every authority concurred, was built from only four elements. And those four elements had been identified in the fifth century B.C. by the imaginative and somewhat idiosyncratic Greek philosopher known as Empedocles of Acragas.

Even though Empedocles had the true number of elements wrong, and the substances he identified aren't actually elements anyway, he had more or less (less, I guess) the right idea. In fact, stripped of the literary embellishment in his poetic metaphors (and ignoring a few really weird ideas that didn't make much sense), Empedocles articulated much of what passes today for sound scientific concepts.

He basically identified the essence of modern notions of matter and force, and he dreamed up a theory of the universe that shares features with some current cosmological speculations.

Empedocles was born in Sicily around 490 B.C., apparently into a prominent family (his grandfather, legend has it, was an Olympic champion chariot racer). By some accounts Empedocles promoted democracy (despite his aristocratic status) and supposedly declined an offer to be king of Acragas, his home city-state. His oratorical ability and skillful writings inspired Aristotle to declare Empedocles the founder of rhetoric. Empedocles may also have been a physician (he wrote a lot about physiological topics at any rate), he dabbled in magic, and even described a primitive notion of natural selection's role in shaping the forms of organisms. But most of all, he deserves recognition as one of the great natural philosophers of antiquity.

Empedocles is most well-known for his theory that all matter consists of four elements — he called them “roots” — and named them for the Greek gods Zeus, Hera, Aidoneus and Nestis. They personified (or godified) the physical forms known as fire, earth, air and water (although experts do not agree about which god stood for which element). These elements, Empedocles declared, persist throughout recurring cycles of creation and destruction. That is, the various forms of matter and life and the structures of the everyday world are just mixtures of the elements in varying proportions.

Empedocles declared that sensible objects come into being as the elements are melded together or pulled apart by two opposing forces: “love” and “strife” (sometimes translated as “hate” or “conflict”).

Love impelled the combination of elements into a unified whole; strife was the destructive agitator that ripped the elements asunder.

Remarkably, virtually all the Greek philosophers seemed to buy this story — at least the four elements part — and it persisted throughout the educated Western world until well after the Middle Ages. It wasn’t inescapably obvious, though. Ancient Chinese scholars agreed on just three of those four elements and identified a total of five: earth, fire, water, metal and wood. But the rest of the world didn’t care what the Chinese thought the elements were. In the West, Aristotle adopted Empedocles’ classification and therefore so did the rest of educated Europe.

Empedocles developed his element theory in response to the philosophy of Parmenides, who was a couple of decades or so older than Empedocles. Parmenides argued that nothing came from nothing, and therefore nothing new could be created. Matter, and all existence, was therefore everlasting and never changing. In the face of all the obvious change in the world, it might seem an odd philosophy, but it gained wide acceptance in the philosophical era preceding Socrates. In an attempt to preserve Parmenidean logic while still accounting for the apparent change in the universe, Empedocles proposed that his four elements “never cease their continual interchange,” but “they exist always changeless in the cycle.” So no element ever comes into being or is ever destroyed. Elements just get mixed up in different ways, either while merging into one under the influence of love, or while dissembling during the predominance of strife.

Cosmologically, then, love forced everything into unity, a huge homogeneous sphere. But then strife attacked, mixmastering the sphere’s innards to create diversity, ultimately reaching a state of utter chaos. When chaos triumphed, strife’s work was done. Then love reasserted its influence to rebuild the harmonious sphere. A diverse world like the one we live in, Empedocles averred, could exist either during the phase of love’s ascendancy, pulling things together, or during the opposite side of the cycle, while strife strove for chaos.

(Take a guess which phase he would think we are in today.)

Life emerges during love’s assembly phase, when body parts emerge from earth and are randomly connected. But some mixes, like a beast’s head on a man’s body, don’t work well and die out, Empedocles believed, leaving only those creatures who are fit to survive. (Empedocles perhaps thought he had special knowledge about life-forms, as he believed in reincarnation and stated that he had previously been a bird and a fish.)

Apart from the poetic and mythological metaphor of gods at work in this process, Empedocles’ cycle of creation and destruction of the cosmos resembles a modern theory of cosmology proposing a cyclic universe. That idea isn’t widely approved of today, but is a legitimate scientific proposal.

On the other hand, Empedocles’ basic notion of unalterable elements governed by fundamental forces echoes today’s physics textbooks.

Unchangeable forms of matter create the phenomena of nature through interactions governed by forces, he asserted, as do present-day experts.

Empedocles' elements are not, of course, quite the same thing as the fundamental particles of matter that physicists talk about now. Nor are his elements the same kind of things as the elements that Dmitrii Mendeleev so carefully organized in his periodic table in 1869. Water is a compound of two elements, hydrogen and oxygen; air is a mixture of oxygen, nitrogen and a few other gases (such as an ever increasing amount of carbon dioxide); earth is a bunch of stuff; and fire is a manifestation of stuff getting burned up by combining with oxygen.

But that's not the point. Empedocles may not have known a real element from an elephant. But he grasped the central feature that makes an element an element: It's something that stays the same despite all sorts of change. Chemical reactions take elements and combine and splice them, arrange and rearrange them, but in the end an element retains its identity and can be recovered from whatever mess any force, or chemist, got it into. Implicit in Empedocles' beliefs is the law of conservation of mass, which modern scientists articulated only a couple of hundred years ago. The footnotes added to this story by modern nuclear physics do not detract from its conceptual validity for everyday life.

Empedocles not only attributed god status to the elements, but also believed he was a god himself. When it was time to die, one ancient account claims, he jumped into a volcano to demonstrate his confidence that he would live again. Perhaps he thought he would be reincarnated millennia later. Maybe as Mendeleev.

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Please visit the site: <https://www.sciencenews.org/blog/context/greek-philosopher-had-right-idea-just-too-few-elements>

TURKISH ARCHAEOLOGISTS DISCOVER **WORLD'S 'OLDEST' BRONZE AGE** **SHIPWRECK OFF ANTALYA COAST**

A group of Turkish underwater researchers has found a 3,600-year-old Bronze Age shipwreck, which could be the world's oldest shipwreck, off the shores of southern Turkey's Antalya province, the provincial governor's office said Monday.

The shipwreck, estimated to date back to 1600 B.C., was discovered off the western shores of the city by Antalya University's Underwater Research Department.

The 14-meter-long shipwreck was found in 50-meter depth, with 1.5 tons of copper bullion inside of it, reports said.

Speaking to reporters, Governor Münir Karaloğlu described the discovery as groundbreaking for the field of underwater archaeology, saying that the newly discovered shipwreck, which was named the "Western Antalya Shipwreck", was the "Göbeklitepe" of the underwater world. Şanlıurfa's archaeological site Göbeklitepe houses the oldest known temple in human history and is often referred to as ground zero of human history.

Karaloğlu said the artifacts that will be removed from the wreck will be displayed at a museum in Kemer district, which will become "the epicenter of underwater archaeology."

Stating that copper bullions were the main find in the wreck, Hakan Öviz, one of the researchers from Antalya University, noted: "From the typology of the bullions, we determined that the shipwreck was one of the merchant vessels of the 16th century B.C. It has broken fresh ground in underwater archeology thanks to these findings."

The number of visible bullion the ship once carried was determined through three-dimensional scans of the shipwreck obtained via sonar surveys, photographic mosaic and photo-scan work.

Preliminary research found that the bullions were removed from the mines located in Cyprus and molded in 15 or 16 centuries B.C. and was being transported to Aegean shores or Crete when the ship sunk.

"It was probably caught in the middle of a storm while traveling to the Aegean [northwest of Antalya] region from Cyprus [island south of Antalya]. It was carrying a cargo of copper bullion and type of that bullion helped us date the ship. This may well be world's earliest vessel carrying industrial goods," Öviz said, adding that they would now form a team with local and international researchers for a five-year project to further investigate the wreck.

Previously, a shipwreck dating back to 1400 B.C. was found off the shores of Antalya, which was the oldest of its kind until this recent discovery. The antique shipwreck had been named the "Uluburun Shipwreck" after the location it was discovered in. The

artifacts found in the wreck are currently on display at the Museum of Underwater Archaeology in Muğla's Bodrum district.

If confirmed, the new shipwreck off Antalya's coast will also be older than a Greek merchant ship found off Bulgaria's Black Sea coast last year. That shipwreck dated back more than 2,400 years and was described as the world's oldest known intact shipwreck.

Please visit the site: https://www.dailysabah.com/history/2019/04/08/turkish-archaeologists-discover-worlds-oldest-bronze-age-shipwreck-off-antalya-coast/amp?_twitter_impression=true

ANCIENT CHRISTIAN MANUSCRIPTS **DIGITIZED AT MONASTERY BENEATH** **MOUNT SINAI**

Team from Greece is photographing thousands of fragile manuscripts, including some of the earliest copies of the Christian gospels, in Egypt's Sinai Desert, where Islamists have destroyed countless cultural artifacts.

At St. Catherine's Monastery at the foot of Egypt's Mount Sinai, the silence in the library is broken only by low electrical humming, as an early manuscript is bathed in green light.

A team from Greece are photographing thousands of fragile manuscripts, including some of the earliest copies of the Christian gospels, using a complex process that includes taking images in red, green and blue light and merging them with computer software to create a single high-quality color picture.

There is a tangible sense of urgency to the mission.

Although the monastery has survived centuries of warfare, it lies in a region where Islamist militants have destroyed countless cultural artifacts and documents in Syria and Iraq. Egypt's Christian churches have also been targeted by an Islamist insurgency in the rugged and thinly populated northern Sinai.

The Holy Monastery of the God-Trodden Mount Sinai – which is part of the Eastern Orthodox church – lies in the safer southern half of the Sinai Peninsula. But in 2017, Islamic State claimed responsibility for an attack on a nearby Egyptian police checkpoint, in which one officer was killed.

“The upheaval of our times requires a rapid completion of this project,” Archbishop Damianos of Sinai, Faran and Raitho, and Abbot of St. Catherine's Monastery, told Reuters by email.

The aim is to create the first digital archive of all 4,500 manuscripts in the library, starting with around 1,100 in the Syriac and Arabic languages, which are particularly rare.

The task could take more than a decade, using digital cameras and computer arrays alongside sophisticated cradles designed to support the more fragile manuscripts.

The project began last year and is being undertaken by the nonprofit research organization Early Manuscripts Electronic Library (EMEL), in collaboration with the monastery and the Library of the University of California, Los Angeles. UCLA Library said it will start publishing the manuscripts online, in full color, from the fall of 2019.

“This library is an archive of the history of Christianity and its neighbors in the Mediterranean world, and therefore is of interest to communities all over the world who

find their history here,” Michael Phelps, Director of the Early Manuscripts Electronic Library, told Reuters.

The monastery lies at the foot of Mount Sinai, by tradition the site where Moses received the Ten Commandments.

UNESCO has listed the area as a World Heritage site, citing its sacred status in Christianity, Islam and Judaism. It says St. Catherine’s was founded in the sixth century, and is the oldest Christian monastery still in use for its original function.

The most famous manuscript in the library is the fourth-century Codex Sinaiticus – a Greek manuscript of the Bible which contains the oldest surviving complete New Testament. Its pages are divided between several institutions.

Another is the Codex Syriacus, an ancient copy of the Gospels in Syriac. Other manuscripts cover science, medicine and the Greek classics.

The digitization of the first stage alone, the Syriac-Arabic manuscripts, will take around three years and cost a projected \$2.75 million, said Phelps.

“Throughout the centuries, monks have lived here in prayer, in dedication to spiritual goals, a witness to God’s revelation to mankind... in that sense especially, the Sinai Monastery is an ark, a spiritual ark in the wilderness,” said Father Justin of Sinai, the monastery’s librarian.

The project will provide a more complete record than partial microfilming carried out decades ago by the U.S Library of Congress, and also by the National Library of Israel. The two institutions are making their records available to the new digitization effort, the project organizers said.

Please visit the site: <https://www.israelhayom.com/2019/04/18/ancient-christian-manuscripts-digitized-at-monastery-beneath-mount-sinai/>

TELL AL HAMMAM OFFERS CLUES TO BLANK PAGE IN REGION'S HISTORY, BY SAEB RAWASHDEH

Tell Al Hammam, a site northeast of the Dead Sea, can help researchers understand “city states” in the southern Levant, and perhaps why the area around the site was abandoned for 600 years, according to archaeologist Mohammad Najjar.

It is the largest Early Bronze Age site and the third-largest Middle Bronze Age site in the southern Levant, Najjar said in a recent interview with The Jordan Times.

Najjar has followed the site since the Tell Al Hammam Project was established there 15 years ago, when he served as director of excavations and archaeological survey at the Department of Antiquities.

“Every year, I was visiting the site during the field season. Last year, the project’s director asked me to join as senior archaeological consultant,” Najjar noted, adding that he was asked because his PhD dissertation was about this particular historical period.

However, not many sites of from the period have been excavated in Jordan, which created a false impression that the land to the east of the Jordan River were on the periphery at the time, as opposed to the core in the land to the west of the river, Najjar underlined.

He added that excavations at Middle Bronze Age sites like Pella and Tell Al Hammam will help fill the gaps in our knowledge on the region.

The site dates back to the Neolithic period, 8,000 years ago, according to the archaeologist.

“The site was occupied uninterruptedly until 1,650 BC. A gap that lasted for 600-700 hundred years was documented in the site’s occupational history,” Najjar elaborated, noting that occupation restarted during the Iron Age (9th century BC) and lasted until modern times.

“It is clear that Tall Al Hammam was a major city with a huge fortification system that included walls, monumental gates and towers.

Last year, we started to excavate the Middle Bronze Age palace and we have plans to continue exposing this important administrative building, hoping to find the palace archives,” he said.

Furthermore, Tell Al Hammam was the centre of a city state that included the town itself and probably up to five satellite sites that can be visually seen from the main site, he explained.

“At least 26 hectares of the city were inside the city walls, so the population could easily have exceeded 26,000, according to certain calculations,” Najjar underlined.

Archaeological evidence and scientific analysis showed that the city was suddenly destroyed and abandoned for the more than 600 years that followed.

“No traces of war or earthquakes were noticed in the archaeological record,” the archaeologist said, adding that petrified pottery sherds, bricks and stones point to an airburst meteoric explosion at the northern tip of the Dead Sea which may have caused the destruction.

This theory is supported by a 6 per cent salinity rate found in the soil at the site, which poisoned the ground for 600 years, Najjar said.

The salt originated from the Dead Sea approximately 10km to the southwest of the site, Najjar added, noting that the salt in the soil “couldn’t be explained as sedimentary salts from the ancient Dead Sea because at its highest level, 18 thousand years ago, the Dead Sea’s waters were lower.. than the top of the site of Tell Al Hammam”.

“Most probably the Dead Sea salts were transported to the site or the sites in the area by a shock and heat wave caused by the impact,” Najjar underscored.

Please visit the site: <http://www.jordantimes.com/news/local/%E2%80%98tell-al-hammam-offers-clues-blank-page-regions-history%E2%80%99>

BETTER LABOR PRACTICES COULD IMPROVE ARCHAEOLOGICAL OUTPUT

New analysis illuminates how much archaeological knowledge production has fundamentally relied upon site workers' active choices in responding to labor conditions
LEHIGH UNIVERSITY

Archaeological excavation has, historically, operated in a very hierarchical structure, according to archaeologist Allison Mickel. The history of the enterprise is deeply entangled with Western colonial and imperial pursuits, she says. Excavations have been, and often still are, according to Mickel, led by foreigners from the West, while dependent on the labor of scores of people from the local community to perform the manual labor of the dig.

In a recently published paper examining some of this history specifically in the context archaeological excavations undertaken in the Middle East?Mickel writes: "Even well into the 20th century, locally hired excavation workers continued to benefit little from working on archaeological projects, still predominantly directed by European and American researchers who paid extremely low wages and did not share their purpose, progress, hypotheses, or conclusions with local community members."

Over time, the teams have gotten smaller in size, but hiring and labor practices remain the same, explains Mickel, an assistant professor of anthropology at Lehigh University, who specializes in the Middle East.

"We haven't really changed the hierarchy of how we hire or the fact that workers are paid minimum wage--sometimes as little as a few dollars a day, which is not very much to spend even in their own context, for work that is dangerous and has a lot of risk to it," she says.

In a new paper, "Essential Excavation Experts: Alienation and Agency in the History of Archaeological Labor," published in *Archaeologies*:

Journal of the World Archaeological Congress, Mickel illuminates the ways that nineteenth century archaeologists working in the Middle East managed local labor in ways that reflected capitalist labor management models. She focuses on two case studies from early Middle Eastern archaeology by examining the memoirs of two 19th century archaeologists: Italian archaeologist Giovanni Battista Belzoni, known for his work in Egypt, and British archaeologist Sir Austen Henry Layard, best known for his work in Nimrud, an ancient Assyrian city about 20 miles south of Mosul, Iraq.

Mickel's analysis reveals the different ways local laborers responded to similar conditions. Her examination ultimately reveals how much archaeological knowledge has fundamentally relied upon the active choices made by the local laborers who do the digging.

Divergent responses to exploitative labor practices Mickel argues that the framework established by the German philosopher and economist Karl Marx of the capitalist mode

of production can be seen in 19th century archaeological work in the Middle East?and, in many ways, in archaeological projects today. This includes Marx's assertion that, she writes, "...the capitalist mode of production leads to workers experiencing a sense of powerlessness and an inability to fulfill the potential of their own skills, expertise, and abilities."

In Mickel's analysis, Belzoni's approach to securing and retaining local laborers for his work in Egypt, which began in 1816, exemplified the conditions of modes of production that lead to his workers' "...alienation in the Marxist sense," beginning with how little he paid them.

She writes: "Monetarily devaluing the archaeological work of native Egyptians in this way engenders an understanding that archaeological labor is quite literally of little worth—one that in Marx's view deeply impacts the self-image of the workers in a production process.

Not only were the workers paid next to nothing for performing the manual labor of Belzoni's endeavors, they were also not involved in the conceptualization of the project. In the end, the antiquities were subsequently shipped thousands of miles away, challenging both ideologically and spatially any relationship between the workers and the archaeological objects being unearthed through excavation, as well as the knowledge gleaned from them."

Mickel also writes about Belzoni's use of strongarm tactics to maintain the workforce he employed. These include resorting to physical violence and bribery?strategies Belzoni used, in one example, on a foreman to force laborers to return to work during a strike.

During his famed excavation of the Memnon Head in 1816, Belzoni had to leave the site for an extended period of time in order to raise funds.

He believed, writes Mickel, "...that the workers and their families were too lazy to dig on their own..."

"Indeed," she continues, "no substantial digging proceeded in Belzoni's absence by the time he returned. The reasons for this surely have nothing to do with any indolence on the part of the native Egyptian workforce, but rather can be explained in terms of alienation."

In examining Layard's memoir, Mickel finds that although Layard worked in the same region and during the same time period as Belzoni, his workers' responded to similar working conditions very differently.

"Operating under extremely similar circumstances," writes Mickel, "the groups of workers examined here made very divergent decisions about how best to respond to an exploitative labor system, whether to rise up demonstratively against it or to resist the devaluation of their work by establishing themselves as essential to the production of artifacts and historical knowledge."

Layard's strategies for hiring and managing a local labor force had much in common with Belzoni's, including elements of capitalist labor relations modes such as low wages. Additionally, Layard's memoirs suggest "...that he viewed the total excavation endeavor

as metaphorically signifying the superiority of Western civilization over Oriental peoples and cultures."

And yet Layard's workmen, explains Mickel, often appear in his writing as trusted experts in the excavation process: "These men developed impressive excavation abilities that Layard himself recognized, repeatedly hiring the same groups of people for season after season and site after site. One native Assyrian man whom he hired again and again, Hormuzd Rassam, ultimately went on to lead his own excavations on behalf of the British Museum at places like Nimrud and Nineveh; Rassam even published his own archaeological memoirs for popular distribution like Layard and other archaeologists of the time"

Mickel compares these two contexts and concludes: "Operating under extremely similar circumstances, the groups of workers examined here made very divergent decisions about how best to respond to an exploitative labor system, whether to rise up demonstratively against it or to resist the devaluation of their work by establishing themselves as essential to the production of artifacts and historical knowledge."

Focusing attention on the divergent decision these two groups of laborers made reveals how much is owed to archaeological workers' localized responses to a structure designed to maximize benefit to the archaeologists and minimize workers' control within the project, asserts Mickel.

She writes: "What would the archaeological record look like if this was not the case? How would archaeological knowledge be transformed if the means of its production were not controlled by archaeologists alone but shared with local stakeholders?"

Digging and questioning

As part of her work, Mickel supervises and participates in excavations in regions such as Petra, Jordan and Catalhoyuk, Turkey, while researching the history of archaeology and its contemporary practice.

Mickel has spent two to three months each summer in Turkey and Jordan, and between 2011 and 2015 spent a year at both sites, conducting dissertation fieldwork on a Fulbright grant.

"What I find in [Petra and Catalhoyuk] is relevant to a lot of other contexts because archaeology is fairly regional in its practice," she says.

Beyond digging, Mickel examines records of archaeological excavations for the individuals listed as site workers. She visits their homes and asks questions about the site workers' experiences on the excavations.

"I found that this system has led to one in which workers are doing this dance all the time in archaeology where they are integral to carrying out an excavation, they work for almost nothing, they are good at what they do, they have decades of experience in addition to generational knowledge that's been handed down. ... Most of these people, for context, their fathers worked in archaeology, their grandfathers worked in archaeology--it's almost like a family business for them to be there. So they have a ton of knowledge,

but if I tell them how much I admire their expertise, they react really negatively to that label of expertise."

Mickel believes that an improvement of labor practices would benefit not just workers, but archaeology as a whole. She argues for ways in which the field could be producing better science if archaeologists were to change their labor practices.

"This isn't charity work," says Mickel. "If we want to have better archaeology, if we want to know more about the past, then we need to find ways to benefit from the knowledge that local people have been hiding for decades and decades and decades from us."

Please visit the site: https://www.eurekalert.org/pub_releases/2019-04/lu-blp041919.php [Go there for embedded linx]

GRAECO-ROMAN ERA TOMB DISCOVERED IN UPPER EGYPT, BY NEVINE EL-AREF

An Egyptian-Italian archaeological mission working at the Aga Khan Mausoleum area in Aswan has discovered a rock-cut tomb dating back to the late Pharaonic Graeco-Roman period.

Mostafa Waziri, the general secretary of the Supreme Council of Antiquities, explains that the mission found inside the tomb parts of a painted wooden coffin.

Also discovered were fragments of another coffin adorned with a complete text that includes the name of the owner, identified as Tjt, and an invocation to the gods of the First Cataract; Khnum, Satet and Anuket, as well as Hapy, the Nile god.

Ayman Ashmawy, the head of the antiquities ministry's ancient Egypt department, told Ahram Online that the tomb consists of a stairway partly flanked by sculpted blocks leading to the funerary chambers.

The entrance was sealed by a stone wall found in its original place over the stairway.

Patrizia Piacentini, the head of the mission, said that the mission also found many amphorae and offering vases, as well as a funerary structure containing four mummies and food vessels. Also found were two mummies, likely of a mother and her child, still covered by painted cartonnage.

A round-topped coffin was excavated from the rock floor. In the main room were around 30 mummies, including young children who were deposited in a long lateral niche. “Leaning against the north wall of the room was an amazing intact stretcher made of palm wood and linen strips, used by the people who deposited the mummies in the tomb,” Piacentini told Ahram Online .

At the entrance of the room were vessels containing bitumen for mummification, white cartonnage ready to be painted and a lamp.

On the right and left sides of the door, many beautiful colored and gilded cartonnages, fragments of funerary masks painted with gold and a well preserved statuette of the Ba-bird, representing the soul of the deceased, still presenting all the details of the decoration have been found.

The mission has mapped around 300 tombs dating from the 6th century BC to the 4th century AD, located in the area surrounding the Mausoleum of the Aga Khan, on the west bank of the Nile in Aswan.

Please visit the site:

<http://english.ahram.org.eg/NewsContent/9/41/330518/Heritage/GrecoRoman/GraecoRoman-era-tomb-discovered-in-Upper-Egypt.aspx> [Go there for pix]

**DNA FROM MEDIEVAL CRUSADER
SKELETONS SUGGESTS SURPRISING
DIVERSITY DNA SUGGESTS CRUSADERS
INTERMARRIED WITH LOCAL PEOPLE,
AND THEIR SONS ALSO FOUGHT,
BY KIONA N. SMITH**

European soldiers and civilians poured into the Levant in the 12th and 13th centuries, often killing or displacing local Muslim populations and establishing their own settlements in an effort to seize control of sites sacred to three major religious groups.

But in a new study, DNA from the skeletons of nine soldiers hints that the armies of the Crusades were more diverse and more closely linked with local people in Lebanon than historians previously assumed. The genetic evidence suggests that the Crusaders also recruited from among local populations, and European soldiers sometimes married local women and raised children, some of whom may have grown up to fight in later campaigns.

Living and dying side by side

For centuries, the mingled, charred bones of at least 25 soldiers lay buried in two mass graves near the ruins of the Castle of St. Louis, a 12th- to 13th-century Crusader stronghold near Sidon, in south Lebanon. Several of the skeletons (all apparently male) bore the marks of violent death, and the artifacts mingled with the bones—buckles of medieval European design, along with a coin minted in Italy in 1245 to commemorate the Crusades—mark the pit's occupants as dead Crusader soldiers, burned and buried in the aftermath of a battle. From nine of them, geneticist Marc Haber and his colleagues at the Wellcome Sanger Institute obtained usable DNA sequences, which offer a rare look into the ranks of the soldiers who fought on one side of the 200-year series of wars.

Before becoming the namesake of the largest metro area in Missouri, French King Louis IX led the Seventh Crusade, a final (and ultimately failed) push by European forces to wrest control of Syria and Lebanon from Muslim rulers based in Egypt. In 1253, Louis' forces suffered a major defeat at Sidon, and the king himself arrived on the scene a few days after the battle. Accounts from the time describe Louis personally piling soldiers' decomposing remains into mass graves in the aftermath. Whether he really did that is unclear, of course. But it's reasonably likely—based on the date of the coin and radiocarbon dating of material from the pits—that these skeletons could be the remains of some of those men.

“We see this exceptional genetic diversity in the Near East during medieval times.”

It appears the soldiers were a more diverse group than many historians supposed. When Haber and his colleagues compared the DNA sequences to databases of modern DNA samples from around the world, three of the dead Crusaders closely resembled modern

Europeans: two were most likely of Spanish ancestry, and one was most likely Sardinian. Four of the Crusaders' genomes closely resembled those of modern Lebanese people and DNA samples from the bones of people who lived in Lebanon under the Roman Empire around 2,000 years ago. That suggests local people had joined the Crusades, which lines up well with historical accounts of local Christians becoming soldiers, officers, and knights in the Crusader forces.

"It wasn't just Europeans," Haber said in a statement to the press.

"We see this exceptional genetic diversity in the Near East during medieval times, with Europeans, Near Easterners, and mixed individuals fighting in the Crusades and living and dying side by side."

Generations of fighting

If you used statistical analysis to group the most similar genomes together (which is exactly what Haber and his colleagues did), the three European soldiers would cluster together in one group, and the four Lebanese soldiers would form another. But the other two soldiers would fall somewhere in the middle, which suggests that they may have been the children of Europeans and Near Eastern people.

To get more information about the two soldiers' ancestry, Haber and his colleagues looked at DNA sequences from their Y chromosomes.

Because that particular set of DNA is usually passed directly from father to son, it's possible to trace paternal lineages through Y-chromosome DNA the same way that maternal lineages can be traced through mitochondrial DNA. The three Europeans' Y-chromosome DNA fell into groups of lineages usually associated with European ancestry. So did the two soldiers with mixed ancestry. Mitochondrial DNA, which passes only from mother to child, was less clear: the two soldiers' mitochondrial genomes both fell into a group that's common all over Europe and the Near East.

That seems to suggest that these two soldiers both had European fathers and Near Eastern mothers, but it's also possible that their parents came from mixed ancestries themselves; there's no way to say for sure based on the DNA evidence. Either way, it underscores how long the Crusades lasted. It's one thing to say that the Crusades were a 200-year series of conflicts, but it's another to realize that a wave of European migrants to the Levant intermarried with local people. Their children—and perhaps their children's children—apparently grew up to fight in the next round of warfare.

Ghosts of the past

But although hundreds of thousands of Europeans fought and settled in the Levant from 1095 to 1291, there's no trace of European ancestry in the genomes of the people living in Lebanon today. In fact, Haber and his colleagues compared the genomes of modern Lebanese people with DNA extracted from the bones of people who lived near Mt. Lebanon between 237 and 632 CE, when the area was part of the Roman Empire. It turned out that they hadn't changed very much. Today's Lebanese people are clearly descended from the people who have lived in the area since the Bronze Age, with little trace of the temporary European invaders.

"If you look at the genetics of people who lived during the Roman period and the genetics of people who are living today, you would think that there was just this continuity," Haber said in a statement.

"You would miss that, for a certain period of time, the population of Lebanon included Europeans and people with mixed ancestry."

Haber and his colleagues suggest that the interaction between groups during the Crusades didn't last long enough or happen at a large enough scale to leave a genetic trace 800 years later. The genetic traces of such brief encounters, they say, tend to get diluted over time. That suggests that, while looking at modern people's genomes can reveal some things about our large-scale shared human story, many events may go missing. That's why looking at ancient DNA from the remains of people who lived closer in time to these events can tell us things that modern DNA can't. And that can help fill in gaps in written history.

The American Journal of Human Genetics, 2019. DOI:
10.1016/j.ajhg.2019.03.015 (About DOIs).

Please visit the site: <https://arstechnica.com/science/2019/04/dna-from-medieval-crusader-skeletons-suggests-surprising-diversity/>

URINE SALTS IN SOIL MAY MARK ADVENT OF HERDING

According to a report in The Atlantic, Jordan Abell of Columbia University and his colleagues were able to detect a possible shift from hunting and gathering to herding at the site of Aşıklı Höyük, in Turkey's central Anatolia region. Because the area is dry, Abell hypothesized that the sodium, nitrate, and chlorine salts contained in the urine of people and animals would not have been washed away from the soil by rain.

The scientists analyzed soil samples from trash heaps, bricks, and hearths from different layers of the site, and found that between 10,000 and 9,700 years ago, the salt concentrations rose dramatically.

This possible increase in urine output corresponds with archaeological evidence suggesting that the hunter-gatherers began to keep sheep and goats, but it appears that the shift toward herding may have occurred more rapidly than had been previously thought.

Over a period of about 1,000 years, the researchers estimate that on average, some 1,800 people and animals lived at the settlement. That's many more individuals than archaeologists estimate the housing for people at the site would have accommodated, suggesting that the number of goats or sheep living there had increased.

The team members are now looking for a way to distinguish between human and animal urine salts as their research continues.

Please visit the site: <https://www.archaeology.org/news/7594-190418-turkey-herding-urine>

NECROPHAGY: A MEANS OF SURVIVAL IN THE DEAD SEA

Studying organic matter in sediments helps shed light on the distant past. What was the climate like? What organisms populated the Earth?

What conditions did they live in? Researchers from the University of Geneva (UNIGE), Switzerland, and the University of Lyon, France, have examined the sediments in the Dead Sea, where the salinity is without compare, making it one of the most hostile environments on the planet.

The geologists drilled a 400-metre hole in the core of the Dead Sea before analysing each layer of sediment and the traces of a strategy that enables bacteria to survive by feeding on the remains of other organisms. This discovery, to be read about in the journal *Geology*, will further our understanding of how life can develop even in the most severe conditions. It also provides vital research leads for detecting life on other planets.

The study of the deep biosphere – microbial presence in sediments – helps us understand the various aspects of the evolution of the Earth and the manifold climatic changes that it has been subjected to. «It's about studying bacteria and archaea – the oldest forms of life on Earth – that live in the sediments, and analysing the transformation processes that result from their presence, and that's called diagenesis,” explains Daniel Ariztegui, a professor in the Department of Earth Sciences in UNIGE Faculty of Sciences.

An international team worked on reconstructing the climate of the Dead Sea over the last 200,000 years. Although the surface area of the lake and its depth are roughly equivalent to those of Lake Geneva, the Dead Sea loses a metre a year, which explains its ever-increasing salinity: 275 grams of salt per litre compared to 20 to 40 grams per litre in the oceans. Nevertheless, microbial life subsists in this extreme environment. But is it possible that a form of life has managed to adapt to the sediments in the Dead Sea – a particularly hostile environment that is isolated from the surface without any light, oxygen or frequent food intake? The scientists drilled a hole 400 metres deep and 10 centimetres in diameter in the heart of the Dead Sea in an attempt to find traces of microbial presence in the sediments, analysing sediment samples for each metre that was dug.

Necrophilous bacteria

“We started by freezing the collected samples to preserve any genetic material that might degrade at room temperature,” explains Dr Camille Thomas, a researcher in UNIGE Department of Earth Sciences. “Then we used different techniques, including scanning electron microscopy, which can identify at very high resolution the remains of microbes that could have changed the original composition of the sediments.”

The aim was also to extract the organic compounds trapped in the salt, such as DNA or lipids. “This enables us to identify the organisms that live or have lived in the sediment, and helps us understand how they manage to survive under these conditions,” continues professor Ariztegui.

Earlier research had shown that archaea could be found in the most saline environments in the Dead Sea. “But here we uncovered molecules known as isoprenoid wax esters that can’t be produced by archaea but only by bacteria from fragments of archaea,” says Dr Thomas. This proves that a form of life other than archaea developed that is potentially still present in these sediments: bacteria. “Archaea have the capacity to withstand the Dead Sea’s very high levels of salinity.

Until now, they were the only ones that had been identified in the deep waters of the Dead Sea. But it turns out that another population can overcome these intense conditions by feeding on the corpses of archaea: bacteria – which we thought were not so well adapted.” In becoming “necrophages”, these bacteria have been able to acclimatise to one of the most severe environments on our planet. Furthermore, they have contributed to the chemical changes found in the sediments of the Dead Sea.

Please visit the site: <https://www.heritagedaily.com/2019/04/necrophagy-a-means-of-survival-in-the-dead-sea/123444>

STONEHENGE: DNA REVEALS ORIGIN OF BUILDERS, BY PAUL RINCON

The ancestors of the people who built Stonehenge travelled west across the Mediterranean before reaching Britain, a study has shown.

Researchers compared DNA extracted from Neolithic human remains found across Britain with that of people alive at the same time in Europe.

The Neolithic inhabitants appear to have travelled from Anatolia (modern Turkey) to Iberia before winding their way north.

They reached Britain in about 4,000BC. Details have been published in the journal Nature Ecology & Evolution.

The migration to Britain was just one part of a general, massive expansion of people out of Anatolia in 6,000BC that introduced farming to Europe.

Before that, Europe was populated by small, travelling groups which hunted animals and gathered wild plants and shellfish.

One group of early farmers followed the river Danube up into Central Europe, but another group travelled west across the Mediterranean.

DNA reveals that Neolithic Britons were largely descended from groups who took the Mediterranean route, either hugging the coast or hopping from island-to-island on boats. Some British groups had a minor amount of ancestry from groups that followed the Danube route.

When the researchers analysed the DNA of early British farmers, they found they most closely resembled Neolithic people from Iberia (modern Spain and Portugal). These Iberian farmers were descended from people who had journeyed across the Mediterranean. From Iberia, or somewhere close, the Mediterranean farmers travelled north through France. They might have entered Britain from the west, through Wales or south-west England. Indeed, radiocarbon dates suggest that Neolithic people arrived marginally earlier in the west, but this remains a topic for future work.

In addition to farming, the Neolithic migrants to Britain appear to have introduced the tradition of building monuments using large stones known as megaliths. Stonehenge in Wiltshire was part of this tradition. Although Britain was inhabited by groups of "western hunter-gatherers" when the farmers arrived in about 4,000BC, DNA shows that the two groups did not mix very much at all. The British hunter-gatherers were almost completely replaced by the Neolithic farmers, apart from one group in western Scotland, where the Neolithic inhabitants had elevated local ancestry. This could have come down to the farmer groups simply having greater numbers.

"We don't find any detectable evidence at all for the local British western hunter-gatherer ancestry in the Neolithic farmers after they arrive," said co-author Dr Tom Booth, a

specialist in ancient DNA from the Natural History Museum in London. "That doesn't mean they don't mix at all, it just means that maybe their population sizes were too small to have left any kind of genetic legacy." Co-author Professor Mark Thomas, from UCL, said he also favoured "a numbers game explanation".

Professor Thomas said the Neolithic farmers had probably had to adapt their practices to different climatic conditions as they moved across Europe. But by the time they reached Britain they were already "tooled up" and well-prepared for growing crops in a north-west European climate. The study also analysed DNA from these British hunter-gatherers. One of the skeletons analysed was that of Cheddar Man, whose skeletal remains have been dated to 7,100BC.

He was the subject of a reconstruction unveiled at the Natural History Museum last year. DNA suggests that, like most other European hunter-gatherers of the time, he had dark skin combined with blue eyes.

Genetic analysis shows that the Neolithic farmers, by contrast, were paler-skinned with brown eyes and black or dark-brown hair. Towards the end of the Neolithic, in about 2,450BC, the descendants of the first farmers were themselves almost entirely replaced when a new population - called the Bell Beaker people - migrated from mainland Europe. So Britain saw two extreme genetic shifts in the space of a few thousand years.

Prof Thomas said that this later event happened after the Neolithic population had been in decline for some time, both in Britain and across Europe. He cautioned against simplistic explanations invoking conflict, and said the shifts ultimately came down to "economic" factors, about which lifestyles were best suited to exploit the landscape.

Dr Booth explained: "It's difficult to see whether the two [genetic shifts] could have anything in common - they're two very different kinds of change. There's speculation that they're to some extent population collapses. But the reasons suggested for those two collapses are different, so it could just be coincidence."

Please visit the site: <https://www.bbc.com/news/science-environment-47938188> [Go there for pix]

ARCHAEOLOGISTS DISCOVER A NEW PROFESSION IN AN ANCIENT EGYPTIAN WOMAN'S TEETH, BY KRISTINA KILLGROVE

Some archaeologists rejoice in opening graves that have been sealed for millennia, while others marvel when their lab work reveals the hidden past of a particular person. During routine analysis of a skeletal collection from ancient Mendes, two archaeologists discovered odd tooth wear in an older Egyptian woman that suggested her body had more to tell them about her life.

The skeleton was originally excavated in the late 1970s by the NYU Institute of Fine Arts Expedition to Mendes, along with 67 others. The site was the capital of ancient Egypt during the 29th Dynasty, or roughly the 4th century BC, but it was occupied continuously for a total of about 5,000 years. In addition to being a capital, Mendes was a trade hub and religious cult center, and archaeologists have also found residential and burial areas.

In the 1990s, new excavation by Nancy Lovell of the University of Alberta and her team produced additional bodies, for a total of 92. These burials appeared to be of middle-class people based on burial style. However, the grave of this particular older woman, which dated to 2181-2055 BC, was rich and elaborate compared to others in the area. Her skeleton had been placed in a wooden coffin, and her journey to the afterlife was outfitted with alabaster vessels, a bronze mirror, and cosmetics. In going through the human remains from Mendes, Lovell, along with her former student Kimberley Palichuk, noticed something intriguing in her teeth.

Writing in the recently published *Bioarchaeology of Marginalized People*, Lovell and Palichuk note that 16 of the woman's 24 preserved teeth "show two patterns of wear which are inconsistent with chewing food." Specifically, 14 teeth exhibit flat abrasions, while "the most unusual pattern of wear appears on both the vestibular [lip-side] and oral [tongue-side] surfaces of the maxillary central incisor crowns," which is more wedge-like.

While some cultures modify the teeth on purpose -- such as by inlaying stones, filing them to certain shapes, or removing certain teeth entirely -- the archaeologists reason that since there is "no evidence for intentional modification of teeth in ancient Egypt in texts, artistic depictions, or archaeologically recovered dental remains, the unusual wear this woman exhibits must have been acquired incidentally."

Incidental tooth modification is still interesting, however, because it is often the by-product of the use of the teeth in repetitive tasks. "A number of ethnographic accounts record the use of the anterior teeth as aids in the preparation of vegetable fibers for basketry, cordage, and other products," Lovell and Palichuk write.

Since reeds were used extensively at Mendes, including as mats for burial, "the wedge-shaped wear could have been caused by the splitting of vegetable material," they suggest.

A strong case can be made that the plant that the woman was running between her teeth was *Cyperus papyrus* because "papyrus stalks were used for firewood, to make boxes and baskets for storage and transport of goods, and to make sandals, curtains, and floor mats," the researchers explain. Stripping off the outer rind of the papyrus stalk with the teeth would cause abrasions, but the microscopic bits of silica in the plant would also scour tooth enamel, hastening tooth wear and contributing to the unusual shape of this woman's front teeth.

In addition to the oddly shaped wear, many of the woman's teeth were found to have horizontal microwear features. "The patches would seem to have been caused by a rubbing action that occurred horizontally at the gum line and would have abraded the teeth," Lovell and Palichuk say. The most likely cause of this microwear is habitual or excessive toothbrushing.

While modern toothbrushes are made of soft, synthetic bristles, in ancient Egypt, some people used frayed twigs and possibly a type of dentifrice like sodium bicarbonate or natron for cleaning their teeth.

This practice was not common, though. "The rarity of tooth cleaning in ancient Egypt may help to explain why only [this] one individual in the skeletal sample exhibited the abrasion patches," Lovell and Palichuk note. "It may be the case that plant residues adhered to this woman's teeth as a result of her task activities, necessitating regular cleaning." Use of natron or other natural salt could even have had the secondary effect of an analgesic, which this woman may have appreciated if her worn teeth caused her pain.

Sonia Zakrzewski, a bioarchaeologist at the University of Southampton, told me that this study is intriguing and noted that "too rarely have we as archaeologists actually considered the practicalities of using the reeds and who might be doing this. We can feel empathy for this woman and the likely pain she felt resulting from her excessive dental wear."

The discovery of this older woman with unusual dental issues "has important implications for our understanding of the professionalization of women in ancient Egypt," Lovell and Palichuk explain, because previous researchers have suggested, based primarily on artistic works commissioned by men, that there were only seven professions open to women in ancient Egyptian culture -- priestess, musician, singer, dancer, mourner, weaver, and midwife. But this longstanding assumption about women's work, bioarchaeologist Tamer Gad Rashed of Cairo University tells me, is incorrect because "throughout Egyptian history, women occupied all positions. The present study's findings show that Egyptian women were - and still are - found everywhere and in every sector of Egyptian daily life."

This older woman's skeleton, Lovell and Palichuk suggest, may therefore represent "the professionalization of women that is not registered in the documents and tomb scenes that are created by men and reflect male interests and biases." Female craft specialists were simply not acknowledged by ancient Egyptian conventions, making them historically marginalized figures. "We can construct a richer representation of women's work in ancient Egypt by allowing individuals to tell their stories through their skeletons," the researchers conclude.

Casey Kirkpatrick, a bioarchaeologist at Western University with an expertise in Egyptian dentistry, notes that this study is important because "it suggests that ancient Egyptian women may have contributed to society in ways other than those that have been traditionally depicted or described." Zakrzewski agrees that the analysis of this ancient woman's contribution is the key to her a professional identity. "We can now see her as being at the core of her community rather than as a marginalized person," Zakrzewski says, "albeit after having been marginalized by archaeologists in the past."

More bioarchaeological work of the sort that Lovell and Palichuk have done would be welcome in order to better understand the society of ancient Egypt, Kirkpatrick suggests, as "there is still much to be learned about the lives of individuals relegated to the periphery of history." Additional work, Rashed agrees, "would result in more interesting findings related to the great Egyptian Civilization."

Individual teeth may seem to the untrained eye like an extraneous part of a larger burial. But placed into the context of a skeleton and a past culture, as Lovell and Palichuk have done, even tiny marks on a handful of teeth can reveal a hidden world whose surface archaeologists have so far have only scratched.

Please visit the site:

<https://www.forbes.com/sites/kristinakilgove/2019/04/11/archaeologists-discover-a-new-profession-in-an-ancient-egyptian-womans-teeth/>

VAST NECROPOLIS DISCOVERED FROM RESCUE EXCAVATIONS AT ANCIENT LARNACA SITE

Cyprus Ministry of Transport, Communications and Works, Department of Antiquities, announces the results of the salvage excavations conducted in conjunction with the construction of the sewerage network of Larnaka in the period of 27th June 2016 to 31st October 2018.

Throughout this period more than 110 tombs have been excavated and recorded, in a wide area of several kilometres, testifying to the presence of a vast necropolis, as well as to the architectural evidence for the city-kingdom of Kition. The dating of the tombs ranges from the Early Bronze Age to the late Roman period (4th century AD).

The large majority of tombs are subterranean rectangular chamber tombs, carved in the natural bedrock, consisting of one or two adjoining chambers. The entrance to the tomb was via a sloping corridor or a carved staircase. Sometimes, niches were carved on the walls of the corridor, possibly to place offerings for the deceased.

Every time a burial was placed inside, the stomion (the point-of-entry into the chamber), was sealed either with a gypsum slab or with stones. These tombs were used for collective burials and in most instances, appear to have been used for centuries. They are characterized by the wealth of the finds consisting of utilitarian/storage vessels and fine wares and also items of personal adornment made of gold, bronze and semi-precious stones.

The excavations in Archbishop Kyrillos II Street brought to light two tombs that date to 2,500 BC. They are of vital importance for the city since they provide evidence for the use of St John's Quarter in the Early Bronze Age.

Unique finds of Geometric date were unearthed in two chamber tombs in Empress Theodora and Esperidon Streets. The wealth of the finds and the remarkable craftsmanship of the vessels are worth noting.

One type of tomb dating to the Hellenistic period that has been attested for the first time in Kition (a known type in Nea Pafos and Kourion), was excavated in Ali Dede, Sittika Hanoum and Derbis Yusuf Streets and in the Hamit Bey Square. A total of more than 47 'mnima'-type tombs were recorded in this area. The cist tombs were used for single inhumations, usually with very few finds or without any at all.

Simultaneously with the excavation of the necropolis of Kition, further work was undertaken in the nucleus of the ancient settlement, the Chrysopolitissa Quarter, which revealed the urban topography of the Hellenistic and Roman periods.

The number of statuettes found at Tefkrou Street, in conjunction with elaborate walls, leads to the conclusion that the foundations belong to a sanctuary spanning the Archaic through to the Hellenistic period.

The urban nucleus of Kition was revealed, in Kyriacou Matsi and Kimonos Streets, while walls possibly of public buildings were found in Chrysopolitissa Avenue. Clay pipes of the Hellenistic period, running along the same avenue, must be associated with the water network of the city. Impressive underground water channels, carved on the natural bedrock, were found at Michali Partella Street. These impressive structures, that extend for several kilometres in the Chrysopolitissa Quarter, testify to the importance given to water as a natural resource by the inhabitants of the city.

An extensive part of the Sewerage contract C12 covers the heart of medieval Larnaca. The excavations carried out on St Francis of Assisi Street uncovered a monastery dating to the end of the 15th-16th century. Foundations of small adjoining rooms were found, divided by a single wall running across the north-south axis with a parallel horizontal narrow corridor on the western part of the building and other vertical corridors that secure private access. These rooms may be identified with monastic cells of the Monastery of the Order of the Franciscans, mentioned in travellers' accounts from 1546, as a stop/hospice for pilgrims on their journey to the Holy Lands.

During the Ottoman period a water system of clay pipes was installed and regularly maintained in Larnaca. The pipes were inserted into a stone channel and they were protected with gypsum slabs on top. These features constitute a unique indication for the plan and road networks of the settlement.

A subterranean part of the Bekhir Pasha aqueduct was located at St. Constantinos Street. It consists of a channel carved in the limestone that joins the visible part of the aqueduct.

The above-mentioned excavations provided a unique opportunity to discover and document the development of the history of the city of Larnaca. They have revealed a city inhabited for more than 5000 years, one of the most prominent city-kingdoms in the Iron Age and a stop for pilgrims on their way to the Holy Lands during the Medieval period.

The goal of the Department of Antiquities is to enable modern development to co-exist with the rich past of the city and to show that construction works of social importance, despite the short-term inconvenience caused to the inhabitants, has long-term and beneficial results.

Please visit the site: <https://www.tornosnews.gr/en/greek-news/culture/35145-vast-necropolis-discovered-from-rescue-excavations-at-ancient-larnaca-site.html> [Go there for pix]
