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Πληροφοριακό Δελτίο της Ελληνικής Αρχαιομετρικής Εταιρείας

- Ιανουάριος 2022 -

**The greatest way to live with honor in this world
is to be what we pretend to be. (Socrates)**

Newsletter of the Hellenic Society of Archaeometry

- January 2022 -

Nr. 250

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ΣΥΝΕΔΡΙΑ - CONFERENCES/WORKSHOPS

CONFERENCE COLOURS 2022: BRIDGING SCIENCE WITH ART, ÉVORA UNIVERSITY, 14-16 SEPTEMBER 2022, PORTUGAL

Dear Colleagues,

It is with great pleasure that we announce the third edition of the Conference COLOURS 2022: Bridging Science with art, that will be held in Évora University from 14th to 16th September 2022.

COLOURS2022 is dedicated to Modern and Contemporary art, with a special focus on mural painting and street art. The **scope** is to:

- Promote a forum between the several disciplines that study colour in its wide perspectives in art: chemistry and physics, psychology, archaeology, geology, history, history of art, visual arts, architecture and conservation-restoration.
- Bringing together scientists, from both analytical and conservation fields, artists and institutions to discuss the most recent advances in technology applied to colour imaging, diagnosis, conservation and management of cultural heritage.

We invited you to submit an abstract in the following topics:

1. Colour history and symbolism in the 20 and 21 centuries
2. Old and new colour materials and their origin/manufacture/uses
3. Colour deterioration (origin, types, mechanisms)
4. Science and technology applied to colour studies
5. Challenges for conservation-restoration

All information and details about the conference, and on the opportunities for publishing in International Journals indexed in SCOPUS, can be found at Colours 2022 website.

Looking forward to meeting you all in Évora to discuss **COLOURS!**

Milene Gil and António Candeias.

On behalf of the Local Organizing Committee

Our mailing address is:

Almada Project
Univerisade de Évora
Évora 7005-152
Portugal

COLOURS2022 is organized under the framework of project *ALMADA: Unveiling the mural painting Art of Almada Negreiros (1938-1956): technical, material and diagnostic*

scientific study as guide for its future conservation and enjoyment financed by the Portuguese Science and Technology Foundation (Fundação para a Ciência e Tecnologia).

Almada Negreiros was a key artist of Portuguese Modern Art from the first half of the 20th century and he has left in the city of Lisbon a rich opus of mural paintings still to be discovered by the International Art world. The third conference of COLOURS: bridging science to ART intends to pay homage to Almada Negreiros and to all contemporary and following artist generations who worldwide have combined old colour traditions with new painting materials and techniques. COLOURS2022 is a unique opportunity to discuss them together and the challenges that the safeguard of their works of art face nowadays.

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**AMERICAN CERAMIC SOCIETY'S FIRST
PAN AMERICAN CERAMICS CONGRESS-
FERROELECTRICS MEETING OF THE
AMERICAS (PACC-FMA '22), PANAMA CITY,
PANAMA, JULY 24TH - JULY 28TH, 2022**

Deadline for submissions: January 24, 2022 11:59 PM.

The Pan American Ceramics Congress will have a symposium on Materials Approaches to Art, Archaeology and Architecture in the Americas, organized by the Art, Archaeology and Conservation Science (AACS) Division. This symposium will cover a wide range of materials analyses applied on art, archaeology, and architecture. Topics of interest are non-invasive and micro-destructive techniques, reconstruction of technology, dating techniques, artifact sourcing, deterioration and conservation of cultural heritage materials, monitoring deterioration, and general technical studies. Topics related to the use of cultural heritage as a means to improve diversity in the field of materials science education are also welcome. This symposium is open to conservation scientists, archaeologists, conservators, and other professionals working with cultural heritage materials. Special consideration will be given to submissions related to the cultural heritage of the Americas.

ACerS is also pleased to announce the addition of a hybrid option for PACC-FMA '22 to allow participation by individuals who cannot attend in-person due to travel restrictions. We plan to provide a hybrid solution that will incorporate pre-recorded talks from virtual attendees into the live on-site programming. All live sessions will be recorded for all attendees to view at the conclusion of the live conference, available until September 30, 2022.

AACS has additional support funding to assist students and early career professionals to attend the conference. For this funding special consideration will be given to presenters from Latin America. Please contact the symposium organizers for more details.

For more information or to submit an abstract, please visit the American Ceramics Society website:

[https://ceramics.org/event/pan-american-ceramics-congress-and-ferroelectrics-meeting-of-the-americas-pacc-fmas-2022#:~:text=The%20Pan%20American%20Ceramics%](https://ceramics.org/event/pan-american-ceramics-congress-and-ferroelectrics-meeting-of-the-americas-pacc-fmas-2022#:~:text=The%20Pan%20American%20Ceramics%20)

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**5TH INTERNATIONAL CONFERENCE ON
INNOVATION IN ART RESEARCH AND
TECHNOLOGY (INART 2022), PARIS,
TUESDAY 28 JUNE - FRIDAY 1ST JULY 2022**

Dear Colleagues,

Thank you to all those who have already submitted their abstracts to the 5th International Conference on Innovation in Art Research and Technology (inArt 2022) to be held in Paris, on Tuesday 28 June to Friday 1st July 2022.

To allow late submissions, the **deadline for abstract submission** has been **extended to Monday, January 10, 2022**, after the Christmas break.

The conference inArt 2022 aims to gather professionals from all the disciplines concerned by the study and the preservation of cultural heritage materials: chemists, physicists, geologists, biologists, conservation scientists, conservators, historians, archaeologists, etc. Ancient materials require interdisciplinary approaches and the development of specific analytical methodologies due to their complexity and heterogeneity, the need for non-invasive analyses and limited sampling, or to simulate alteration processes. The conference wish to stimulate discussions between the participants around three main topics related to the scientific analysis of ancient artefacts: knowledge of the manufacturing techniques; understanding of degradation processes with the use of innovative conservation strategies; and the development of new methodologies and data treatments.

Important dates:

Abstract Submission (4000 characters): **extended to January 10th, 2022.**

Notification of abstract acceptance: early March, 2022.

Registration: early registration fees before April 30, 2022.

Conference: June 28th - July 1st 2022.

Further information for abstract submission, conference fees, online registration procedures, social events are available on the conference website:

<https://inart2022.sciencesconf.org/>

Looking forward to your abstract submission and to seeing you in June 2022 in Paris,

The organising committee

Ludovic BELLOT-GURLET, Anne-Solenn LE HÔ, Delphine NEFF, Laurianne ROBINET, Aurélie TOURNIÉ

Contact: inart2022@sciencesconf.org

ΘΕΣΕΙΣ ΕΡΓΑΣΙΑΣ/ΥΠΟΤΡΟΦΙΕΣ –
JOB VACANCIES/FELLOWSHIPS

RESEARCH ASSISTANT IN
ARCHAEOLOGICAL SCIENCE, UNIVERSITY
OF CAMBRIDGE

Dear colleagues,

I'm looking for an aspiring archaeological scientist who has self-drive, is keen to learn on the job, and is good team player, to work closely with my team on a variety of projects, primarily related to materials and technologies. I offer training, a wide range of research opportunities and networks, the chance to travel, an amazing work environment, and a full-time job for 5 years. The post will be based at the University of Cambridge, UK.

Is that person you? Do you know that person? I would be grateful for any leads.

Further details here: <https://www.jobs.cam.ac.uk/job/32442/>

Best wishes,

Marcos

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1-YEAR RESEARCH ASSISTANT IN ARCHAOMETALLURGY AT THE CYPRUS INSTITUTE

Dear All,

I am looking for a **Research Assistant in Archaeometallurgy**, for 1 year, to help me establishing a basic documentation and 'infrastructure' in my collection of samples and papers, and to prepare and process some samples, too. For details of the position [click on the link](#). Deadline is 10 January 2022, but early applications are recommended.

The position pays the same rate as a PhD student would receive at CyI (c. €1,200/month), with c 21 days annual leave (plus public holidays). Unfortunately, the salary is not enough for non-EU candidates to fulfil the requirements of the local migration department to issue work visa; thus, only people with EU nationalities are realistically eligible for this position. Sorry for that...

Thilo

*I may be emailing at odd hours – but
I do NOT expect an out-of-hours or weekend reply!*

Dr.-Ing. habil. Thilo Rehren FSA
A.G. Leventis Professor in Archaeological Sciences
Director, Science and Technology in Archaeology and Culture Research Center
The Cyprus Institute
Nicosia, Cyprus

<https://www.cyi.ac.cy/>
<https://www.cyi.ac.cy/index.php/starc/about-the-center/center-overview.html>
Th.Rehren@cyi.ac.cy
<https://cyi.academia.edu/ThiloRehren>

VACANCY. DOCTORAL SCHOLARSHIP.
RESEARCH ON FRIABLE MEDIA IN ART ON
PAPER (PASTEL, CHARCOAL, CHALK), KU
LEUVEN AND ROYAL MUSEUM OF FINE
ART, BRUSSELS

FRIABLE - Brain Belpo Project - Heritage Science
www.kuleuven.be/personeel/jobsite/jobs/...

KU Leuven together with the Royal Museum of Fine Arts Brussels (RMFAB), is looking for a 4-year full-time PhD candidate to perform research in context of the FRIABLE project: FRIABLE- Valorisation and Preservation of friable medium on paper. Case Study on the collection of the Royal Museums of Fine Arts of Belgium. This project aims at assessing the fragility of modern works on paper made with friable media (i.e. pastel, charcoal and chalk), at developing a protocol to guarantee their preservation and to train professionals for a better preventive conservation of those types of works. Adopting a holistic approach, it will merge together knowledge from (technical) history of art, conservation and engineering for a better understanding of the condition state of a national collection and a more effective risk management.

Project

The PhD researcher will focus on technical art history and research the fragility of friable art on paper and their media (i.e. pastel, charcoal and chalk) of 19th-20th century Belgian artists. The presence of a large number of pastels and charcoals, used on their own or together with other media, in the collection of the RMFAB and their early acquisition show the importance of these techniques in Belgian Art History of the 19th and 20th Centuries. The foundation in 1900 of a group uniting watercolourists and pastellists, the Societe nationale des aquarellistes et pastellistes, underpins equally their importance. No systematic research onto this part of the collection has ever been conducted and published.

The PhD researcher will:

- Complete, and successfully defend a doctoral thesis within 4 years;
- Present research results at international and national conferences and colloquia;
- Contribute to the organization of events, activities and other tasks related to the FRIABLE project and its research (colloquia, team events, visits from external experts etc.);
- Contribute to the KU Leuven Book Heritage Lab and VIEW by participating in its regular programme of academic activities and undertaking administrative activities.

Profile

We are looking for a candidate who has:

- A Master in Art History or Conservation-Restoration of Graphic Materials or a related discipline;
- A solid training in technical art history;
- Proven academic research skills;
- Eagerness to work in an interdisciplinary research team and to conduct interdisciplinary research within the FRIABLE project;
- Eagerness to publish international articles and write a dissertation;
- Excellent command of English and academic writing skills;
- The successful candidate will produce a complete and acceptable doctoral thesis proposal.

Salary: 40.000 - 45.000 Euro/year bruto

Deadline: 19 January 2022.

More information and application website

www.kuleuven.be/personnel/jobsite/jobs/...

ΑΝΑΚΟΙΝΩΣΕΙΣ - ANNOUNCEMENTS

APPLICATIONS FOR THE ADVANCED MASTERS IN STRUCTURAL ANALYSIS OF MONUMENTS AND HISTORICAL CONSTRUCTIONS

Dear Colleagues,

Please find below information about the Advanced Master Course in Structural Analysis of Existing Buildings, Monuments and Historical Constructions.

I kindly invite you to disseminate this information to anybody who could be interested in applying.

After 10 years of European funding, 430 students from 70 countries, applications for the **Advanced Masters in Structural Analysis of Monuments and Historical Constructions** are opened up to January 20, 2022. This is the leading international course on conservation of heritage structures, **winner of the 2017 European Union Prize for Cultural Heritage "Europa Nostra"**, and a unique opportunity to meet people from all over the world.

This Master Course, which is running its 15th edition, is organized by a Consortium of leading European Universities/Research Institutions in the field, composed by **University of Minho** (coordinating institution, Portugal), the **Technical University of Catalonia** (Spain), the **Czech Technical University in Prague** (Czech Republic), the **University of Padua** (Italy) and the **Institute of Theoretical and Applied Mechanics of the Czech Academy of Sciences** (Czech Republic).

The course combines the most recent advances in research and development with practical applications.

A significant number of **scholarships**, ranging from 4,000 to 13,000 Euro, are available to students of any nationality.

Please find full details on the MSc programme, as well as electronic application procedure, in the SAHC website at www.msc-sahc.org

Visit also the SAHC blog <http://blog.msc-sahc.org> and www.linkedin.com/school/sahcmasterscourse/

Yours sincerely,
Paulo B. Lourenco

Course Coordinator

Editor of the International Journal of Architectural Heritage: Conservation, Analysis, and Restoration

Check out the first book resulting from the SAHC

Historic Construction and Conservation: Materials, Systems and Damage

Publisher: Routledge

More info: [link](#)



THE MUSEUM OF CYCLADIC ART AND THE CYCLADIC ART FOUNDATION IN NEW YORK "PETROS D. GONEOS MEMORIAL AWARD" FOR STUDIES ON THE CULTURE OF THE CYCLADES ACADEMIC YEAR 2022-2023

The Museum of Cycladic Art, in conjunction with its research activities, and the Cycladic Art Foundation (Cycladic Art Foundation, New York) announce the Petros D. Goneos Memorial Award for Studies on the Culture of the Cyclades, an academic fellowship which is funded by an endowment established in the memory of Petros D. Goneos (1968-2019), former active member and Vice President of the Cycladic Art Foundation in New York.

The award is destined to encourage, support, and promote high quality research from new researchers who focus on topics related to the culture of the Cyclades from the Neolithic up to the Post-Byzantine period (up to 1830) or its perception to the modern times. Proposed research will be approached through disciplines as Archaeology, Anthropology, and Art History, as well as natural and physical sciences.

read more

<https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcycladic.gr%2Fen%2Fpage%2Fchrimatiko-epathlo-sti-mnimi-petrou-d-goneou&data=04%7C01%7Caegeanet%40lists.ku.edu%7C4983284359274c5d113008d9bbbed594a%7C3c176536afe643f5b96636feabbe3c1a%7C0%7C0%7C637747450390292607%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000&sd=IKO0NQ6%2BOP3E%2BfopuhVZo6RcWdXu8wKGgzpTQP3rcrw%3D&reserved=0>

→ About the Award

<https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcycladic.gr%2Fen%2Fpage%2Fchrimatiko-epathlo-sti-mnimi-petrou-d-goneou&data=04%7C01%7Caegeanet%40lists.ku.edu%7C4983284359274c5d113008d9bbbed594a%7C3c176536afe643f5b96636feabbe3c1a%7C0%7C0%7C637747450390292607%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000&sd=IKO0NQ6%2BOP3E%2BfopuhVZo6RcWdXu8wKGgzpTQP3rcrw%3D&reserved=0>

The award is offered annually and covers a single academic year, from September until June. It includes \$5,000 given to a single successful applicant or group of applicants with a common project. Payment will be provided as one single sum at the beginning of the academic year in September. Successful applicants are not eligible to apply again for a second year of funding.

→ Eligibility

<https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcycladic.gr%2Fen%2Fpage%2Fchrimatiko-epathlo-sti-mnimi-petrou-d-goneou&data=04%7C01%7Caegeanet%40lists.ku.edu%7C4983284359274c5d113008d9bbbed594a%7C3c176536afe643f5b96636feabbe3c1a%7C0%7C0%7C637747450390292607%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000&sd=IKO0NQ6%2BOP3E%2BfopuhVZo6RcWdXu8wKGgzpTQP3rcrw%3D&reserved=0>

[08d9bbed594a%7C3c176536afe643f5b96636feabbe3c1a%7C0%7C0%7C637747450390292607%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikl1haWwiLCJXVCI6Mn0%3D%7C3000&sd=IKO0NQ6%2BOP3E%2BfopuhVZo6RcWdXu8wKGzptQP3rcrw%3D&reserved=0](https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcycladic.gr%2Fen%2Fpage%2Fchrimatiko-epathlo-sti-mnimi-petrou-d-goneou&data=04%7C01%7Caeganet%40lists.ku.edu%7C4983284359274c5d113008d9bbed594a%7C3c176536afe643f5b96636feabbe3c1a%7C0%7C0%7C637747450390292607%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikl1haWwiLCJXVCI6Mn0%3D%7C3000&sd=IKO0NQ6%2BOP3E%2BfopuhVZo6RcWdXu8wKGzptQP3rcrw%3D&reserved=0)

Applicants from all countries, pursuing PhD research or having completed their doctorate within the past ten years (after September 01, 2012) are eligible to apply. Applicants are also encouraged to apply for joint collaborative and interdisciplinary projects. In this case, the award amount remains the same for a group versus an individual award winner.

→ Application Information

<https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcycladic.gr%2Fen%2Fpage%2Fchrimatiko-epathlo-sti-mnimi-petrou-d-goneou&data=04%7C01%7Caeganet%40lists.ku.edu%7C4983284359274c5d113008d9bbed594a%7C3c176536afe643f5b96636feabbe3c1a%7C0%7C0%7C637747450390292607%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikl1haWwiLCJXVCI6Mn0%3D%7C3000&sd=IKO0NQ6%2BOP3E%2BfopuhVZo6RcWdXu8wKGzptQP3rcrw%3D&reserved=0>

Applicants should send to the email address fellowships@cycladic.gr

a research proposal of no more than 1,000 words (bibliographies and references do not count toward the word limit) and a curriculum vitae documenting qualifications to conduct the proposed research.

Applicants should also provide the names and contact information of two referees who are expected to independently send their reference letters directly to the Museum (fellowships@cycladic.gr).

The deadline for submitting applications is Friday, February 25, 2022 at midnight (Athens Time). Recommendation letters are due no later than Friday, March 04, 2022 at midnight (Athens Time).

Read more →

<https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fcycladic.gr%2Fen%2Fpage%2Fchrimatiko-epathlo-sti-mnimi-petrou-d-goneou&data=04%7C01%7Caeganet%40lists.ku.edu%7C4983284359274c5d113008d9bbed594a%7C3c176536afe643f5b96636feabbe3c1a%7C0%7C0%7C637747450390292607%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikl1haWwiLCJXVCI6Mn0%3D%7C3000&sd=IKO0NQ6%2BOP3E%2BfopuhVZo6RcWdXu8wKGzptQP3rcrw%3D&reserved=0>

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[Instagram]

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Photo. Paris Tavitian © Museum of Cycladic Art

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CALL FOR PAPERS: IEEE BITS SPECIAL ISSUE ON "INFORMATION PROCESSING IN ARTS AND HUMANITIES"

We are organising a Special Issue in 'Information Processing in Arts and Humanities' to be published in IEEE Bits (www.itsoc.org/bits). This is a new magazine that is being launched by IEEE that intends to cover various topics in and applications of information processing.

This special issue intends to showcase how information processing tools (broadly defined, hence encompassing artificial intelligence, signal and image processing powered by machine learning, and more) can be used to address challenges arising in the arts and humanities.

It also intends to bridge the gap between the information processing and the arts and humanities communities, by gathering representative contributions from interdisciplinary teams spanning both fields, in order to raise the visibility of this emerging interdisciplinary space. We specifically encourage contributions from interdisciplinary teams composed of information processing researchers and arts or humanities scholars.

The call for papers containing specific instructions along with timelines is attached or can be sent on request.

Catherine Higgitt
Principal Scientist
National Gallery
London
catherine.higgitt@ng-london.org.uk



PROF. EMER. VASSOS KARAGEORGHIS **1929-2021**

Dear colleagues

It is with great sadness that I write to inform you that Prof. Emer. Vassos Karageorghis passed away yesterday. Here is the text I prepared with Giorgos Papasavvas and Demetris Michaelides on behalf of the University of Cyprus.

The University of Cyprus bids farewell to Emeritus Professor Vassos Karageorghis, the first Professor of Archaeology, and founder of the Archaeological Research Unit of the university. Hard-working and tireless, charismatic, with unparalleled leadership skills, generous, resourceful and imaginative, a man of works and deeds, a profound connoisseur of Cypriot, and not only, archaeology. A man whose great vision for the promotion and study of the cultural heritage of his country, leaves behind a tremendous and long-lasting oeuvre. A man of high education and paideia, and an unsurpassed scientific and academic output, he leaves behind a work that will remain indelible in the memory of all of us.

Vassos Karageorghis studied archaeology at the Institute of Archaeology of the University of London (1948-1952). He received his doctorate from the same university in 1957. After completing his studies, he returned to Cyprus and began a brilliant career as an archaeologist at the Department of Antiquities, which he served for 37 years. In 1963 he succeeded Porphyrios Dikaïos as the Director of the Department of Antiquities of the newly established Republic of Cyprus. He held this position until his retirement in 1989. During this period the Department of Antiquities flourished. Many monuments of Cyprus were uncovered and brought to the fore during his leadership, while archaeological museums were established in all districts of the island. With the power given to him by the Antiquities Law, Vassos Karageorghis fought many battles to save archaeological sites which were under threat by the burst in building development brought by the booming tourism industry after the island's Independence.

But the biggest battle he fought, and won, was the promotion of Cypriot Archaeology within the international scientific community. Through his archaeological excavations and the consequent, impressive discoveries (e.g. the royal necropolis of Salamis, the monumental temples of Kition, the settlements of the Late Bronze Age in Pyla and Maa, and many others), the unsurpassed high number of publications, monographs and scholarly articles, and the many lectures he gave abroad on subjects of Cypriot archaeology, Vassos Karageorghis succeeded in elevating and promoting the status of Cypriot archaeology at an international level.

At the same time, he kept the scientific field open by inviting eminent foreign archaeologists to conduct excavations in Cyprus. In turn, these archaeologists expanded the archaeology of our island even more, taught it in their universities and discussed it in international conferences and scientific publications, consolidating its international character and orientation. Many colleagues remember the warm hospitality he always extended together with his wife Jacqueline Karageorghis, herself also a prominent

archaeologist. In 1974, when, after the Turkish invasion, many of the foreign missions found their excavations under Turkish occupation, Karageorghis found and proposed new sites so that they could resume their work already in the following year. Their successors continue to work on the island to this day. This alone would be enough to demonstrate the great contribution of Vassos Karageorghis to his country.

But Vassos Karageorghis did not stop there. He organized a series of international scientific conferences that dealt with a wide range of topics, and brought distinguished archaeologists from all over the world to Cyprus. They thus formed long lasting relationship with the island and promoted its cultural heritage in their own countries. He was always willing to meet young archaeologists and support them in the early years of their careers. He launched the publication of the annual "Chronique des fouilles et découvertes archéologiques à Chypre" in the French scientific journal Bulletin de Correspondence Hellenique of the French Archaeological School at Athens, and upgraded the Report of the Department of Antiquities, Cyprus, making it a well-respected international scientific journal. At the same time, he published more than 125 books in various languages, and more than 485 articles, which were widely read and will continue to be read in the decades to come.

In 1989 he was appointed Director of the "Anastasios G. Leventis" Foundation, which he served until 2010. His contribution from this position was just as ambitious and inspired. During his tenure at the foundation, many important collections of Cypriot antiquities, that were kept in the largest and most important museums in the world (British Museum, the Louvre, the Metropolitan Museum of Art, etc.), were re-exhibited and published. With the support of the Leventis family, Vassos Karageorghis established the Foundation's scholarship scheme which supported many young archaeologists, both Cypriot and foreign, and enabled them to complete their postgraduate studies and doctoral dissertations, often with topics around Cyprus, thus promoting once again the archaeological research on the island.

From 1989 to 1992, Vassos Karageorghis served as an advisor to the President of the Republic of Cyprus, Mr. George Vasileiou, and from this position he played an important role in the establishment of the Archaeological Research Unit (ARU) in 1991 at the newly founded University of Cyprus. His relationship with the University Cyprus has always been very tight, and in many ways it is thanks to him that archaeology has become such a successful discipline in the first academic institution of the country. In 1992 he was elected Professor of Archaeology at the University of Cyprus and appointed director of the Archaeological Research Unit, a position he held until 1996. Today, almost thirty years later, there are ten members of academic staff and 17 postdoctoral researchers working at the ARU, which since 1996 is also a part of the Department of History and Archaeology.

Although he retired from the University of Cyprus in 1996, his relations with the country's highest academic institution, of which he was elected Emeritus Professor, remained close. That is why he decided to donate his personal library, one of the most important archaeological libraries on the island, to the University of Cyprus. He continued to collaborate with many of the members of the ARU in research programs, conferences, and publications.

Vassos Karageorghis served archaeology and culture from other places as well. From 2013 to 2019 he was an Associate Professor at the Cyprus Institute. In 2016 he was appointed as one of the four founding members of the Cyprus Academy of Sciences, Letters and Arts, of which he became, in 2019, one of the four Transitional Regular Members.

For this brilliant career and his contribution to the archaeology of Cyprus but also to the discipline of archaeology in general, he was widely recognized and received the highest awards by many universities and research institutes, as well as by foreign Academies, such as the Academy of Athens, the British Academy, the French Academy, the Swedish Academy, and the Academia dei Lincei (Italy). He was also honored with the prize of the Société des Études Grecques de la Sorbonne (1966), the RB Bennet Commonwealth Prize (1978), the Onassis Prize "Olympia" (1991), and the International Prize of Venice "I Cavalli d'Oro di San Marco" (1996). In May 2008, the President of the Hellenic Republic, Karolos Papoulias, awarded him the Brigadier General of the Order of Honor, and in 2011 he received the State Award for Archaeology of Cyprus, the highest award given by the Republic of Cyprus for the Preservation and Promotion of the Cultural Heritage.

Cyprus and the University of Cyprus are poorer today because they lost one of the most important people of culture. Vassos Karageorghis, however, has left behind a tremendous oeuvre and has contributed greatly to the consolidation of Cypriot archaeology both locally and internationally. The University of Cyprus owes him a lot and will always recognize the legacy he leaves behind.

He will be sorely missed. I owe him so much and I will always remember him.

All the best

Lina Kassianidou

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ARCHAEOLOGICAL SOIL AND SEDIMENT MICROMORPHOLOGICAL COURSE

Dear colleagues,

The Malcolm H. Wiener Laboratory for Archaeological Science is offering an intensive **week-long course in Archaeological Micromorphology**. Dr. Panagiotis (Takis) Karkanas, Director of the Wiener Laboratory, and Dr. Paul Goldberg, Senior Visiting Professor, Institut für Naturwissenschaftliche Archäologie (INA), University of Tübingen, will lead the course, which will primarily focus on deciphering site formation processes and micro-stratigraphy. Students will receive instruction in optical mineralogy, description, and interpretation of micromorphological thin sections based on analysis of soil fabrics and sedimentary microstructures.

Training will include the study of:

- Soils and pedogenic processes
- Natural processes in archaeological sites (e.g. water and debris flows, wind-blown sediment, standing water sediment)
- Biological sediments (e.g., dung, coprolites, guano)
- Anthropogenic processes (e.g., burning, stabling, living and constructed floors, dumping and filling, trampling, raking, building materials)
- Post-depositional alterations (e.g., chemical diagenesis, bioturbation)

A maximum of 8 students will be accepted for the course. Preference is given to advanced students with a background in geoarchaeology, and preferably some exposure to optical mineralogy as well.

Training fee is 350 euros for the entire week. Accommodation is not provided, but we will offer recommendations and assistance to course participants in order to arrange accommodation themselves.

The course will take place from June 6-10, 2022.

Applications will be submitted no later than March 1, 2022 via the online application form: <https://ascsa.submittable.com/submit/154931/archaeological-soil-and-sediment-micromorphology-course>.

Applications will include one paragraph outlining the candidate's background and why the candidate is interested in participating in the course, a CV, and names and email addresses of two referees. Participants who successfully complete the course of instruction will receive a certificate detailing the content of the course.

For further information or questions, please contact Dr. Panagiotis (Takis) Karkanas at tkarkanas@ascsa.edu.gr

Best wishes

Paul and Takis

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AMERICAN SCHOOL OF
CLASSICAL STUDIES AT ATHENS

WIENER LAB FIELD SCHOOL ON SITE FORMATION, STRATIGRAPHY, AND GEOARCHAEOLOGY IN THE ATHENIAN AGORA

Dear colleagues,

The Malcolm H. Wiener Laboratory for Archaeological Science (ASCSA) in collaboration with the ASCSA Excavations at the Athenian Agora offers a full week-long Field School on Site Formation, Stratigraphy, and Geoarchaeology in the Athenian Agora. Dr. Panagiotis (Takis) Karkanas, director of the Wiener Laboratory and Paul Goldberg, Senior Visiting Professor, Institut für Naturwissenschaftliche Archäologie (INA), University of Tübingen, will supervise the intensive field school. The course will take place from **May 21 to May 28, 2022**.

Deadline: February 15, 2022

Registered students will be involved in interdisciplinary field research in the Athenian Agora primarily focused on archaeological context, geoarchaeology, and material sciences. Through field observations, laboratory analysis, and lectures, the students will receive instruction in the study and analysis of archaeological sediments and deposits, as well as gain experience in the recording of stratigraphy, and the understanding of site formation processes. Please note that some accepted participants from the postponed 2020 season will be part of the 2022 program. Therefore, **a maximum of 5 additional students will be accepted for the course**. Preference is given to advanced students and post-docs with a background in archaeology, and preferably some exposure to the natural sciences as well.

The cost for Room and Board is 350 euros for the entire week. Travel costs to Greece and to the site are not included.

Applications should be submitted no later than February 15th via the online application form at: <https://www.ascsa.edu.gr/programs/international-field-school-on-archaeological-science>

Application materials include one paragraph explaining why the candidate is interested in participating in the course, a CV, a list of grades (unofficial transcript), and names and email addresses of two referees.

Participants who successfully complete the course of instruction will receive a certificate detailing the content of the field school.

Textbooks: *Reconstructing Archaeological sites* 2019 by Panagiotis Karkanas and Paul Goldberg (Wiley Blackwell), *Practical and Theoretical Geoarchaeology* 2006 by Paul Goldberg and Richard I. Macphail (Blackwell)) (a new addition is expected in early 2022) and *Microarchaeology* 2010 by Stephen Weiner (Cambridge University Press).

A syllabus will be emailed 3 weeks before the start of the field school.

For further information or questions, please contact Dr. Panagiotis (Takis) Karkanas at tkarkanas@ascsa.edu.gr

Apologies for the multiple duplicate emails.

Best wishes

Paul and Takis

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AMERICAN SCHOOL OF
CLASSICAL STUDIES AT ATHENS

INTERNET SITES

SPECTACULAR 3D VIDEO DEPICTS ANCIENT ATHENS AS NEVER SEEN BEFORE, BY TASOS KOKKINIDIS

A realistic reconstruction of ancient Athens. Credit: Ancient Athens 3D

A spectacular 3D video reconstruction of ancient Athens in the late 5th century BC takes the viewer over the city pinpointing its monuments, markets, temples, and neighborhoods.

The video made by Ancient Athens 3D and released in November presents the city the way it would look in the years before the defeat in the Peloponnesian War in 404 BC.

The city of Athens was completely destroyed by the Persian army in the years 480-479 BC. In the years that followed, the Athenians managed to rebuild their city and by the middle of the 5th century BC, the statesman and general Pericles ordered an extensive construction program that made Athens the center of classical Greece.

Since Athens is considered the birthplace of democracy, Pericles must be considered its father. By any measure, he was without a doubt the first great statesman in the entire world, making Athens a model city-state worthy of emulation by all the others.

Pericles led Athens from 461 to 429 BC, in a period historians term “The Golden Age of Pericles,” firmly establishing the rule of democracy in the city.

It was the time when the great temples on the Acropolis hill were built, including the Parthenon and Erechtheion and many buildings of public administration for the Athenian Democracy.

Art, literature, and thought flourished in Ancient Athens

In Athens, the fifth century BC served as a period in which art, literature, and thought flourished, and it ultimately defines our image of Ancient Greece.

As Patrick Garner, the author of three novels about Greek gods said, in the 21st century much of what the world thinks of as ancient Greece is based on 5th century B.C. Greek architecture. We visualize the Parthenon atop the Acropolis in Athens, which was completed in 438 B.C. at the height of the Athenian empire.

We also picture the Erechtheion with its iconic Porch of the Maidens — six elegant Caryatids that for 2400 years have stoically faced the Parthenon.

But these marvels were hardly isolated achievements, and are just a hint of the intellectual accomplishments of classical Greece, Garner added.

The video presents almost all of the important monuments, spaces, and areas within the city.

Ancient Athens 3D says that the 3D reconstructions were made after the most recently published international research and a great effort was made to be as accurate as possible. Of course, simplifications and artistic license are present in order to technically manage a big project like this one, it adds.

Please visit the site: <https://greekreporter.com/2021/12/12/spectacular-3d-video-depicts-ancient-athens-as-never-seen-before/>

ARTIST SHOWS HOW ALL THE ROMAN EMPERORS LOOKED BY USING FACIAL RECONSTRUCTION, AI, AND PHOTOSHOP

If you've ever set foot in a museum of Greek and Roman art, you've probably seen the rows of tranquil-looking concrete busts. They do, however, have no pupils in the eyes, lack any sort of color, and in general, get kinda repetitive after the third and fourth display hall.

But the artist named Haround Binous is bringing the dusty emperors back to life in a series of hyper-realistic illustrations. The guy from Université de Lausanne, Switzerland is combining facial recognition AI, Photoshop, and historical references to revive all the Roman emperors, from Augustus to Valentinian III.

The result is so precise and true to life, these ancient dudes with luscious curls and sun-kissed tans could easily pass as A-list Hollywood actors off duty. I mean, look at Augustus—is that you, Daniel Craig?

Please visit the site: <https://dunyanewsss.blogspot.com/2020/08/artist-shows-how-all-roman-emperors.html> [Go there for a slew of them!]

ΝΕΕΣ ΕΚΔΟΣΕΙΣ – NEW PUBLICATIONS

TELESTES - AN INTERNATIONAL JOURNAL **OF ARCHAEOLOGICAL AND** **ARCHAEOLOGY OF SOUND ISTITUTI** **EDITORIALI E POLIGRAFICI** **INTERNAZIONALI, PISA - ROMA**

Link: <http://telestes.libraweb.net>

Direttore/Editor in chief: ANGELA BELLIA, National Research Council, IT

CALL FOR PAPERS «TELESTES» seeks to fill a gap in current scholarly publications and specialist periodicals on the archaeological evidence of musical and dance interest. It also aims to place musical and choral performances of the past into one clearly defined space and event in order to interpret their cultural significance, both religious and social, and to understand what music and making music and dance meant in ancient societies. Furthermore, the Journal publishes papers on the study of sound and hearing along with related sensorial aspects in archaeological contexts and on past soundscapes and sonic fabrics (anthrophony, biophony, and geophony): this includes subject areas that range from the behaviour of sound in a sonic space and aural architecture to auditory experience and physical acoustics, as well as auditory archaeology and the importance of sound as a medium of social interaction in the past.

The Journal welcomes research on the broadly defined Mediterranean region and from other areas of the world, such as North Europe, Central and South America, Africa, Southeast Asia, and the Pacific Rim. Contributions pertaining to different periods are welcome.

Cross-disciplinary and multi-disciplinary approaches would be particularly appreciated.

The preferred language for the contributions is English, but other languages (including German, French, Italian and Spanish) are acceptable.

At this stage, the goal for the Journal is to publish one issue per year with 5-6 contributions, with a total of ca. 200 pp. The preferred length for the contributions is 8,000 words. The format of the Journal will be 21,5x31cm. The Journal will be published in both print and digital formats, the former in black and white and the latter in colour. The digital issue will be available on www.libraweb.net. Manuscripts should be sent to angbellia@gmail.com and will be subject to peer review by two anonymous readers. The deadline for the submission of manuscripts for the first issue is 31 March 2022.

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PREDYNASTIC BEER PRODUCTION, DISTRIBUTION, AND CONSUMPTION AT HIERAKONPOLIS, EGYPT

Journal of Anthropological Archaeology
Volume 64, December 2021, 101347

Beer was a staple food, but also served a variety of social functions in the political economy of Ancient Egypt. Recent excavations at Hierakonpolis, a major site of Egypt's Pre- and Early Dynastic period, have revealed large-scale brewery installations, suggesting that the beverage played a significant role in the development of complex society and the expression of power and status, with collateral impact on craft specialization. However, there is as yet no definite consensus on how beer was produced, distributed or consumed in Predynastic Egypt.

To address this gap, this research applies microfossil residue analyses on pottery fragments recovered at two different areas at Hierakonpolis: from a midden near the Predynastic beer production site at Locality HK11C; and from the Second Dynasty ceremonial enclosure of King Khasekhemwy. The results provide the first scientific evidence for a long tradition of beer jars—pottery vessels specifically for and symbolic of beer—beginning in the early Naqada II phase of the Predynastic period. The results suggest that beer production contributed to the economic and ideological integration of society, the rise of the elite, and the cultural unification that took place leading up to the consolidation of the centralized political state.

Please visit the site:

<https://www.sciencedirect.com/science/article/abs/pii/S0278416521000805> [See also <https://vinepair.com/booze-news/ancient-egyptian-beer-discovered/>]

THE RISE OF METALLURGY IN EURASIA - EVOLUTION, ORGANISATION AND CONSUMPTION OF EARLY METAL IN THE BALKANS, BY MILJANA RADIVOJEVIĆ, BENJAMIN ROBERTS, MIROSLAV MARIĆ, JULKA KUZMANOVIĆ-CVETKOVIĆ, THILO REHREN

Paperback; 205x290mm; 698pp; 340 figures; 70 tables (colour throughout). 806 2021. [Available both in print and Open Access](#). Printed ISBN 9781803270425. Epublication ISBN 9781803270432.

The Rise of Metallurgy in Eurasia is a landmark study in the origins of metallurgy. The project aimed to trace the invention and innovation of metallurgy in the Balkans. It combined targeted excavations and surveys with extensive scientific analyses at two Neolithic-Chalcolithic copper production and consumption sites, Belovode and Pločnik, in Serbia. At Belovode, the project revealed chronologically and contextually secure evidence for copper smelting in the 49th century BC. This confirms the earlier interpretation of c. 7000-year-old metallurgy at the site, making it the earliest record of fully developed metallurgical activity in the world. However, far from being a rare and elite practice, metallurgy at both Belovode and Pločnik is demonstrated to have been a common and communal craft activity.

This monograph reviews the pre-existing scholarship on early metallurgy in the Balkans. It subsequently presents detailed results from the excavations, surveys and scientific analyses conducted at Belovode and Pločnik. These are followed by new and up-to-date regional syntheses by leading specialists on the Neolithic-Chalcolithic material culture, technologies, settlement and subsistence practices in the Central Balkans. Finally, the monograph places the project results in the context of major debates surrounding early metallurgy in Eurasia before proposing a new agenda for global early metallurgy studies.

About the Authors

Miljana Radivojević holds the Archaeomaterials Lectureship at the UCL Institute of Archaeology (UK), where she graduated in Archaeometallurgy. She has spent more than 20 years publishing on early metallurgy in the Balkans and southwest Asia and the role of aesthetics in the invention of novel technologies. ;

Benjamin Roberts has spent over 20 years researching and publishing on European Copper and Bronze Age archaeology and frequently metallurgy and metal objects across Europe. He co-edited with Chris Thornton *Archaeometallurgy in Global perspective: Methods and Syntheses* (2014) and is currently leading Project Ancient Tin. ;

Miroslav Marić is a specialist in the Neolithic-Bronze Age of the central Balkans at the

Institute for Balkan Studies, Serbian Academy of Sciences and Arts, Serbia. He is the field director of the Gradište Idoš project. ;

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ΕΙΔΗΣΕΙΣ - NEWS RELEASE

LONG-AGO VICTIM OF VESUVIUS MAY SHED LIGHT ON ANCIENT ROME

Archaeologists found the remains of a person buried at The newest remains emerged during a complex project to recover the ancient beachfront — hundreds of yards inland from the current shoreline — to make it accessible to the public, possibly by 2024.

The recent work unearthed more than 150 fragments of wood of various kinds, which had been catapulted by the force of the eruption toward the water. Along with sundry branches and trees, archaeologists also found beams, door and window frames, and what Mr. Camardo described as the largest preserved wooden board from the ancient Roman world: a “perfectly preserved” 34-foot plank that took 12 workers to move.

“We think it was probably used in scaffolding for buildings,” he said.

Mr. Petrone said that while new finds at Herculaneum were important from an archaeological, anthropological and historical point of view, the volcanological aspects were equally significant. With its crater just nine miles from the heart of Naples, Vesuvius, which erupted as recently as 1944, remains one of the most dangerous volcanoes in the world.

“Through the study of these victims, of these effects, you can have an idea of what can happen in the case of a future eruption of Vesuvius,” he said cheerfully. “The volcano is still active, and it is standing in an area with three million people.”

Please visit the site: <https://www.nytimes.com/2021/12/01/world/europe/vesuvius-victim-herculaneum-ruins.html> [Go there for pix]

GOLD JEWELLERY FROM THE TIME OF NEFERTITI FOUND IN BRONZE AGE TOMBS IN CYPRUS, BY CECILIA SJÖBERG

Archaeologists from the University of Gothenburg have concluded an excavation of two tombs in the Bronze Age city of Hala Sultan Tekke in Cyprus. The finds include over 150 human skeletons and close to 500 objects – including gold jewellery, gemstones and ceramics – from around 1350 BCE.

Contact: Peter Fischer peter@fischerarchaeology.se.

Since 2010, the New Swedish Cyprus Expedition (The Söderberg Expedition) has had several rounds of excavations in Cyprus. In 2018, archaeologists discovered two tombs in the form of underground chambers, with a large number of human skeletons. Managing the finds required very delicate work over four years, since the bones were extremely fragile after more than 3,000 years in the salty soil.

In addition to the skeletons of 155 individuals, the team also found 500 objects. The skeletons and ritual funeral objects were in layers on top of each other, showing that the tombs were used for several generations.

“The finds indicate that these are family tombs for the ruling elite in the city. For example, we found the skeleton of a five-year-old with a gold necklace, gold earrings and a gold tiara. This was probably a child of a powerful and wealthy family,” says Professor Peter Fischer, the leader of the excavations.

The finds include jewellery and other objects made of gold, silver, bronze, ivory and gemstones and richly decorated vessels from many cultures.

“We also found a ceramic bull. The body of this hollow bull has two openings: one on the back to fill it with a liquid, likely wine, and one at the nose to drink from. Apparently, they had feasts in the chamber to honour their dead.”

A message thousands of years old

One particularly important find is a cylinder-shaped seal made from the mineral hematite, with a cuneiform inscription from Mesopotamia (present day Iraq), which the archaeologists were able to decipher.

“The text consists of three lines and mentions three names. One is Amurru, a god worshiped in Mesopotamia. The other two are historical kings, father and son, who we recently succeeded in tracking down in other texts on clay tablets from the same period, i.e., the 18th century BC. We are currently trying to determine why the seal ended up in Cyprus more than 1000 kilometres from where it was made.”

Among the finds are the red gemstone carnelian from India, the blue gemstone lapis lazuli from Afghanistan and amber from around the Baltic Sea, which shows that the city had a central role for trade during the Bronze Age. The gold jewellery, along with

scarabs (beetle-shaped amulets with hieroglyphs) and the remains of fish imported from the Nile Valley, tell the story of intensive trade with Egypt.

Wide-ranging trading network

By comparing with similar finds from Egypt, the archaeologists were also able to date the jewellery.

“The comparisons show that most of the objects are from the time of Nefertiti and her husband Echnaton around 1350 BCE. Like a gold pendant we found: a lotus flower with inlaid gemstones. Nefertiti wore similar jewellery.”

The ceramic finds are also important.

“The way that the ceramics changed in appearance and material over time allows us to date them and study the connections these people had with the surrounding world. What fascinates me most is the wide-ranging network of contacts they had 3,400 years ago.”

The next step will be DNA analysis of the skeletons.

“This will reveal how the different individuals are related with each other and if there are immigrants from other cultures, which isn’t unlikely considering the vast trade networks,” says Peter Fischer.

All of the objects from the excavation belong to Cyprus and are stored in museums in Nicosia and Larnaca. Some of the most important finds are already on display. Teresa Bürge, post-doctoral researcher in archaeology at the University of Gothenburg, is responsible for documentation of the ceramics. She can be reached by email: teresa.burge@gu.se

The Bronze Age city of Hala Sultan Tekke is currently on UNESCO’s list to be named a World Heritage Site. The most recent report from the University of Gothenburg about the excavations was from 4 December 2020. 3,500-year-old place of worship with mass burials discovered.

Please visit the site: <https://www.gu.se/en/news/gold-jewellery-from-the-time-of-nefertiti-found-in-bronze-age-tombs-in-cyprus> [Go there for nice pix]

ARCHAEOLOGIST COMPARES ERUPTION AT ROMAN TOWN CLOSE TO POMPEII TO DROPPING OF WW2 ATOMIC BOMB

The partially mutilated remains of a Vesuvius victim, found on what would have been the beach of Herculaneum. Photograph: Supplied Angela Giuffrida

An Italian archaeologist has compared the impact of the AD79 eruption of Mount Vesuvius on Herculaneum – the ancient Roman beach town close to Pompeii – to the dropping of an atomic bomb on the Japanese city of Hiroshima during the second world war.

Such was the heat of the pyroclastic surge produced by Vesuvius – believed to have been between 400C and 500C – that the brains and blood of the Herculaneum’s victims instantly boiled.

“The remains of victims here have been found in a similar condition to those of Hiroshima,” said Domenico Camardo, an archaeologist at the Herculaneum conservation project. “You really get a sense of the horror and tragedy.”

Camardo was speaking as the partially mutilated remains of a Vesuvius victim, found on what would have been the beach of the ancient town in October, were shown to the press on Wednesday.

Archaeologists believe the man, thought to have been aged between 40 and 45, was killed only steps away from the sea as he tried to flee the eruption.

The remains of victims at Herculaneum were found in a similar condition to those at Hiroshima. Photograph: Angela Giuffrida/The Guardian

The man appeared to have been clutching what experts said was a small leather bag containing a wooden box, from which a ring, perhaps iron or bronze, is protruding.

“He was possibly escaping with his treasures,” said Nunzia Laino, a conservator who will be among the team analysing the remains once they are moved to a laboratory. “The objects found with the human remains are of a particular complexity. There are also fabric scraps, so they will have to be carefully extracted before studies can be done.”

The victim’s bones were also a reddish colour, which Francesco Sirano, director of Herculaneum archaeological park, said was the mark of the stains left by the man’s blood.

The discovery was made during the first archaeological dig at Herculaneum, a much smaller and less well-known site than neighbouring Pompeii, in almost three decades.

‘Sensational’: skeleton buried in Vesuvius eruption found at Herculaneum [Read more](#)

Excavations in the 1980s and 90s unearthed the well-preserved skeletons of more than 300 victims piled up in boat sheds, where they are believed to have been sheltering while they waited to be rescued by sea.

The remains of a soldier, who was believed to have been among the army of Pliny the Elder, the Roman naval commander who attempted to save the inhabitants of Pompeii and Herculaneum, were found in the 1980s, close to the most recent discovery.

Camardo said the eruption of Vesuvius hit Herculaneum in a different way to Pompeii.

“This is the crucial difference between the two,” he added. “Pompeii was destroyed by a rain of ash and lapillus, which buried it by three or four metres. Instead, Herculaneum was first destroyed by the pyroclastic cloud of a temperature of over 400 degrees. It burned trees, inhabitants and other forms of life.”

The city was subsequently hit “by six waves of volcanic mud that arrived like a flood and froze it under almost 20 metres of material”, Camardo added. “But this flood of mud, which then hardened, allowed the conservation of all the organic relics, as oxygen was not able to filter through ... so today we find things like items of food, which haven’t been found in Pompeii.”

The discoveries were made during the first archaeological dig at Herculaneum in almost three decades. Photograph: Supplied Advertisement

Herculaneum, which was rediscovered during the digging of a well in the early 18th century, is said to have been wealthier than Pompeii, and lavish villas decorated with frescoes and mosaic floors – including the House of the Bicentenary, which was found in 1938 – have been excavated.

Excavations have been particularly challenging as the site lies beneath the modern town of the same name. Other discoveries have included organic matter of fruit and bread as well as wooden furniture and ancient scrolls that were carbonised by the heat and ash.

Items of wooden furniture from homes and shops, as well as an inscription that belonged to a temple dedicated to the goddess of Venus, have also been discovered during the latest beach excavations.

Sirano expects to find the remains of further victims as excavations continue. Part of the beach area being excavated is expected to be opened to the public in 2024.

Please visit the site: <https://www.theguardian.com/science/2021/dec/01/eruption-of-vesuvius-on-herculaneum-like-hiroshima-bomb-pompeii>

THE RISE OF SILVER COINAGE IN THE ANCIENT MEDITERRANEAN, BY GIL DAVIS

Why was money invented? The question is seldom asked nowadays because money is all-pervasive in modern developed economies, but this was not always the case.

The traditional answer to why money was invented is based on Aristotle's contention in his *Nicomachean Ethics* that it was a development from barter, leading to his oft-quoted formulation that 'money is the measure of everything'. In other words, money was useful because it was a universal denominator but also, it was a virtually imperishable, easily portable, readily exchangeable store of wealth.

A sophisticated 'commodity exchange' was used in the great Eastern and Egyptian empires in which silver was valued against wheat, dates, figs, olives, copper, gold and other commodities. Silver was extracted in Western Asia from the fourth millennium BCE and used extensively in the form of Hacksilber (lumps of silver, often chopped up jewellery).

There is an argument in the literature as to whether this constituted a form of proto money, but thorough investigation of Hacksilber hoards in the southern Levant combined with elemental compositional analysis has shown that the weights and composition of the silver are too variable to have been used as coinage.

The earliest coins were minted in Lydia around the end of the seventh century BCE dated by their find in a foundation deposit under the Temple of Artemis at Ephesus (the so-called 'Artemision Hoard'). The attribution of the invention to the Lydians comes from Herodotus 1.94, but the use of money was closely followed by local Greek Ionian cities along the coast of western Asia Minor including Miletos, Teos and Phokaia. The coins were minted in electrum which is a mixture of gold and silver. Until recently, electrum was believed to have occurred naturally in the form of nuggets found in the Pactolus River which flowed through Sardis, the Lydian capital, but this has been proved incorrect.

Electrum was manufactured to a recipe from its inception of 55% gold and 45% silver with minor amounts of copper. This regularized the composition of the earliest money and therefore its value, by state fiat. Arguably, when Greek city-states adopted coinage, they turned to pure silver because they lacked access to gold, but also because gold was intrinsically too valuable for everyday purchases. Even electrum coins were usually tiny with the smallest of them weighing only 0.08 g with a diameter of 2.5 mm (1/192 stater).

Silver was mined in modern Turkey and Iran. The Phoenicians developed trade all the way across the Western Mediterranean accessing silver from Sardinia and Spain. Silver ore could be found in many places in the Greek world most famously and extensively in Lavrion (Attica) and Thracio-Macedonia (Northern Greece) and in some of the Greek islands, albeit in lesser quantities.

Mineralization in the Aegean occurs at the subduction zones where tectonic plates from Africa and Asia Minor meet and super-heated water filled with minerals concentrated in

marine sediments (similar to the genesis of oil fields) is forced up to the surface with the minerals settling between layers of schist and marble. Ancient miners could detect its presence from the discoloration caused by oxidizing minerals. They were seeking minerals such as galena and jarosite from which silver (and other minerals especially lead and gold) could be extracted through a difficult and environmentally unfriendly process of mining, crushing, roasting and cupellating. There is some evidence that the Phoenicians used a more efficient method than the Greeks allowing them, and later the Romans, to mine relatively low-grade ores.

Until recently, understandings of early silver sources were hindered by an over-reliance on literary evidence and assumptions drawn from numismatics and archaeology. Relatively few Archaic period coins had been analyzed due to the damage done by sampling. A new technique developed by the ‘Silver’ group based at the Ecole Normale Supérieure de Lyon (ERC Advanced Grant ‘Silver Isotopes and the Rise of Money’) of which the author is part, removes only a few micrograms with no visible damage to the coin. This has encouraged museum curators to allow access to larger quantities of material for testing. The group also uses a new clustering method to identify statistically distinct groups of data and determine which coins are in the groups, providing objective, and frequently surprising, results.

State-of-the-art, high-precision lead isotopic data is also greatly improving our understanding of ore sources. Newly utilized silver isotopic fractionation as well as chemical analysis, allows for further discrimination of overlapping lead isotope fields. Isotopes do not significantly change their composition in the manufacturing process that makes them ideal both for tracking ore sources and subsequent use. Mixing of more than two silver sources does cause problems for the interpretation of provenance. Chemical analysis rarely helps with provenance but gives valuable information on composition and technological processes.

Coinage was always minted to meet the expenditure requirements of the state. It could also assist with regulating payments to the state for instance of taxes and harbour dues. Ancient states had no demonstrated interest in money supply; this was a by-product of expenditure.

Coinage was only accepted at face value in the areas controlled by a state. It was issued at a discount usually around 5%. This discount is termed ‘seigniorage’ and represents the profit made on the creation of money; the difference between the face value and the cost of materials (bullion plus manufacturing costs). The undervaluation makes money ‘fiduciary’ and stems from the power of the state to monopolise the money supply and enforce the use of its own currency. The transition from pure commodity money essentially backed by its bullion value to over-valued money is seen in the issue of bronze coinage from Classical times.

Some states issued coins that traded widely. The most famous of these was the Athenian ‘owl.’

In Classical times, it became accepted all around the Mediterranean and was widely imitated in the Near East. Many states did not issue coinage at all until Hellenistic times with Sparta being a celebrated example. Presumably, they met their coinage needs from other states.

It is important to note that silver in the form of bullion or larger denomination coins would have been used to settle larger transactions.

Perhaps as little as 10% of silver was coined. By Hellenistic times, if not earlier, coins were minted primarily to meet military expenditure.

The study of coins using new analytical techniques and statistical methods together with wider surveys of mining districts and a more nuanced conception of the geology of ore deposits is quickly changing our understanding of silver sources. The literary evidence is seen to be anecdotally useful but potentially misleading especially concerning the range of ore sources. Silver was accessed from Spain to Iran and traded largely independently of, or despite, political factors.

Ironically, to end this story where it began, a main reason why money was invented was so the state could enforce payments at a profit.

Gil Davis is Director of the Archaeology of Ancient Israel Program at the Australian Catholic University in Sydney and Managing Editor of the Journal of the Numismatic Association of Australia.

Please visit the site: <https://www.asor.org/onetoday/2021/12/rise-of-silver-coinage>
[[Go there for pix and better format]



A TOOL KIT TO HELP SCIENTISTS FIND THE ULTIMATE CHICKPEA, BY VERONIQUE GREENWOOD

A major plant genome sequencing effort may offer a path to breeding more climate-resilient chickpeas, while also revealing clues to the legume’s origins.

When you open a can of chickpeas and fish out the nutty, savory little beans, you’re partaking in a history that began around 10,000 years ago. The modern chickpea’s ancestor, a wild Middle Eastern plant that likely had tiny, hard seeds, was cultivated by humans around the same time as wheat and barley, and began to evolve as early farmers selected plants whose seeds were larger and more succulent.

Archaeologists have even found what appear to be domesticated chickpeas buried beneath Jericho in the West Bank, so deep that they would have been grown even before the inhabitants of one of history’s longest occupied cities began to make pottery.

The humble chickpea has had a somewhat rocky road to its present popularity, however, suggests a new study published last week in *Nature* that sequences the genomes of more than 3,000 examples, making it one of the largest plant genome sequencing efforts ever completed.

“I’m truly excited to see what else will be uncovered from this massive resource,” said Patrick Edger, a professor of horticulture at Michigan State University who was not involved in the study.

The researchers now believe that after chickpeas were first domesticated in Turkey’s southeastern Anatolia region, their cultivation may have stagnated for millennia. The result was a genetic bottleneck that makes all chickpeas today descendants of a relatively small group from a thousand years ago. What’s more, the modern varieties grown by most farmers are low in genetic diversity, which means that they are at risk of failing under the stress of climate change. By mapping the legume’s genetic makeup in such rich detail, the scientists hope to make it easier for plant breeders — who develop new kinds of crops — to bring diversity back into the chickpea’s genes, giving it a flexible tool kit to survive drought, flooding and diseases.

While hummus may have become ubiquitous in American grocery stores only in the past 15 years, chickpeas have long been a staple crop in the developing world, said Rajeev Varshney, a research program director at the International Crops Research Institute for the Semi-Arid Tropics in Hyderabad, India, as well as a professor at Murdoch University in Australia and an author of the new paper.

India is the world’s largest producer of chickpeas, growing more than 10 million metric tons in 2019, as well as one of the largest importers.

But chickpeas’ status as a developing world crop has meant that they have not received as much attention from breeders as commodities like corn, Dr. Varshney said. Chickpea

farmers grow a handful of varieties that have been improved over the years without, for the most part, the benefit of genetic information that might give breeders more control over what traits the beans will have.

In the present study, the researchers sequenced the DNA of 3,366 samples of chickpeas, ranging from wild relatives of the crop to modern stock. They identified a set of genes the plants had in common, as well as a wide variety of others, including some that scientists had not discovered before. These common genes are likely to handle the basic traits that all the plants share, while the unique genes, on the other hand, may encode special abilities like resistance to drought and protection from diseases. Going further, the researchers flagged sets of genes, some found in older varieties, that may prove helpful to modern chickpeas.

The way plant breeding usually works, Dr. Varshney said, is that once a genetic trait, like resistance to a fungal disease, is brought into a given variety, all the individuals will have the exact same tool to block infection. That means that if a form of the disease evolves that can get past that defense, the results could be disastrous.

“The whole crop — the whole field — will be wiped out,” Dr. Varshney said.

Using the gene sets identified in this study, and making sure that many different sets are represented in chickpea populations, could be a protection against crop failures, he hopes. And he said that breeding more resilient chickpeas is a process that should start now, using genetic information to speed the process: If farmers wake up one day and find they need a chickpea that can thrive at 104 degrees Fahrenheit, “this would be very challenging,” said Dr. Varshney. “It needs to be incremental.”

The study also peers into what the chickpea’s genes can tell us about its travels. The bean left the Middle East along independent routes to the Indian subcontinent and the land that borders the Mediterranean. And although patterns in its genes suggest a gradual decline in popularity for thousands of years, the scientists are not sure why that might have been.

“Maybe farmers thought, this is not useful,” Dr. Varshney said.

That changed about 400 years ago, when, according to the data, humans seem to have rediscovered the wonders of the chickpea, for reasons unclear to the researchers. Next time you dunk pita in hummus, you can be glad they did.

Please visit the site: <https://www.nytimes.com/2021/11/20/science/chickpea-breeding-climate-change.html>

AN ANCIENT GREEK ASTRONOMICAL CALCULATION MACHINE REVEALS NEW SECRETS, BY TONY FREETH

Scientists have a new understanding of the mysterious Antikythera mechanism that challenges assumptions about ancient technology

In 1900 diver Elias Stadiatis, clad in a copper and brass helmet and a heavy canvas suit, emerged from the sea shaking in fear and mumbling about a “heap of dead naked people.” He was among a group of Greek divers from the Eastern Mediterranean island of Symi who were searching for natural sponges. They had sheltered from a violent storm near the tiny island of Antikythera, between Crete and mainland Greece. When the storm subsided, they dived for sponges and chanced on a shipwreck full of Greek treasures—the most significant wreck from the ancient world to have been found up to that point. The “dead naked people” were marble sculptures scattered on the seafloor, along with many other artifacts. Soon after, their discovery prompted the first major underwater archaeological dig in history.

One object recovered from the site, a lump the size of a large dictionary, initially escaped notice amid more exciting finds. Months later, however, at the National Archaeological Museum in Athens, the lump broke apart, revealing bronze precision gearwheels the size of coins. According to historical knowledge at the time, gears like these should not have appeared in ancient Greece, or anywhere else in the world, until many centuries after the shipwreck. The find generated huge controversy.

The lump is known as the Antikythera mechanism, an extraordinary object that has befuddled historians and scientists for more than 120 years. Over the decades the original mass split into 82 fragments, leaving a fiendishly difficult jigsaw puzzle for researchers to put back together. The device appears to be a geared astronomical calculation machine of immense complexity. Today we have a reasonable grasp of some of its workings, but there are still unsolved mysteries.

We know it is at least as old as the shipwreck it was found in, which has been dated to between 60 and 70 B.C.E., but other evidence suggests it may have been made around 200 B.C.E.

In March 2021 my group at University College London, known as the UCL Antikythera Research Team, published a new analysis of the machine.

The team includes me (a mathematician and filmmaker); Adam Wojcik (a materials scientist); Lindsay MacDonald (an imaging scientist); Myrto Georgakopoulou (an archaeometallurgist); and two graduate students, David Higgon (a horologist) and Aris Dacanalidis (a physicist). Our paper posits a new explanation for the gearing on the front of the mechanism, where the evidence had previously been unresolved. We now have an even better appreciation for the sophistication of the device—an understanding that challenges many of our preconceptions about the technological capabilities of the ancient Greeks.

ANCIENT ASTRONOMY

We know the Greeks of that era were accomplished naked-eye astronomers. They viewed the night sky from a geocentric perspective—every night, as Earth turned on its axis, they saw the dome of stars rotating. The stars’ relative positions remained unchanged, so the Greeks called them the “fixed stars.” These early astronomers also saw bodies moving against the background of stars: the moon goes through a rotation against the stars every 27.3 days; the sun takes a year.

The other moving bodies are the planets, named “wanderers” by the Greeks because of their erratic motions. They were the deepest problem for astronomy at the time. Scientists wondered what they were and noticed that sometimes the wanderers move in the same direction as the sun—in “prograde” motion—then come to a stop and reverse direction to move in “retrograde.” After a while they reach another stationary point and resume prograde motion again. These rotations are called the synodic cycles of the planets—their cycles relative to the sun. The seemingly strange reversals happen because, as we know now, the planets orbit the sun—not, as the ancient Greeks believed, Earth.

In modern terms, all the moving astronomical bodies have orbits close to the plane of Earth’s motion around the sun—the so-called ecliptic—meaning that they all follow much the same path through the stars. Predicting the positions of the planets along the ecliptic was very difficult for early astronomers. This task, it turns out, was one of the primary functions of the Antikythera mechanism. Another function was to track the positions of the sun and moon, which also have variable motions against the stars.

Much of the mechanism’s design relies on wisdom from earlier Middle Eastern scientists. Astronomy in particular went through a transformation during the first millennium B.C.E. in Babylon and Uruk (both in modern-day Iraq). The Babylonians recorded the daily positions of the astronomical bodies on clay tablets, which revealed that the sun, moon and planets moved in repeating cycles—a fact that was critical for making predictions. The moon, for instance, goes through 254 cycles against the backdrop of the stars every 19 years—an example of a so-called period relation. The Antikythera mechanism’s design uses several of the Babylonian period relations.

One of the central researchers in the early years of Antikythera research was German philologist Albert Rehm, the first person to understand the mechanism as a calculating machine. Between 1905 and 1906 he made crucial discoveries that he recorded in his unpublished research notes. He found, for instance, the number 19 inscribed on one of the surviving Antikythera fragments. This figure was a reference to the 19-year period relation of the moon known as the Metonic cycle, named after Greek astronomer Meton but discovered much earlier by the Babylonians. On the same fragment, Rehm found the numbers 76, a Greek refinement of the 19-year cycle, and 223, for the number of lunar months in a Babylonian eclipse-prediction cycle called the saros cycle. These repeating astronomical cycles were the driving force behind Babylonian predictive astronomy.

The second key figure in the history of Antikythera research was British physicist turned historian of science Derek J. de Solla Price.

In 1974, after 20 years of research, he published an important paper, “Gears from the Greeks.” It referred to remarkable quotations by Roman lawyer, orator and politician Cicero (106–43 B.C.E.). One of these described a machine made by mathematician and inventor Archimedes (circa 287–212 B.C.E.) “on which were delineated the motions of the sun and moon and of those five stars which are called wanderers ... (the five planets) ... Archimedes ... had thought out a way to represent accurately by a single device for turning the globe those various and divergent movements with their different rates of speed.”

This machine sounds just like the Antikythera mechanism. The passage suggests that Archimedes, although he lived before we believe the device was built, might have founded the tradition that led to the Antikythera mechanism. It may well be that the Antikythera mechanism was based on a design by Archimedes.

FIENDISHLY COMPLEX

For decades researchers were stuck trying to decipher the workings of the device by looking at the surface of its disintegrating fragments.

In the early 1970s they finally got to peek inside. Price worked with Greek radiologist Charalambos Karakalos to obtain x-ray scans of the fragments. To their astonishment, the researchers found 30 distinct gears: 27 in the largest fragment and one each in three others.

Karakalos, with his wife, Emily, was able to estimate the tooth counts of the gearwheels for the first time, a critical step in understanding what the mechanism calculated. The machine was looking more complicated than anyone had conceived.

The x-ray scans were two-dimensional, meaning that the structure of the gearing appeared flattened, and they revealed only partial pictures of most of the gears. Scientists could only infer the number of teeth on many of the gears. Despite these shortcomings, Price identified a gear train—a set of linked gears—that calculated the average position of the moon on any specific date by using its period relation of 254 sidereal rotations in 19 years. Driven by a prominent feature on the front of the mechanism called the main drive wheel, this gear train starts with a 38-tooth gear (two times 19, as a gear with just 19 teeth would be a bit too small). This 38-tooth gear drives (via some other gears) a 127-tooth gear (half of 254; the full number would require too large a gear).

It seems that the device could be used to predict the positions of the sun, moon and planets on any specific day in the past or future. The maker of the machine would have had to calibrate it with the known positions of these bodies. A user could then simply turn a crank to the desired time frame to see astronomical predictions. The mechanism displayed positions, for instance, on a “zodiac dial” on the front of the mechanism, where the ecliptic was divided into a dozen 30-degree sections representing the constellations of the zodiac. Based on the x-ray data, Price developed a complete model of all the gearing on the device.

Price’s model was my introduction to the Antikythera mechanism. My first paper, in fact, “Challenging the Classic Research,” was a comprehensive demolition of most of Price’s proposed gearing structure for the machine. Nevertheless, Price correctly determined the

relative positions of the major fragments and defined the overall architecture of the machine, with date and zodiac dials at the front and two large dial systems at the back. Price's achievements were a significant step in decoding the Antikythera mystery.

A third key figure in the history of Antikythera research is Michael Wright, a former curator of mechanical engineering at London's Science Museum. In collaboration with Australian professor of computer science Alan G. Bromley, Wright carried out a second x-ray study of the mechanism in 1990 using an early 3-D x-ray technique called linear tomography. Bromley died before this work bore fruit, but Wright was persistent, making important advances, for example, in identifying the crucial tooth counts of the gears and in understanding the upper dial on the back of the device.

The Antikythera mechanism, with its precision gears bearing teeth about a millimeter long, is completely unlike anything else from the ancient world.

In 2000 I proposed the third x-ray study, which was carried out in 2005 by a team of academics from England and Greece in collaboration with the National Archaeological Museum in Athens. X-Tek Systems (now owned by Nikon) developed a prototype x-ray machine to take high-resolution 3-D x-ray images using microfocus x-ray computed tomography (x-ray CT). Hewlett-Packard used a brilliant digital imaging technique called polynomial texture mapping for enhancing surface details.

The new data surprised us. The first major breakthrough was my discovery that the mechanism predicted eclipses in addition to the motions of the astronomical bodies. This finding was connected to the inscription Rehm had found that mentioned the 223-month saros eclipse cycle. The new x-rays revealed a large, 223-tooth gear at the rear of the mechanism that turns a pointer around a dial that spirals out, making four turns in total that are divided into 223 sections, for 223 months. Named after the customary name of the Babylonian eclipse cycle, the saros dial predicts which months will feature eclipses, along with characteristics of each eclipse as described by inscriptions in the mechanism. The finding revealed an impressive new feature of the device, but it left a massive problem: a group of four gears lying within the circumference of the large gear that appeared to have no function.

It took months to understand these gears. When I did, the results were astonishing. These gears turned out to calculate the variable motion of the moon in a very beautiful way. In modern terms, the moon has variable motion because it has an elliptical orbit: when it is farther from Earth, it moves more slowly against the stars; when it is closer, it moves more quickly. The moon's orbit, however, is not fixed in space: the whole orbit rotates in a period of just under nine years.

The ancient Greeks did not know about elliptical orbits, but they explained the moon's subtle motion by combining two circular motions in what is called an epicyclic theory.

I figured out how the mechanism calculated the epicyclic theory by building on a remarkable observation by Wright. He had studied two of the four mysterious gears at the back of the mechanism. He saw that one of them has a pin on its face that engages with a slot on the other gear. It might seem to be a useless arrangement because the gears will surely just turn together at the same rate. But Wright noticed that the gears turn on different axes separated by just over a millimeter, meaning that the system generates

variable motion. All these details appear in the x-ray CT scan. The axes of the gears are not fixed—they are mounted epicyclically on the large 223-tooth gear.

Wright discarded the idea that these gears calculated the moon's variable motion because in his model, the 223-tooth gear turned much too fast for it to make sense. But in my model, the 223-tooth gear rotates very slowly to turn the pointer for the saros dial.

Calculating the epicyclic theory of the moon with epicyclic pin-and-slot gears in this subtle and indirect way was an extraordinary conception by the ancient Greeks. This ingenuity reinforces the idea that the machine was designed by Archimedes. This research on the back dials and gearing completed our understanding of the back of the mechanism, reconciling all the evidence to date. My colleagues and I published our findings in 2006 in *Nature*. The other side of the device, however, was still very much a mystery.

THE FRONT OF THE MECHANISM

The most prominent feature of the front of the largest fragment is the main drive wheel, which was designed to rotate once a year. It is not a flat disc like most of the other gears; this one has four spokes and is covered in puzzling features. The spokes show evidence that they held bearings: there are circular holes in them for turning axles. The outer edge of the gear contains a ring of pillars—little fingers that stick up perpendicularly, with shoulders and pierced ends that were clearly intended to carry plates. Four short pillars held a rectangular plate, and four long pillars held a circular plate.

Following Price, Wright proposed that an extensive epicyclic system—the two-circles idea the Greeks used to explain the odd reversing motions of the planets—had been mounted on the main drive wheel. Wright even constructed an actual model gearing system in brass to show how it worked. In 2002 he published a groundbreaking planetarium model for the Antikythera mechanism that displayed all five planets known in the ancient world. (The discovery of Uranus and Neptune in the 18th and 19th centuries, respectively, required the advent of telescopes.) Wright showed that the epicyclic theories could be translated into epicyclic gear trains with pin-and-slot mechanisms to display the planets' variable motions.

When I first saw Wright's model, I was shocked by its mechanical complexity. It even featured eight coaxial outputs—tubes all centered on a single axis—that brought information to the front display of the device. Was it really plausible that the ancient Greeks could build such an advanced system? I now believe that Wright's conception of coaxial outputs must be correct, but his gearing system does not match the economy and ingenuity of the known gear trains. The challenge our UCL team faced was to reconcile Wright's coaxial outputs with what we knew about the rest of the device.

One crucial clue came from the 2005 x-ray CT study. In addition to showing the gears in three dimensions, these scans made an unexpected revelation—thousands of new text characters hidden inside the fragments and unread for more than 2,000 years. In his research notes from 1905 to 1906, Rehm proposed that the positions of the sun and planets were displayed in a concentric system of rings. The mechanism originally had two covers—front and back—that protected the displays and included extensive inscriptions. The back-cover inscription, revealed in the 2005 scans, was a user manual

for the device. In 2016 Alexander Jones, a professor of the history of astronomy at New York University, discovered definitive evidence for Rehm’s idea within this inscription: a detailed description of how the sun and planets were displayed in rings, with marker beads to show their positions.

Any model for the workings of the mechanism should match this description—an explanation literally inscribed onto the back cover of the device describing how the sun and planets were displayed. Yet previous models had failed to incorporate this ring system because of a technical problem that we could not solve. Wright had discovered that the device used a semisilvered ball to show the phase of the moon, which it calculated mechanically by subtracting an input for the sun from an input for the moon. But such a process appeared to be incompatible with a ring system for displaying the planets because the outputs for Mercury and Venus prevented the moon-phase device from accessing the input from the sun gear system. In 2018 Higgon, one of the graduate students on our UCL team, came up with a surprisingly simple idea that neatly fixed this technical problem and explained a mysterious pierced block on one of the spokes of the main drive wheel.

This block could transmit the “mean sun” rotation (as opposed to the variable “true sun” rotation) directly to the moon-phase device. This setup enabled a ring system for the front of the Antikythera mechanism that fully reflected the description in the back-cover inscription.

In trying to decipher the front of the device, it was imperative to identify the planetary cycles built into the mechanism because they define how the gear trains calculated planetary positions. Earlier research assumed that they would be based on the planetary period relations derived by the Babylonians. But in 2016 Jones made a discovery that forced us to discard that assumption.

The x-ray CT of the front-cover inscription shows it is divided into sections for each of the five planets. In the Venus section, Jones found the number 462; in the Saturn section, he found the number 442.

These numbers were astonishing. No previous research had suggested that ancient astronomers knew them. In fact, they represent more accurate period relations than the ones found by the Babylonians. It seems that the makers of the Antikythera device discovered their own improved period relations for two of the planets: 289 synodic cycles in 462 years for Venus and 427 synodic cycles in 442 years for Saturn.

Jones never figured out how the ancient Greeks derived both these periods. We set out to try ourselves. Dacanalís, our other UCL graduate student, assembled a comprehensive list of the planetary period relations and their estimated errors from Babylonian astronomy.

Could combinations of these earlier relations be the key to the more accurate Antikythera period relations? Eventually we found a process, developed by philosopher Parmenides of Elea (sixth to fifth century B.C.E.) and reported by Plato (fifth to fourth century B.C.E.), for combining known period relations to get better ones.

We proposed that any method the Antikythera creators used would have required three criteria: accuracy, factorizability and economy. The method must be accurate to match the known period relations for Venus and Saturn, and it must be factorizable so the planets could be calculated with gears small enough to fit into the mechanism. To make the system economical, different planets could share gears if their period relations shared prime factors, reducing the number of gears needed. Such economy is a key feature of the surviving gear trains.

Based on these criteria, our team derived the periods 462 and 442 using the idea from Parmenides and employed the same methods to discover the missing periods for the other planets where the inscriptions were lost or damaged.

Armed with the period relations for the planets, we could now understand how to fit the gear trains for the planets into the tight spaces available. For Mercury and Venus, we theorized economical five-gear mechanisms with pin-and-slot devices, similar to Wright's mechanisms for these planets. We found strong supporting evidence for our reconstruction in one four-centimeter-diameter fragment. Inside this piece, the x-ray CT shows a disk attached to a 63-tooth gear, which turns in a d-shaped plate. The number 63 shares the prime factors 3 and 7 with 462 (the Venus period). A gear train using the 63-tooth gear could be designed to match a bearing on one of the spokes of the main drive wheel. A similar design for Mercury matches the features on the opposite spoke. These observations gave us great confidence that we were on the right track for Mercury and Venus.

For the other known planets—Mars, Jupiter and Saturn—our team conceived of very compact systems to fit the available space. These designs were a radical departure from Wright's systems for these planets. Working independently, Christián C. Carman of the National University of Quilmes in Argentina and I had shown that the subtle indirect gearing system for the variable motion of the moon could be adapted for these planets. Our UCL team proved that these gearing systems could be extended to incorporate the new period relations for the planets. This system allowed the Antikythera makers to mount several gears on the same plate and design them to precisely match the period relations.

These economical seven-gear trains could intricately interleave between the plates on the pillars of the main drive wheel so that their outputs conformed to the customary cosmological order of the celestial bodies—moon, Mercury, Venus, sun, Mars, Jupiter and Saturn—that determines the layout of the ring system. The dimensions of the available spaces between the plates were exactly right to accommodate these systems, with some spare capacity and some evidence still unexplained.

We added a mechanism for the variable motion of the sun and an epicyclic mechanism for calculating the “nodes” of the moon—the points at which the moon's orbit cuts through the plane of the ecliptic, making an eclipse possible. Eclipses happen only when the sun is close to one of these nodes during a full or new moon. Medieval and renaissance astronomers called a double-ended pointer for the nodes of the moon a “dragon hand.” The epicyclic gearing for this dragon hand also exactly explained a prominent bearing on one of the spokes that had previously appeared to have no function. We had finally explained all the features on the main drive wheel; we published our findings in March 2021 in *Scientific Reports*.

A BEAUTIFUL CONCEPTION

We now understood how the front display matched the description in the back-cover user's manual, with the sun and planets shown by marker beads on concentric rings. The front cover also displayed the moon's phase, position and age (the number of days from a new moon), and the dragon hand that showed eclipse years and seasons.

With the concentric rings for the planets, we realized that we could now make sense of the front-cover inscription as well. This writing is a formulaic list of the synodic events of each planet (such as its conjunctions with the sun and its stationary points) and the intervals in days between them. On the back plate, the eclipse inscriptions are indexed to markings on the saros dial. On the front plate, inscriptions about the risings and settings of stars are indexed to the zodiac dial. Our insight was that the inscriptions on the front could refer to index letters on the planetary rings: if the sun pointer is at one of these letters, then the corresponding inscription entry describes the number of days to the next synodic event. Because the left-hand side of the inscription, where we would expect these index letters to be, is missing, we cannot prove the hypothesis—but it is a compelling explanation.

The device is unique among discoveries from its time. It single-handedly rewrites our knowledge of the technology of the ancient Greeks. We knew they were highly capable—they built the Parthenon and the Lighthouse of Alexandria even earlier than the Antikythera mechanism. They had plumbing and used steam to operate equipment. But before the discovery of the Antikythera mechanism, ancient Greek gears were thought to be restricted to crude wheels in windmills and water mills. Aside from this discovery, the first precision-gear mechanism known is a relatively simple—yet impressive for the time—geared sundial and calendar of Byzantine origin dating to about C.E. 600. It was not until the 14th century that scientists created the first sophisticated astronomical clocks. The Antikythera mechanism, with its precision gears bearing teeth about a millimeter long, is completely unlike anything else from the ancient world.

Why did it take centuries for scientists to reinvent anything as sophisticated as the Antikythera device, and why haven't archaeologists uncovered more such mechanisms? We have strong reasons to believe this object can't have been the only model of its kind—there must have been precursors to its development. But bronze was a very valuable metal, and when an object like this stopped working, it probably would have been melted down for its materials.

Shipwrecks may be the best prospects for finding more of them. As for why the technology was seemingly lost for so long before being redeveloped, who knows? There are many gaps in the historical record, and future discoveries may well surprise us.

With the Antikythera mechanism, we are clearly not at the end of our story. We believe our work is a significant advance, but there are still mysteries to be solved. The UCL Antikythera Research Team is not certain that our reconstruction is entirely correct because of the huge loss of evidence. It is very hard to match all of the surviving information. Regardless, we can now see more clearly than ever what a towering achievement this object represents.

Tony Freeth is a member of the University College London Anti-kythera Research Team. A mathematician and an award-winning filmmaker, Freeth has conducted research on the Antikythera mechanism and promoted it through films and presentations since 2000. Credit: Nick Higgins

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Please visit the site: <https://www.scientificamerican.com/article/an-ancient-greek-astronomical-calculation-machine-reveals-new-secrets/> [Go there for pix]

THE SCALE ARMOUR FROM YANGHAI, **BY SEAN MANNING**

Some comments on Patrick Wertmann et al., “No borders for innovations: A ca. 2700-year-old Assyrian-style leather scale armour in Northwest China.” *Quaternary International*,
<https://doi.org/10.1016/j.quaint.2021.11.014> It has been discussed on Sci News – www.spektrum.de – <https://www.media.uzh.ch/> – Science Daily – Heritage daily among others.

The cemetery at Yanghai in Uighur territory continues to give. This week, an article about hide scale armour in a grave there has been circulating on the Internet and corporate social media. The grave had other cool things, like a wooden bedstead and a wooden fire drill, but most of the attention has focused on the authors’ claims that the armour was made within the Neo-Assyrian Empire. Unfortunately, that claim is the weakest part of a strong article.

This study was performed by a combined Swiss-German-Russian-Chinese team and published in a geology journal. The bibliography seems solid which is challenging in an article in English on a subject where the archaeology is mostly published in Chinese and Russian. I was surprised not to see the book on Golyamata Mogila in Thrace and the well-preserved scale armour there.

The article begins with one of my favourite frames: The first millennium BCE was pivotal for the environment and for human societies in Central and Eastern Eurasia Among the major driving forces was the increasing use of horse riding, which extended range of movement significantly and led to the development of cavalry units as a part of large armies. Empires with enormous outreach and gravitational pull formed and disintegrated in close dependence. The wide spread of military technologies demonstrates their bonds, though mostly in the form of metal objects due to the inherent survivability of their materials.

The great story of the first millennium BCE is how a world with no state as large as Poland changed into a world where you could ride from the Atlantic to the Pacific and only have to change your money twice. The story of the first millennium BCE is the story of mega-states (like the story of the first millennium CE is the story of how Judaism and its offshoots outlasted those states and became key to social order from Ireland to the Indus). Because hide and fabric armour rots much faster than iron-alloy or copper-alloy armour, and because armour was too bulky to lose by accident and was not customarily disposed of in ways which preserve it, body armour is hard to study archaeologically, and hide and fabric armour is even harder.

The armour is dated in two different ways. In terms of the style of the burial and the other grave goods, it belongs to Yanghai period III (700-300 BCE). A thorn stuck in the armour was carbon-dated to between 786 and 543 cal BCE (95.4% probability). So there is a rough agreement between the stratigraphic date (“which types of objects are found together? those must have been used at about the same time. which are never or very

rarely found together? those were probably used at different times”) and the radiometric date (“how much of certain elements has decayed since this was made?”)

They then argue that scale armour spread out of Southwest Asia in the Iron Age, and was not indigenous to the Eurasian steppes. I am not sure about this but I do not have the library resources or the time to investigate right now. I thought that scale armour, chariots with spoked wheels, and the composite bow were a tripartite weapons system which spread out of the South Caucasus or the steppes in the Bronze Age. The authors make a distinction between lamellar, where the plates are fastened to one another and do not need a lining, and scale armour, which will fall apart without the lining. Lamellar armour was very popular in the Eurasian steppes, China, and Japan for thousands of years. Around 1500-1900 BCE, a man in Omsk, Siberia was buried with a lamellar armour. I am suspicious of the authors’ claim that scale armour has not been found in the Eurasian steppes before the middle of the first millennium BCE, but with the books and time available to me I cannot say that it is false.

They notice that their armour has some things in common with a scale armour in the Metropolitan Museum of Art, New York City. The armour in the Met has no archaeological provenance, so we can use the armour from Yanghai to guess where it came from. The authors then try to connect the Yanghai armour to the Assyrian empire thousands of kilometers away.

In age, construction details and aesthetic appearance its closest parallel is the MET armour. The stylistic correspondence but functional specifics make the two armours appear as outfits for different units of the same army: the Yanghai armour possibly for light cavalry, the MET armour perhaps for heavy infantry. This degree of standardization of military equipment at the time under discussion was a characteristic feature of the Neo-Assyrian forces in the 7th century BCE. With all of the above in mind, we suggest that both leather scale armours were manufactured in the Neo-Assyrian Empire.

That seems like a leap of logic with seven-league boots. This armour does not look like the standardized waist-length, iron and bronze armours introduced by one of the Neo-Assyrian kings. I don’t know of any documentary evidence for leather armour in the Neo-Assyrian empire, whereas documents mention iron and bronze armour and hundreds of kilos of iron and bronze scales survived to be excavated (one of the documents from Tal Hallaf mentions iron and bronze armours, although not the document I translated in an earlier post). I believe I have seen other armours from the Eurasian steppes with this distinctive ‘waistband’ of large scales, whereas I do not know of any armours from Southwest Asia with this feature. And any two armours from the same tradition will have the kind of similarities which we see between the armour in the Met and the armour from Yanghai. But this is only a tiny part of the article, which mostly argues that scale armour spread out of the Mesopotamian world into the Eurasian steppes and the borders of China. All the empirical data in the article is valid even if you don’t find this one conclusion convincing.

The crew of an Assyrian chariot in the 7th century BCE. These armours end at the waist rather than having a skirt or a ‘girdle’ of tall scales; they protect both front and back completely rather than just protecting the lower half of the back; they have short sleeves rather than a ‘yoke’ over the shoulder. That seems like three important differences from the Yanghai armour! Photo by author, the Louvre, 2019.

These scales are long and symmetric (not short with one scalloped edge). They are of iron (not hide). They are laced in the middle with criss-cross lacing, not just at the top with a thong which goes over under over. Do they have much in common with the armour above? Photo c/o Wikipedia Commons after M.E.L. Mallowan ed., Nimrud and its Remains (1965) pp. 409-411, 426

I was especially impressed by the examples of scale and lamellar armour from eastern Eurasia which the authors collected, including many objects from China which are rarely discussed in English. This lets you see how armourers continually invented the same few basic solutions. In Europe and Japan, armour which just protects the front often has a strap from the left shoulder to under the right arm, a strap from the right shoulder to under the left armpit, and a strap across the back. My breastplate and fauld are worn like that. But the authors show that this strapping system was also used on some warriors of the terracotta army of the First Emperor of China! The Yanghai armour has a long ‘wing’ which wraps under one arm, across the back, and is tied under the other arm. Students of armour know that several of the armours from Wisby (made circa 1300-1330, buried with their wearers in 1361) are built the same way almost 2000 years later.

Understanding the ergonomics of armour helps us interpret limited evidence, and could also be useful to artists imagining fantasy armour. And Siberian armour was very influential through China on Japan and Tibet.

So this article does not make a good case that the armour from Yanghai was made in the Assyrian world. But it has a lot of interesting details for armour geeks. And if you like big ideas, the article makes a case that scale armour spread from Southwest Asia to the Eurasian steppes, and not the other way around. One of the latest trends in Neo-Assyrian military studies is asking whether things we associate with the Eurasian steppes such as large, organized forces of cavalry might have been developed by the Assyrians and spread from them into Eurasia rather than the reverse.

The authors’ article is available as Patrick Wertmann et al., “No borders for innovations: A ca. 2700-year-old Assyrian-style leather scale armour in Northwest China.” Quaternary International, <https://doi.org/10.1016/j.quaint.2021.11.014>

Further Reading:

“Call for Sources: The Organic Components of Scale Armour in Antiquity” version 1.3 (November 2019) https://www.bookandword.com/my-articles/#organic_components_scale_armour

Some thoughts on ‘Armour Never Wears’ (2016) <https://www.bookandword.com/2016/02/08/some-thoughts-on-armour-never-wearies/>

Please visit the site: <https://www.bookandword.com/2021/12/11/the-scale-armour-from-yanghai/>

NUMEROUS FINDS EMERGE FROM THE HOUSE OF THE LIBRARY IN POMPEII, BY ALESSANDRA RANDAZZO

Divided between the 6th and 7th Regiones, the Insula Occidentalis of Pompeii is one of the most exclusive residential areas of the ancient city. The area is located on the western edge of Pompeii, with a scenic view of the Gulf of Naples, and from the 2nd century BC onwards it was progressively urbanised thanks to the construction of the so-called "ville urbane" (urban villas), located above the city walls and equipped with terraces offering a wide panorama.

After the settlement's annexation by Silla in 80 BC, the existing dwellings were further expanded with a series of terraces sloping down to the sea, which gradually came to rest on the city walls, which no longer served their purpose as a defence against external attacks. The residential complexes, among the most beautiful in the city, were brought to light as early as the first excavations carried out by the Bourbons, and their complex articulation also justifies the term used to refer to them as 'urban villas'.

In recent months work has been underway to restore the Insula Occidentalis and in particular work is focusing on the House of the Library, the House of the Golden Bracelet, the House of Fabius Rufus and the House of Castricio.

From the House of the Library, one of the houses most representative of the serene atmosphere of leisure, meditation, and academic pursuits that characterised these dwellings, numerous new findings are emerging from the archaeological excavation, including finds attributable to the last phases of life in the house.

A worked stone disc that formed the base of a mortar and a bronze or copper vase, an olla (jar), all testify to the work that must have been going on in the building complex. The house, in fact, presents several problematic areas due to the numerous earthquakes that preceded the eruption of 79 AD, including the great earthquake of 62 AD and the seismic swarm that most likely preceded the disastrous event.

In modern times there was a further disaster when, during the Second World War, Pompeii was bombed and several buildings were affected by more than a hundred bombs that fell on the city and of which two also hit the House of the Library.

The stone disc, circular and with a polished surface, still has a small pile of fragments of glass paste ready for the milling necessary to produce the so-called 'Egyptian Blue', a blue/blue pigment used for painting.

The copper olla, on the other hand, found on the opposite side of the threshold of the opening that connected a vast vaulted room with the terrace overlooking the Gulf of Naples, still contains a small iron crucible that was probably used to cook the oxides in the pigment production process. Both finds were taken to the Park's laboratories for content analysis.

The name Library House is attributed to the scholar Volker Michael Strocka, who identified one of the interior rooms as a "library". It still bears a splendid fresco depicting a figure with an ivy-crowned head, carrying the tools for poetic compositions: a volumen, a lyra and a capsula for books. The poet is probably Philoxenus of Kythera, author of dithyrambs in Greek who lived in the second half of the 5th century BC.

Please visit the site:

<https://archaeologynewsnetwork.blogspot.com/2021/12/numerous-finds-emerge-from-house-of.html> [Go there for pix]

ANCIENT MOUND UNEARTHED UNDER DAM WATER

A 4,000-year-old mound and an architectural structure inside it have been unearthed after the water level of Atatürk Dam receded 15 meters in the southeastern province of Adıyaman.

The mound structure emerged in the place known as Gavur Tepe, located within the borders of Ürgüç village. The Adıyaman Museum Directorate was informed about the mound, which was noticed by villagers.

Examinations made by Sabahattin Ezer, an associate professor and the head of Adıyaman University's Archaeology Department, and Mehmet Alkan, the museum director, on the wall and architectural structure revealed that it is a 4,000-year-old mound.

Ezer, who has been conducting surveys since 2013 and deepened these surveys in the last two years with the instruction of the university rector, Professor Mehmet Turgut, said: "Our examination reveals that this place is a mound. As the water of the Atatürk Dam fell, a natural destruction occurred. As a result of this destruction, some archaeological remains surfaced. We can clearly see that there is a mound formation here and that there is a settlement in this mound from the 2nd millennium B.C. Also, the ceramic remains here show us this very clearly. In other words, the existence of a settlement dating back 4,000 years is definitely here."

"During the examinations that we made on the surface, we also detected walls. There are architectural structures. The walls that emerged with the erosion of the water give us ideas about the architecture of this place. Adıyaman University is carrying out surface research.

Especially in the last two years, we focused on the prehistoric times of Adıyaman and found stone axes and stone tools dating back to 7,000 years B.C.," he added.

Please visit the site: <https://www.hurriyetdailynews.com/ancient-mound-unearthed-under-dam-water-170088>

WHY THIS ANCIENT CIVILIZATION FELL OUT OF LOVE WITH GOLD FOR 700 YEARS, BY BRIDGET ALEX

Analysis of 4,500 artifacts suggests an early society between the Black and Caspian Seas turned against bling

Four thousand years ago, the finest gold items on Earth belonged to the nomadic groups that roamed the mountainous lands between the Black and Caspian Seas. These communities herded animals for a living, but they also mastered gold working long before most societies. Their elites flaunted that bling, especially in their tombs, which were loaded with golden goblets, jewelry and other treasures. Word of this gold-rich land spread and spawned tall tales from faraway lands, like the ancient Greek myth of Jason and the Golden Fleece. In most versions of the legend, the hero and his crew brave a perilous journey to retrieve a magical ram’s gold-colored wool from Colchis—what is today the country of Georgia in the Caucasus Mountains.

But, according to new research published in *Scientific Reports*, gold fell out of fashion in the Caucasus and remained unpopular for at least 700 years. Analyzing more than 4,500 artifacts, discovered by archaeologists over the past 130 years, a researcher showed that gold items became rare across a large swatch of the territory between 1500 and 800 B.C.E. The locals seem to have decided, then, that gold was gaudy.

“This paper is important... because it reminds us that our values are not universal. Even something we tend to regard as a global commodity—that is gold, the allure of gold—is not universal in space and time,” says Cambridge professor Marcos Martín-Torres, an expert on ancient metals who was not involved in the research.

And that shift may reflect more than fashion whims. The archaeologist behind the research, Nathaniel Erb-Satullo of Cranfield University in the United Kingdom, thinks the gold decline resulted from elites losing status. Perhaps, average folks decried the one-percenters of their day, and ostentatious markers of wealth, like gold adornments, went out of style. Down with the rich and their riches.

“I’m not saying it was a totally flat social hierarchy,” explains Erb-Satullo. But he sees a “turn away from glorification of the individual person.”

Erb-Satullo’s study began as an offhand observation. In the mid-2010s, while working on archaeological digs in Georgia, he would visit regional museums in his spare time. He would gawk at their collections of exquisite gold artifacts but began to notice a gap in the ages of these items. The exhibits showcased “lovely early gold,” mostly made between 2500 and 1500 B.C.E., during the Middle Bronze Age. They also displayed relics from 800 to 200 B.C.E., when Classical Greeks explored the region and concocted the tale of Jason and the Golden Fleece. But Erb-Satullo rarely spied artifacts from the intervening period, 1500 to 800 B.C.E., during the Late Bronze and Early Iron Ages.

Chatting with Georgian colleagues, he learned that others had casually noted this apparent gold gap, but no one had seriously investigated it. Possibly, metalsmiths did craft gold during the Late Bronze and Early Iron Ages, but archaeologists haven't yet discovered the sites where it's buried. However, Erb-Satullo was intrigued by an alternative explanation: Communities in the Caucasus might have lost their gold lust for nearly 1,000 years.

To determine if the apparent gap signified a real drop in gold working, he decided to build a database of all known gold artifacts from the southern Caucasus—which date between 4000 and 500 B.C.E. That meant searching beyond the flashy items in museum displays. In 2019 he began scouring published reports from archaeological digs that occurred in present-day Georgia, Armenia or Azerbaijan, from the late 1800s, onwards. By late 2020 his database comprised 89 sites and 4,555 gold objects, including cups, figurines, beads and fragments of gold sheet, which likely covered wood objects that decomposed long ago.

Erb-Satullo charted how these artifact counts varied across time, by geographic zone and based on a site's distance from gold ore deposits. The casual observation he'd made, that Georgian museums rarely had gold items from between 1500 and 800 B.C.E., reflected a real decline in gold working during that time. Specifically, the drop occurred in the so-called Middle Kura zone, the northeast corner of the region.

Middle Kura sites, dated between 2500 to 1500 B.C.E., yielded a whopping 1,209 gold items. But the count plummeted to just 29 objects in the next period, 1500 to 800 B.C.E. That's despite the fact that archaeologists have excavated thousands of graves from the latter period. These burials contained fine items, crafted from bronze, carnelian and other precious materials. Gold was just conspicuously rare. Meanwhile, gold counts remained high at sites outside this zone, to the south. These communities continued packing their tombs with gold splendor, as Middle Kura groups eschewed the metal.

The study “brought tons of data together to really make the case that some people in this one particular area were actually choosing not to engage, or choosing to reject a previous technology,” says Catherine Frieman, an archaeologist at the Australian National University, who served as a peer reviewer for the study.

It's difficult to know why these communities rejected the lustrous metal, embraced by their predecessors, neighboring contemporaries and local successors. They left no written records explaining this turn—writing didn't yet exist in the Caucasus region.

But Erb-Satullo gleaned clues from other archaeological remains, which indicate social transformations during the Bronze and Iron Ages. When gold-working peaks, between about 2500 and 1500 B.C.E., evidence of permanent settlements in the southern Caucasus is sparse. Most communities seem to have been nomadic herders. Some members of these groups apparently attained high status and wealth, based on the size and contents of their tombs—located in constructed mounds that could span a football field in diameter and reach 30 feet high.

These nomadic elites “were definitely decked out with wealth,” says Erb-Satullo. It's “when these massive burial mounds appear that we start to see the first real kind of social hierarchy emerge.”

But around 1500 B.C.E., lifestyles and preferences changed. More groups settled into villages, often protected by hilltop fortresses. Graves became more modest, compared to the enormous mounds of prior generations. And gold bling nearly disappeared in the Middle Kura zone.

It's unlikely that artisans depleted their natural supply of gold. The southern Caucasus holds more than 100 known gold deposits. Nearly all the archaeological sites in the study were within two days walk from one or more of these sources, based on Erb-Satullo's estimates of by-foot travel time across the rugged terrain. Plus, prolific and sophisticated gold working reappears in the Middle Kura zone towards the end of the first millennium B.C.E. There's no indication the area experienced a gold shortage.

Together, these clues suggest the upper class scaled back their most egregious displays of wealth. The social hierarchy may have leveled somewhat. Or, perhaps high-status individuals just quit flaunting their riches. Either way, the social turn against gold was unique to Middle Kura residents. Groups outside this zone continued burying their dead with gold bling.

Beyond the Caucasus, the study adds to understanding of the global history of technology and innovations, like metalworking. It provides a rare example, in which a society decided to abandon technology that they had developed and embraced centuries before. The reason such cases are rare: "It's hard to study the rejection of innovations. It's hard to study people who aren't doing things because, by definition, the evidence isn't there," Frieman explains.

When scholars only focus on successful innovations, they make it seem like technology invariably advances in a linear progression from simple to complex—from sticks and stones to iPhones. But 3,500 years ago, in the Caucasus, communities decided to abandon the (then) cutting-edge industry of gold working.

According to Martín-Torres their choice shows, "the history of technology is not even linear. It's much richer and much more colorful, with ebbs and flows that vary depending on the individuals' social and cultural context."

Bridget Alex is an anthropologist and science writer based in Pasadena, California. Her stories can be found in outlets including Discover, Science, and Atlas Obscura. She tweets @bannelia

Please visit the site: <https://www.smithsonianmag.com/science-nature/why-this-ancient-civilization-fell-out-of-love-with-gold-for-700-years-180979254/> [Go there for pix]

BEST PHYSICAL EVIDENCE OF ROMAN CRUCIFIXION FOUND IN CAMBRIDGESHIRE, BY JAMIE GRIERSON

Near 1,900-year-old skeleton discovered with nail through heel bone during excavation in Fenstanton

Nails used for crucifixion are a rare find as rope was commonly used for the capital punishment and victims were rarely given formal burial.

Found at the site of a future housing development in Cambridgeshire, the near 1,900-year-old skeleton at first did not seem particularly remarkable.

Aged 25 to 35 at the time of death, the man had been buried with his arms across his chest in a grave with a wooden structure, possibly a bier, at one of five cemeteries around a newly discovered Roman settlement at Fenstanton, between Roman Cambridge and Godmanchester.

But once his remains were removed to a laboratory in Bedford, a grisly discovery was made – a nail through the heel bone that experts now say is the best physical evidence of a crucifixion in the Roman world.

Nails used for crucifixion – the method of capital punishment by which the victim is tied or nailed to a large wooden beam and left to hang until death – are a rare find, most likely because the victims would not often have received proper burial and, contrary to popular views, it was commonly carried out using rope.

But after prolonged analysis crucifixion was established as the only likely explanation, and the first details of the extraordinary find are reported on Wednesday in British Archaeology magazine.

On a wet, dull day in November 2017, the skeleton was uncovered and recorded in situ without the nail being noticed, as it was protruding only a couple of centimetres either side of the heel and was caked in mud.

It was not until the bones were bagged and removed to the lab, where they were cleaned, that the nail was revealed. David Ingham, project manager at Albion Archaeology, which conducted the dig, said: “Well it’s the first time a skeleton has been excavated archaeologically that anyone has found a nail in, so it’s not the sort of thing you’re looking for.”

He went on: “We know a reasonable amount about crucifixion; how it was practised and where it was practised and when and so on from historical accounts. But it’s the first tangible evidence to actually see how it worked.”

The off-site analysis was conducted by Corinne Duhig, a renowned archaeologist at the University of Cambridge, who came to the conclusion that crucifixion was the reason the

nail was used. The find is more remarkable because it is highly unusual for the body of a crucifixion victim to be reclaimed, brought back to a settlement and buried alongside others.

The reasons behind this, the crucifixion and the identity of the man will never be known, but Romans are thought to have reserved crucifixion for condemned slaves, rebels and lower classes.

The Fenstanton man was found with an iron nail in his right heel bone, the calcaneum, which would have been inserted into the sides of an upright timber. And, while the location of crucifixion is unknown, it is likely to have been elsewhere, possibly by the side of the road.

The find is the only instance of physical evidence of crucifixion in northern Europe and the fourth reported worldwide, two of which had no nails associated with them. A heel bone with a nail in the same position as the new find was accidentally found by builders in Israel in 1968 and was less well preserved and subject to some controversy.

The dig during which the skeleton was found was carried out by Albion Archaeology as a requirement for planning consent for a housing development. Photograph: Adam Williams

The Fenstanton man's bones have been radiocarbon dated to between AD130 and AD360, making them between 1,661 and 1,891 years old. DNA analysis shows he was not genetically related to any of the other bodies found on the site but was from the native population.

There is evidence that suggests the man could have been a slave – his shins were thinned, as if manacles had been worn for prolonged periods of time. However, this is inconclusive – he could have been imprisoned for other reasons.

He was among the remains of 48 bodies found at the site during the archaeological excavations, which were undertaken as a requirement for planning consent for a now-completed housing development.

Ingham hopes a 3D replica of the heel bone with the nail embedded will be displayed at the Museum of Archaeology and Anthropology in Cambridge. Other finds in the settlement include unusual evidence for industrial processing of cattle bones, perhaps for cosmetics and soap.

The dig took place between May and November 2017. The findings were set to be revealed in 2020 but this was delayed by the Covid-19 pandemic.

Please visit the site: <https://www.theguardian.com/science/2021/dec/08/best-physical-evidence-of-roman-crucifixion-found-in-cambridgeshire> [Go there for pix]

EGYPTIAN JEWELRY, MESOPOTAMIAN SEAL FOUND IN CYPRUS OFFER CLUES TO BRONZE AGE TRADE NETWORKS, BY DAVID KINDY

Artifacts found in a pair of tombs on the Mediterranean island speak to the interconnected nature of the ancient world

Archaeologists excavating a pair of Bronze Age tombs on the island of Cyprus have discovered a trove of treasures from across the ancient world, including gold jewelry similar to specimens worn by Queen Nefertiti of Egypt and a carved seal from a kingdom in what is now Iraq, reports Stacy Liberatore for the the Daily Mail. The 500 or so artifacts found at the site date to between roughly 1500 and 1350 B.C.E.

The two tombs contained 155 skeletons, one of which belonged to a child bedecked in gold jewelry. Laid on top of each other in a series of underground chambers, the bodies likely represent several generations of local elites. Recovery of the remains took several years because salty conditions had made the bones too fragile to extract.

“The finds indicate that these are family tombs for the ruling elite in the city,” says Peter Fischer, leader of the New Swedish Cyprus Expedition, in a statement. “For example, we found the skeleton of a 5-year-old with a gold necklace, gold earrings and a gold tiara. This was probably a child of a powerful and wealthy family.”

Fischer and his team began excavating the ruins of Hala Sultan Tekke in 2010 but only discovered the tombs in 2018. According to the archaeologist’s website, objects found during this year’s dig include an ivory comb, scarab amulets, a bovine-shaped vessel and various ceramics.

“The way that the ceramics changed in appearance and material over time allows us to date them and study the connections these people had with the surrounding world,” says Fischer.

A highlight of the cache was a gold pendant featuring a lotus flower inlaid with gemstones. As Daily Sabah notes, the design is comparable to accessories worn by Nefertiti, who ruled Egypt alongside her husband, Akhenaten, around the time when the tombs were in use.

Another notable find was a cylinder-shaped seal made of hematite and inscribed in cuneiform, the written language of ancient Mesopotamia, reports Egypt Independent.

“The text consists of three lines and mentions three names,” says Fischer. “One is Amurru, a god worshipped in Mesopotamia. The other two are historical kings, father and son, who we recently succeeded in tracking down in other texts on clay tablets from the same period, [that is] the 18th century B.C.E.”

A large ceramic pot featuring Grecian war chariots Peter Fischer, Teresa Bürge

The archaeologist adds, “We are currently trying to determine why the seal ended up in Cyprus more than [600 miles] from where it was made.”

In addition to the jewelry and seal, the researchers discovered a wide range of gemstones, including a red carnelian from India, a blue lapis lazuli from Afghanistan and amber from the Baltic Sea. They also found the remains of a fish imported from the Nile River.

The variety of Middle Eastern items present at the site underscores Cyprus’ importance as an ancient trading port.

“What fascinates me most is the wide-ranging network of contacts they had 3,400 years ago,” says Fischer in the statement.

Next, the researchers plan to conduct DNA analysis of the skeletal remains.

“This will reveal how the different individuals are related with each other and if there are immigrants from other cultures, which isn’t unlikely considering the vast trade networks,” Fischer says.

David Kindy is a daily correspondent for Smithsonian. He is also a journalist, freelance writer and book reviewer who lives in Plymouth, Massachusetts. [...]

Please visit the site: <https://www.smithsonianmag.com/smart-news/egyptian-jewelry-mesopotamian-seal-found-in-cyprus-offer-clues-to-bronze-age-trade-180979165/> [Go there for pix]



ANCIENT UNDERWATER TREASURE FOUND IN CAESAREA WITH CHRISTIAN GOLD RING, BY ROSSELLA TERCATIN

Maritime archaeologists found several precious artifacts, hundreds of silver coins from two shipwrecks dating over a millennium apart in the ancient harbor.

Some time ago, a team of divers from the Antiquities Authority's (IAA) Marine Archaeology Unit was surveying an area just outside the harbor of Caesarea, as they routinely do off the entire coast of Israel.

“We spotted a broken metal anchor and decided to see if there was more in the area,” said archaeologist Jacob Sharvit. “We soon started to find many other artifacts.”

That diving led to the discovery of an incredible underwater treasure, from two ancient ships dating back to the third and 14th centuries CE that wrecked in the same spot just meters off the coast – over 1,000 years apart, as the IAA revealed Wednesday. The treasures included hundreds of coins and some unique jewelry.

First established in the fourth century BCE, in the first century, Caesarea was selected by Herod to build a port city. The city remained an important center throughout the Roman and Byzantine times.

The artifacts from the Roman period included silver and bronze coins – which allowed the expert to date the findings – a precious gemstone with a lyre carved on the surface, bronze bells, an eagle figurine, symbol of the Roman rule, another figurine shaped like a dancer wearing a comic mask, and pottery vessels.

“We were surprised by the quantity of bells we uncovered,” said Sharvit. “It is possible that the sailors used them to fish with fish nets during the night, or maybe they were part of the cargo and were goods to sell.”

Perhaps the most extraordinary find, however, was the gold ring. Thick and shaped as an octagon, the ring carried a green stone with the figure of a young shepherd wrapped in a tunic and carrying a lamb on his shoulders engraved on it. The “good shepherd” is one of the earliest expressions to refer to Jesus, used multiple times in the Gospels.

“I am the good shepherd,” reads a verse in John. “The good shepherd lays down his life for the sheep.”

“We know that similar images were found in the Christian catacombs in Rome,” said Helena Sokolov, a curator at the IAA Coin Department.

Caesarea was home to an important early Christian community and it is mentioned several times in the New Testament.

Among others, the Roman centurion Cornelius is said to have been baptized here by the apostle Peter (Acts 10:10).

“This was the first instance of a non-Jew being accepted into the Christian community,” said Sharvit. “From here, the Christian religion began to be disseminated across the world.”

The more modern ship was carrying a hoard of about 560 silver coins from the Mamluk period.

“At the time, Caesarea was not an important center anymore,” Sharvit noted.

“The Mamluks did not really have ships or a fleet, and they were worried that the Europeans would come to wage war from the sea, so they destroyed many ports.”

The expert said it is not possible to determine to whom the ship belonged.

The best time to go explore maritime sites is after storms, he noted, when the currents shift sands and new remains emerge.

“We are planning to go back to the site as soon as this storm passes,” he said, referring to the Carmel storm that has been battering Israel for days.

Please visit the site: <https://www.jpost.com/archaeology/article-689444>

3,600-YEAR-OLD TSUNAMI ‘TIME CAPSULE’ SHEDS LIGHT ON ONE OF HUMANITY’S GREATEST DISASTERS, BY KRISTIN ROMEY

The volcanic eruption of Santorini rocked the Mediterranean and changed history. Now there is crucial—and chilling—new information about the Bronze Age cataclysm.

A remarkable “time capsule” from one of the greatest volcanic disasters in human history has been unearthed on the Turkish coast, providing compelling new evidence of the cataclysmic event and perhaps even the very first physical remains from one of the tens of thousands of people who likely perished.

In a paper published today in the *Proceedings of the National Academy of Sciences*, an international team of researchers presents evidence of a destructive tsunami that followed the eruption of Thera (modern Santorini), a volcanic island in the Aegean Sea, some 3,600 years ago.

The “super-colossal” eruption of Thera, categorized as a 7 (out of 8) on the volcanic explosivity index, is estimated to have been one of the most destructive eruptions in human history, with some researchers likening it to the detonation of millions of Hiroshima-type atomic bombs. Many scholars believe the traumatic collective memory of the Bronze Age event, around 1600 B.C., could be seen in Plato’s allegory of the sunken city of Atlantis, composed more than a thousand years later, and the impact of the event may also be reflected in the biblical Ten Plagues. Akrotiri, a Minoan city buried in ash by Thera, is a popular tourist attraction often likened to Pompeii.

While there are no firsthand accounts of the eruption and subsequent tsunami, modern researchers have sought to define its scope as well as the impact it had on life in the Mediterranean at the time—most notably for the Minoans, a wealthy maritime power centered on the nearby island of Crete that went into decline around the same time, in the 15th century B.C.

Unearthing a tsunami

The paper describes research at the archaeological site of Çesme-Bağlararası, located in the popular resort town of Çesme on Turkey’s Aegean coast and more than 100 miles north-northeast of Santorini. Investigations at Çesme-Bağlararası, situated in a residential neighborhood just two blocks from the modern shoreline, began in 2002, after ancient pottery was found during the construction of an apartment building.

Since 2009, archaeologist Vasif Şahoğlu of Turkey’s Ankara University has directed excavations at what seemed to be a thriving coastal settlement occupied almost continuously from the mid third millennium to the 13th century B.C. But unlike the well-preserved buildings and roads uncovered earlier at the site, Şahoğlu focused on an area where he quickly dug into chaos: collapsed fortification walls, layers of ash, and jumbles of pottery, bone, and marine shells. He reached out to colleagues in various specialties

who could help make sense of the mess, including Beverly Goodman-Tchernov, a professor of marine geosciences at Israel's University of Haifa and National Geographic Explorer who has a particular focus on identifying tsunamis in the archaeological and geological records.

Signatures of past tsunamis may be difficult to identify—evidence such as collapsed buildings and fires may also be the result of earthquakes, floods, or storms. Even then, such evidence can fade quickly with time, particularly in more arid environments like the Aegean coast. While the impacts of the Thera eruption can be seen far away, in Greenland's ice sheets and California's bristlecone pines, only six physical sites with evidence for the Thera-driven tsunami that thundered through the Aegean have been identified so far, and none with the complexity provided by Çesme-Bağlararası.

“Tsunami are predominantly erosive events ... not depositional events, thus the excitement when we find them!” writes Floyd McCoy, a professor of geology and oceanography at the University of Hawaii, Windward College, in an email. McCoy, a National Geographic Explorer who has studied the Thera eruption and tsunami event but did not participate in the new project, calls the research “a real contribution not only to research on tsunami deposits but on their meaning and interpretation especially related to the [Bronze Age] eruption of Thera.”

Now researchers are creating increasingly sophisticated “checklists” to look for historical tsunami events, which also include physical and chemical signatures for marine life brought onto land with the inundating waves, and the particular patterning of sediment and rock deposits. At Çesme-Bağlararası, for instance, mats of shellfish carried in from the ocean were found wedged against collapsed walls of buildings.

“It's rare that I feel really confident in tsunami interpretation, especially in an arid environment, because you just don't have a lot of stuff to work with,” says Jessica Pilarczyk, an assistant professor of earth sciences and Canada research chair in natural hazards at Simon Fraser University, who did not participate in the Çesme-Bağlararası research. “But it seems in this case, there's some really great evidence that they were able to capture and process.”

Jan Driessen, an archaeologist at the University of Louvain, Belgium, and head of the Talos research group that explores the impact of the Santorini eruption, writes in an email that the finds can serve as a case study for archaeologists and other scientists to better understand the devastation that many Aegean sites located closer to the volcano must have suffered. (Driessen is not an author on the current study.)

A disaster with no victims?

One of the most puzzling aspects of the Thera eruption is the lack of victims: more than 35,000 people are estimated to have died in the tsunami spurred by the Krakatoa eruption, and similar numbers have been proposed for the Bronze Age Aegean.

Until now, however, only one individual has been identified as a possible victim of Thera: a man found buried under rubble on the Santorini archipelago during investigations in the late 19th century. (The researchers of the latest paper say they suspect he may have been an earthquake victim and are following up on the original

report, to see what could be confirmed about the date and circumstance of the man's death, and whether the remains are still available for study.)

Theories about the lack of victims vary: smaller, earlier eruptions led people to flee the area before the cataclysmic eruption occurred; victims were incinerated by super-heated gases, or perished mainly in the sea, or were buried in mass graves that have yet to be identified.

“How does one of the worst natural disasters in history have no victims?” Şahoğlu asks.

Goodman-Tchernov suspects that, just as researchers may have been unable to recognize tsunami deposits in the past, they may have also already uncovered victims from the Thera disaster but failed to make the connection. “It's very possible that [other] victims have already been discovered but weren't necessarily identified because they're associated with secondary or tertiary effects at the periphery of the eruption.”

In Çesme-Bağlararası, however, the researchers say they have found the event's first victim: the skeletal remains of a young, healthy man with signs of blunt force trauma, found prone in the rubble of the tsunami deposit. The remains of a dog were nearby in a collapsed doorway. While direct dating of the human and dog skeletons is planned for the coming months, the researchers are confident that they'll be in line with radiocarbon dates already obtained from material sampled near the two- and four-legged victims.

Waves of terror

The researchers determined that four waves of tsunami landfalls hit Çesme-Bağlararası over the course of a few days or weeks. This is particularly fascinating to McCoy, who notes that there were four phases to the eruption of Thera; researchers have long wondered which eruption phase triggered what they thought was a single tsunami event.

“That question rages on,” McCoy writes in an email, “but here they may be telling us two or three or four of those phases all could have been effective tsunami generators, because it appears there might have been as many individual wave events.”

As the waters receded between tsunami landfalls, it appears that surviving residents took the opportunity to dig into the chaos in search victims and of building materials. One such pit was found directly above the body of the young man; whoever dug it, however, stopped a few feet too soon to retrieve him.

This evidence of attempting to retrieve tsunami victims suggests concern about adequate burial after the disaster, possibly in mass graves to reduce disease in its aftermath. “[E]xtrapolating this behavior helps to explain the general absence of human victims from destruction levels in the Aegean,” notes Driessen.

Pinpointing the event

Nine new radiocarbon dates from the tsunami deposit will also add to a debate: Traditionally the eruption of Thera has been assigned to a time period known as Late Minoan IA, which is associated with Egypt's 18th dynasty in the 1500s B.C. But radiocarbon dates of wood found in ash layers at Akrotiri date to the mid-late 1600s

B.C.—a discrepancy of up to more than a century. This causes problems for researchers trying to correlate relative chronologies of the different cultures that lived around the Mediterranean at the time and how they interacted before and after the disaster.

According to the researchers, the eruption could not have occurred earlier than the earliest date they obtained from within the tsunami deposit—a grain of barley found near the remains of the young man, radiocarbon dated to 1612 B.C. Some outside experts have raised specific questions on this methodology, and the general consensus seems to be that while new data is always welcome, the chronology issue will not be resolved by what has been found so far at Çesme-Bağlararası.

While many questions remain for the scientists debating the timing of the Thera eruption and the damage it wreaked across the Bronze Age Mediterranean world, the researchers hope this study will prompt archaeologists working in the region to take another look at their excavations to see if they too have seemingly elusive evidence for one of history's most devastating natural disasters. In the meantime, Şahoğlu hopes that this remarkable archaeological site in the center of a popular resort town may someday become a tourism attraction itself.

And this research may hopefully spark more awareness and even preparedness among the general public, says Pilarczyk, who studies not only coastal hazards in the past but the ones we will face in the future. “When you look at things like tsunamis, because they're so few and far between, sometimes centuries go by before a major event happens. There's not a whole lot of cultural knowledge that gets transferred from year to year, so people assume that they're safe.

Please visit the site: <https://www.nationalgeographic.com/history/article/3600-year-old-tsunami-time-capsule-sheds-light-on-one-of-humanitys-greatest-disasters?fbclid=IwAR1dqGFxNDpqYdqa5o0ZDg58Gj2wP7eN-xgnS6gyGM5o6xdamHEzFFmR8XM>

EGYPT DIGITALLY ‘UNWRAPS’ MUMMY OF PHARAOH AMENHOTEP I

Researchers unearth new mummification techniques used for Pharaoh Amenhotep I whose rule dates back to the 1500s BC.

Analysis showed Amenhotep I was the first pharaoh to be mummified with arms crossed and the last not to have had his brain removed from the skull

Egypt has digitally “unwrapped” the mummy of famed Pharaoh Amenhotep I, revealing its secrets for the first time since it was discovered in 1881 without disturbing his funerary mask.

Thanks to the advanced digital 3D imagery, researchers unearthed new mummification techniques used for the pharaoh, who ruled from 1525 to 1504 BC.

The research was led by Sahar Saleem, a professor of radiology at Cairo University, and renowned Egyptologist Zahi Hawass, a former antiquities minister, the tourism and antiquities ministry said in a statement on Tuesday.

“Saleem and Hawass used advanced X-ray technology, CT [computed tomography] scanning, as well as advanced computer software programs to digitally unwrap the mummy of Amenhotep I in a safe non-invasive method without the need to touch the mummy,” it added.

“The Egyptian study revealed for the first time the face of King Amenhotep I, his age, health condition, in addition to many secrets about the mummy’s unique mummification and reburial.”

A 3D reconstruction of Amenhotep I’s head, done using CT [Egyptian Ministry of Antiquities/Handout via AFP]

Analysis showed Amenhotep I was the first pharaoh to be mummified with arms crossed and the last not to have had his brain removed from the skull.

The tomography scan also revealed that the pharaoh, who conducted several military campaigns during his 21-year rule, had died at the age of 35, apparently of injury or illness.

The mummy, discovered in Luxor, southern Egypt, is the only one not to have had its tight bands unrolled by archaeologists, in order to preserve the mask and garlands of flowers that surround it like hair.

Please visit the site: <https://www.aljazeera.com/news/2021/12/28/egypt-digitally-unwraps-mummy-of-famed-pharaoh>

TOP 10 MOST FASCINATING ARCHAEOLOGICAL DISCOVERIES OF 2021, BY OWEN JARUS

The oldest map in Europe, a "lost golden city" in Egypt and a massive geoglyph in India that may be the world's largest are just some of the archaeological discoveries that were reported in 2021. Despite all the problems associated with the ongoing COVID-19 pandemic, scholars made numerous finds, and in this countdown Live Science takes a look at some of the best history and archaeology stories of 2021.

Massive geoglyph in India

A massive geoglyph, possibly the world's largest, was found in the Thar Desert in India, covering an area of about 51 acres (20.8 hectares) near India's border with Pakistan. It consists of several spirals and a snaking line that goes back and forth.

A hike along the geoglyph's lines would make for a journey of 30 miles (48 kilometers). The geoglyph is estimated to date back around 150 years, but its purpose is unclear. The geoglyph is difficult to see from the ground, and it was first detected by a team of scholars who were analyzing the landscape using Google Earth.

Read more: [Google Earth reveals the world's largest geoglyph](#)

Lost Golden City

Archaeologists have discovered a "Lost Golden City" near [Luxor](#) (ancient Thebes) in Egypt. The city was known as the "The Rise of Aten" and was founded by pharaoh Amenhotep III, who ruled between 1391 and 1353 B.C. The city contains numerous houses, administrative buildings, a large bakery, a production area for mud bricks and several burials. Historical documents suggest that Amenhotep III had three royal palaces in the city, and archaeological excavations are ongoing.

The city's existence was known from historical records but was not discovered until this year. "Many foreign missions searched for this city and never found it," Zahi Hawass, the former minister of state for antiquities affairs and the archaeologist who led the Golden City excavations, said in a translated statement.

Read more: [3,000-year-old 'Lost Golden City' discovered in Egypt](#)

Roman crucifixion uncovered

In Cambridgeshire, U.K., archaeologists found the body of a man who was crucified when he was between 25 and 35 years old. A nail was found driven through at least one of his heel bones, and additionally during the crucifixion his hands would have been tied to a cross; the position this put him in likely caused him to suffocate to death.

Archaeologists found that his leg bones were thin, meaning that he had likely been shackled to a wall for a long time before his crucifixion. The burial dates to the third or fourth century and the man may have been a slave. Very few examples of crucifixion have been found from the [Roman Empire](#) in archaeological excavations.

Read more: [Rare evidence of Roman crucifixion uncovered in the UK](#)

Europe's oldest map

A series of engravings on a 4,000-year-old stone slab in France is actually the oldest map in Europe, researchers found. The slab has a series of lines that represents the Odet River and its surrounding valley in western France — an area of about 18.6 miles by 13 miles (30 kilometers by 21 km), the researchers said.

The stone slab was actually found in 1900. A recent study of the engravings, which used photogrammetry to create a highly detailed 3D image of the slab, revealed that the engravings form a map. It may have been used by a prince or king to illustrate the territory they ruled.

Read more: [Europe's oldest map, a stone slab, unearthed in France](#)

Ancient lovers' embrace

About 1,500 years ago, a couple — a male and female — were buried together in a loving embrace. When archaeologists found their remains, their embrace was still intact despite the passage of time.

"This is the first [couple] found in a loving embrace, as such, anywhere anytime in China," study lead researcher Qian Wang, an associate professor in the Department of Biomedical Sciences at the Texas A&M College of Dentistry, told Live Science in an email.

The man was between 29-35 years old and had a few injuries, including a broken arm and missing finger on his right hand. The woman was between 35-40 years old and had a few cavities but no apparent injuries. Researchers speculate that after the man died the woman may have killed herself to make it easier to be buried in the loving embrace.

Read more: [1,500-year-old burial in China holds lovers locked in eternal embrace](#)

World's oldest pet cemetery

A 2,000-year-old pet cemetery that may be the oldest known example in the world was discovered in Berenice, a port on Egypt's Red Sea coast. The animals buried in this cemetery appeared to have died of natural causes and been treated with loving care. At other sites in Egypt that have animal burials the animals were often sacrificed.

At the pet cemetery archaeologists found a variety of animals including a large dog who was wrapped in a mat of palm leaves. They also include toothless dogs and cats who were very old when they died and may have required help from their owners to eat. "Our discovery shows that we humans have a deep need for the companionship of animals,"

said lead researcher Marta Osypińska, a zooarchaeologist at the Polish Academy of Sciences in Warsaw.

Read more: [World's oldest 'pet cemetery' discovered in ancient Egypt](#)

11,000-year-old parade

An 11,000-year-old prehistoric site in Turkey which is now called Karahantepe was used for a prehistoric parade that saw people walk through a building that contained phallus shaped pillars and a carving of a human head. "All pillars are erected and shaped like a phallus," Necmi Karul, a professor of prehistoric archaeology at Istanbul University, wrote in a paper published in the journal *Türk Arkeoloji ve Etnografya Dergisi*. The building is part of a larger complex. Excavations at the site started in 2019 and are ongoing.

The site dates to a similar time as Gobekli Tepe, another archaeological site that has large buildings and carvings of animals and human heads. Both sites are two of the oldest known monumental sites constructed by people.

Read more: [Human head carvings and phallus-shaped pillars discovered at 11,000-year-old site in Turkey](#)

Oldest war monument

A 4,300-year-old burial ground in Syria, at the site of Tell Banat, may be the world's oldest known war monument, archaeologists say. It contains the corpses of at least 30 warriors along with equids and pellets. Archaeologists found that soldiers with equids tended to be grouped in different areas that soldiers with pellets as if they were part of different units. Ancient inscriptions in Mesopotamia mention how the bodies of the war dead were piled into a highly organized structure.

The people who live in the area in modern times call the mound the "white monument" because the monument's gypsum causes it to glisten in sunlight, the archaeologists wrote. The discovery shows "that ancient people honored those killed in battle, just as we do," Anne Porter, a professor of ancient Near and Middle Eastern Civilizations at the University of Toronto and one of the study researchers, said in a statement.

Read more: [Pyramid-shaped mound holding 30 corpses may be world's oldest war monument](#)

Dragon Man

Scientists in China report the discovery of a new human species which they call *Homo longi* which means "Dragon Man." It's known from a skull that was found in 1933 but hidden in a well during the Japanese occupation of China where it remained for 85 years until it was rediscovered and studied.

The skull is the large *Homo* skull known to exist and studies suggest that Dragon Man may be the closest-known related species to *Homo sapiens*. It's not clear when exactly

Dragon Man first appeared and when it went extinct but the skull itself dates back sometime between 309,000 and 138,000 years ago, scientists found.

Some scientists have questioned whether Dragon Man is in fact a new human species and speculate that the skull may belong to a Denisovan, a hominid that has few known fossils.

Read more: [New human species 'Dragon man' may be our closest relative](#)

Oldest ghost drawing

Barely visible to the naked eye a museum curator identified an engraving on a 3,500-year-old Babylonian tablet as being the oldest known depiction of a ghost. The ghost is male, has a beard and appears grumpy as he is being led, by a rope, to the underworld by a woman.

The tablet has a spell on it that is meant to exorcise a ghost. The spell transfers the ghost into a figurine and calls upon the sun god Shamash to help the ghost pass over into the afterlife. The last line of the ritual warns "do not look behind you." The tablet is in the British Museum, having been acquired in the 19th century, but the ghost wasn't spotted until recently.

Read more: [Oldest ghost drawing discovered on Babylonian exorcism tablet](#)

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