



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

**ΔΟΙΚΗΤΙΚΟ  
ΣΥΜΒΟΥΛΙΟ:**

Γ. Φακορέλλης (πρόεδρος),  
Ι. Μπασιάκος (αντιπρόεδρος),  
Ε. Φιλιππάκη (γενική  
γραμματέας),  
Α. Οικονόμου (ταμίας),  
Μ. Παπαγεωργίου (ειδική  
γραμματέας),  
Μ. Καπαρού (μέλος),  
Ε. Κουλουμπή (μέλος)

**Πληροφορίες:**

Γ. Φακορέλλης (σύνταξη,  
επιλογή ύλης)  
E-mail: [yfacorel@uniwa.gr](mailto:yfacorel@uniwa.gr)

Scientific Association, Year  
of Establishment 1982,  
Headquarters: Kaniggos 27,  
106 82 Athens (Association  
of Greek Chemists)  
<http://archaeometry.org.gr>

**BOARD:**

Y. Facorellis (president),  
I. Bassiakos (vice-president),  
E. Philippaki (general  
secretary),  
A. Oikonomou (treasurer),  
M. Papageorgiou (special  
secretary),  
M. Kaparou (member),  
E. Kouloumbi (member)

**Information:**

Y. Facorellis (editor)  
E-mail: [yfacorel@uniwa.gr](mailto:yfacorel@uniwa.gr)

# Πληροφοριακό Δελτίο της Ελληνικής Αρχαιομετρικής Εταιρείας

**- Μάιος 2022 -**

**No man ever wetted clay and then left it, as if there would  
be bricks by chance and fortune.**

*(Plutarch, 'Plutarch's Morals', 1497)*

## Newsletter of the Hellenic Society of Archaeometry

**- May 2022 -**

**Nr. 254**

## **ΠΙΝΑΚΑΣ ΠΕΡΙΕΧΟΜΕΝΩΝ – TABLE OF CONTENTS**

### **ΣΥΝΕΔΡΙΑ – CONFERENCES/WORKSHOPS**

TECHNART 2023 Lisbon .....	page 4
43 <sup>rd</sup> International Symposium on Archaeometry, 16-20 May 2022, Lisbon, Portugal, Programme .....	page 5
GeoRaman 2022 Conference, 29 August - 2 September 2022, Prague .....	page 6
24 <sup>th</sup> International Radiocarbon Conference and 10 <sup>th</sup> <sup>14</sup> C & Archaeology Conference, September 11 - 16, 2022, Zurich, Switzerland .....	page 7
Metal 2022, September 5-9, 2022, Helsinki, Finland .....	page 9
International Online Conference “Palaeogeography, History and Sea Level Fluctuations: Harbours and Ports of the Eastern Mediterranean”, 4-5-2022, Program .....	page 11

### **ΘΕΣΕΙΣ ΕΡΓΑΣΙΑΣ/ΥΠΟΤΡΟΦΙΕΣ – JOB VACANCIES/FELLOWSHIPS**

Vacancy for Scientist at The National Gallery, London .....	page 14
Job Opportunity: Research Scientist in Data Science, Image Permanence Institute .....	page 16
Ph.D. scholarship opportunity at University of Waikato .....	page 18
Postdoctoral conservation science fellowship at the MFAH & Menil Collection, Andrew W. Mellon Postdoctoral Fellow at the Museum of Fine Arts Houston and the Menil Collection .....	page 20
Job opportunity at the University of Nottingham .....	page 25

### **INTERNET SITES**

Website of the Digital Rosetta Stone Project .....	page 26
--	---------

### **ΝΕΕΣ ΕΚΔΟΣΕΙΣ – NEW PUBLICATIONS**

Review of La Nasa, J., Degano, I., Modugno, F., Guerrini, C., Facchetti, F., Turina, V., Carretta, A., Greco, C., Ferraris, E., Colombini, M.P. and Ribechini, E. (2022), " Archaeology of the Invisible: The Scent of Kha and Merit," Journal of Archaeological Science 141, pp. 1-14 .....	page 27
--	---------

### **ΕΙΔΗΣΕΙΣ - NEWS RELEASE**

From Opium to Saffron, the Ancients Knew a Thing or Two About Drugs, by Karen Polinger Foster, Diana Stein and Sarah Kiehl Costello .....	page 31
4000-year-old boat excavated near the ancient city of Uruk .....	page 36

Why Archaeologists Virtually Reconstructed an Ancient House in Pompeii, by Jane Recker .....	<b>page 37</b>
Ancient smells reveal secrets of Egyptian tomb Jars contained fish, fruit and beeswax balm to sustain the tomb's residents in the afterlife, by Colin Barras ..	<b>page 39</b>
Ancient Greeks Left Their Mark in Egypt in 591 BC – in Graffiti, by Patricia Claus .....	<b>page 41</b>
Analysis Of Roman Coins Uncovers Evidence Of Financial Crisis .....	<b>page 43</b>
Ancient Greek Masterpieces Were Painted in Dazzling Colors, by Philip Chrysopoulos .....	<b>page 45</b>
Researchers propose a 'day zero' for the oldest computer ever discovered, by Katie Wickens .....	<b>page 48</b>
Battle of Plataea: The Decisive Victory Against Persia that Saved Greece, by Philip Chrysopoulos .....	<b>page 50</b>
Was the Acropolis a Harem? A Myth of Orientalism, by Janric van Rookhuijzen .....	<b>page 55</b>
What did the ancient Babylonians discern in the skies above? By M. Willis Monroe, Edited by Sam Haselby .....	<b>page 57</b>
Roman inventions that influence our lives today .....	<b>page 60</b>
How Did Bronze Age Greeks Know About Monkeys from Asia? By Tasos Kokkinidis .....	<b>page 63</b>
Workers discover 'unprecedented' Phoenician necropolis in southern Spain ....	<b>page 65</b>
The shipwrecks rewriting ancient history, by Alessia Franco and David Robson .....	<b>page 67</b>
Dead Sea sediment analyses show 15,000-year-old climate phase periods, by Judy Siegel-Itzkovich .....	<b>page 72</b>

---

---

## **ΣΥΝΕΔΡΙΑ - CONFERENCES/WORKSHOPS**

### **TECHNART 2023 LISBON**

Dear Colleagues,

After this hiatus of two years, we have the pleasure to announce that TECHNART 2023 will be held in Lisbon. In about 1 year, TECHNART 2023 takes place for the second time in Lisbon, from Sunday 7 May to Saturday 13 May. This last day coincides with the big celebrations in Fatima.

The aim of this congress is to provide a scientific forum to present and promote the use of analytical techniques in the field of art and cultural heritage on a worldwide scale to stimulate contacts and exchange experiences, making a bridge between science and art.

Don't miss this opportunity to get in touch again on a firsthand basis with the international community and with the manufacturers of analytical equipment.

For more details, please see <https://technart2023.com>

For any contact, [technart2023@campus.fct.unl.pt](mailto:technart2023@campus.fct.unl.pt)

Looking forward seeing you all in Lisbon,

Kind regards,

The organizing Committee.

Maria Luisa Carvalho

# **43<sup>RD</sup> INTERNATIONAL SYMPOSIUM ON ARCHAEOLOGY, 16-20 MAY 2022, LISBON, PORTUGAL, PROGRAMME**

Dear ISA community, dear colleagues,

## **ISA 2020/2022 - PROGRAMME**

We have finally reach the final schedule for the upcoming ISA 2020/2022. Below is the preliminary programme.

We look forward to welcome you in Lisbon, for the **43<sup>rd</sup> International Symposium on Archaeology**.

To those that haven't informed us about the *in person* or *online* attendance at the symposium, please do it.

**We ask you to help us to better overcome this challenge!**

You can follow us on website and social networks:

<https://www.isa2020-lisboa.pt/>

<https://www.facebook.com/isa2020lisboa>

[https://www.instagram.com/isa2020\\_2022lisboa/](https://www.instagram.com/isa2020_2022lisboa/)

Any doubts don't hesitate to contact with us.

Best regards

The local organizing committee

Rosa Marques

\*\*\*\*\*

If you have any questions, please do not hesitate to reach out to the organizers at [isa2020@isa2020-lisboa.pt](mailto:isa2020@isa2020-lisboa.pt) and check for updates at ISA 2020/2022 website

\*\*\*\*\*

---

---

## **GEORAMAN 2022 CONFERENCE, 29 AUGUST** **- 2 SEPTEMBER 2022, PRAGUE**

GeoRaman 2022 Conference is going to be held in Prague from 29 August to 2 September. The GeoRaman is a traditional international conference that covers applications of Raman spectroscopy in geoscience sensu lato. Conference topics include Raman spectroscopy applications in geology and mineralogy, cultural heritage, and exobiology.

Abstract submission for the GeoRaman conference is still open and we kindly invite you to submit your abstract.

**See the conference website for more information:**

**<https://web.natur.cuni.cz/ugmnz/georaman2022/>**

On behalf of the GeoRaman 2022 Conference local organizing committee.

Adam Culka

---

**24<sup>TH</sup> INTERNATIONAL RADIOCARBON  
CONFERENCE AND 10<sup>TH</sup> <sup>14</sup>C &  
ARCHAEOLOGY CONFERENCE,  
SEPTEMBER 11 - 16, 2022, ZURICH,  
SWITZERLAND**

Dear all

The 24<sup>th</sup> International Radiocarbon Conference will be held together with the 10<sup>th</sup> <sup>14</sup>C & Archaeology Conference in Zurich, Switzerland from September 11 to 16, 2022. The Corona pandemic has significantly disrupted the Radiocarbon conference series calendar. Originally planned for spring 2021, in Israel, the 24th Radiocarbon Conference was postponed, and the organizers agreed to merge the event with the upcoming 10th <sup>14</sup>C & Archeology Conference which was planned for fall 2022 in Zurich.

It is our pleasure to invite you to this joint conference, and we are looking forward to bringing together the radiocarbon community in person again. After a quite long period with limited personal contacts, we are happy to promote personal academic cooperation and exchange of scientific ideas.

**Please visit our website for more detailed and always up to date information on the joint conference: <https://radiocarbon24.ethz.ch/>**

Abstract submission will be possible by the end of April – you will be notified as soon as it is online.

**Scientific Program:**

The primary focus during the first two conference days will be on archaeology to attract participants active in traditional dating applications and technologies. The following days will be devoted to more general fields with radiocarbon applications and technical as well as methodical developments. We also encourage participants who deal with other long-lived radionuclides and their applications to join the conference. There will be plenary sessions every morning followed by parallel sessions later in the day. Prior to the main conference, we plan to organize workshops which will take place at the ETH campus Hönggerberg, where also the AMS laboratory is located.

**Venue and Accommodation:**

The joint conference will take place at the main Building of the Swiss Federal Institute of Technology (ETHZ), very close to downtown Zurich. Lecture halls and infrastructure of ETHZ will be available offering a comfortable environment for presenters and audience supported by modern electronic equipment. For hotel accommodation we refer to common online booking platforms. In case you have problems to find a suitable hotel, or have any other questions regarding the conference please contact us at (email).

On behalf of

Elisabetta Boaretto (Weizmann Institute)

Irka Hajdas (ETH Zurich)

Hans-Arno Synal (ETH Zurich)

Joint Conference Chairs

---

---



## **METAL 2022, SEPTEMBER 5-9, 2022,** **HELSINKI, FINLAND**

Dear colleagues,

On behalf of the ICOM-CC Metals Working Group and conference organizing committee, and after more than two years of uncertainty and isolation, we are very pleased to announce that Metal 2022 is going full steam ahead as a hybrid meeting with both in-person and virtual attendance options! Join us at the spectacular Suomenlinna Fortress, a UNESCO World Heritage Site in Helsinki's harbor from September 5-9, 2022.

For the very first time in the history of our Working Group, virtual attendance will be offered for those who will not be able to travel to Helsinki. The live-streamed and recorded virtual component is a wonderful addition and we hope it will serve as a model to expand outreach and access to the Metals Working Group community worldwide.

Conference registration is now open and ticketed events will be added next week. The early bird registration deadline is June 15! Space at the conference venue is limited, so [register today!](#)

The conference program will be a dynamic ensemble of paper and poster presentations by leading voices in our field, including Young Conservation Professionals. An overarching theme of *Sustainability in Conservation of Cultural Heritage* will reflect on current professional and personal priorities and will include a keynote presentation and a panel discussion exploring what this means to our community. More details about the program will be available in May on the [conference website](#).

An outstanding social program will include an opening reception, conference dinner, several tours to local conservation labs and the National Museum of Finland, a farewell reception, and a post-conference day trip. Pre-conference workshops will be announced shortly.

We are very excited to celebrate the 10th Interim Meeting of the Metals Working Group in Finland and hope to see you in Helsinki in September!

Paul Mardikian, Coordinator, ICOM-CC Metals Working Group

Liisa Näsänen (Program Chair),

Eero Ehanti, Heikki Häyhä, Steering Committee

\*\*\*\*\*

Paul Mardikian MSc. (Cons), MA (Arch), Fellow AIC  
Co-founder/Senior Conservator  
Terra Mare Conservation, LLC  
Charleston, SC  
(843) 670-3920

[www.instagram.com/terramareconservation](http://www.instagram.com/terramareconservation)

Coordinator ICOM-CC Metals Working Group

\*\*\*\*\*



**INTERNATIONAL ONLINE CONFERENCE**  
**“PALAEOGEOGRAPHY, HISTORY AND SEA**  
**LEVEL FLUCTUATIONS: HARBOURS AND**  
**PORTS OF THE EASTERN**  
**MEDITERRANEAN”, 4-5-2022, PROGRAM**

**Zoom link:**

[https://us06web.zoom.us/webinar/register/WN\\_lti\\_aNvJSyCjOTb4NLeV7A](https://us06web.zoom.us/webinar/register/WN_lti_aNvJSyCjOTb4NLeV7A)

**Welcome and opening remarks:**  
**11:00 • Maria Christina Chatziioannou**

**Session I**

**Chair: Ioannis Moschos**

**11:10 • Nikos Mourtzas**

Anchorage, ports and harbours. From the Bronze Age to Hellenistic Aegean. A palaeogeographic approach while the sea level was changing.

**11:30 • Chiara Mauro**

Environmental stress and ancient harbours: a survey based on ancient literary sources.

**11:50 • Alkiviadis Ginalis**

Ports as indicators of historical maritime environmental changes.

**12:10 • Ioannis Nakas**

Sisyphean harbours. Natural changes and the administration of Hellenistic and Roman harbours of the Mediterranean.

**12:30 • Discussion**

**12:50 • Break**

**Session II**

**Chair: Pari Kalamara**

**13:10 • Marco Anzidei**

Sea level changes and vertical land movements in the Mediterranean inferred from fish tanks, harbours and quarries.

**13:30 • Christophe Morhange and Jafar Anbar**

Geoarchaeology of Levantine harbours (from Syria to Gaza). Scientific problems and new avenues of research.

**13:50 • Bjørn Lovén**

Evidence of the relative sea-level change in the Piraeus.

**14:10 • Constantinos Roussos**

Ports and harbours of Crete between the 4th and the 8th c. AD.

**14:30 • Discussion**

**14:50 • Break**

### Session III

**Chair: Vyron Antoniadis**

**15:10 • Eleni Kolaiti**

Roman and Late Roman harbours of the South Aegean: sea level change and coastal landscape readings.

**15:30 • Catherine Bouras**

Monumental transformation of Aegean harbours in the Roman period.

**15:50 • Charikleia Papageorgiadou**

Ports on Roman coins. Reality or mannerism?

**16:10 • David Blackman**

Archaeological interpretations of the evidence.

**16:30 • Discussion**

### Organizing committee

Charikleia Papageorgiadou Nikos Mourtzas

Sophia Zoumbaki Marco Anzidei

Vyron Antoniadis Eleni Kolaiti

### Organising Secretariat

Vyron Antoniadis – Eleni Kolaiti

[vant@eie.gr](mailto:vant@eie.gr) [kolaitileni@gmail.com](mailto:kolaitileni@gmail.com)

Eastern European Summer Time (UTC +3) zone

Photo: Ancient Palaiopolis, Andros Island, Cyclades (archive of the Palaiopolis excavation)

### List of Participants & Contact Information

**Mr. Jafar Anbar**, PhD student, AMU-CCJ, Honor Frost foundation, [jafar3nbar@gmail.com](mailto:jafar3nbar@gmail.com)

**Dr. Vyron Antoniadis**, Associate Researcher, Institute of Historical Research/National Hellenic Research Foundation (IHR/NHRF), [vant@eie.gr](mailto:vant@eie.gr)

**Dr. Marco Anzidei**, Senior Scientist, Istituto Nazionale di Geofisica e Vulcanologia (INGV), National Earthquake Center, [marco.anzidei@ingv.it](mailto:marco.anzidei@ingv.it)

**Prof. David Blackman**, Emeritus, University of Oxford, Classical Archaeology, [david.blackman@classics.ox.ac.uk](mailto:david.blackman@classics.ox.ac.uk)

**Dr. Catherine Bouras**, Secrétaire de rédaction pour la Chronique des fouilles en ligne, École française d'Athènes, [catherine.bouras@efa.gr](mailto:catherine.bouras@efa.gr)

**Dr. Alkiviadis Ginalis**, Curator for Late Antique and Byzantine Archaeology · German Archaeological Institute, Department Istanbul, [alkiviadis-alexandros.ginalis@dainst.de](mailto:alkiviadis-alexandros.ginalis@dainst.de)

**Dr. Pari Kalamara**, Director of the Byzantine and Christian Museum, [pkalamara@culture.gr](mailto:pkalamara@culture.gr)

**Dr. Eleni Kolaiti**, Ext. Collaborating Researcher, Institute of Historical Research/National Hellenic Research Foundation (IHR/NHRF), Society for the Study of Ancient Coastlines - AKTES NPO, [kolaitileni@gmail.com](mailto:kolaitileni@gmail.com)

**Dr. Bjørn Lovén**, Senior Researcher, The Danish Institute at Athens, [bjorn.loven@gmail.com](mailto:bjorn.loven@gmail.com)

**Dr. Chiara M. Mauro**, Junior Researcher and Lecturer, Complutense University of Madrid, Department of Prehistory, Ancient History and Archaeology, [cmauro@ucm.es](mailto:cmauro@ucm.es)

**Prof. Christophe Morhange**, Professor of geoarchaeology, AMU-CEREGE, [morhange@cerege.fr](mailto:morhange@cerege.fr)

**Mr. Ioannis Moschos**, Archaeologist, Ephorate of Antiquities of Achaia- AKTES NPO, [iwmoschos@yahoo.gr](mailto:iwmoschos@yahoo.gr)

**Dr. Nikos Mourtzas**, Independent Research Scholar, Society for the Study of Ancient Coastlines - AKTES NPO, [nikosmourtzas@gmail.com](mailto:nikosmourtzas@gmail.com)

**Dr. Ioannis Nakas**, Independent Scholar, [jnak77@yahoo.com](mailto:jnak77@yahoo.com)

**Dr. Charikleia Papageorgiadou**, Research Director, Institute of Historical Research/National Hellenic Research Foundation (IHR/NHRF), [hpapag@eie.gr](mailto:hpapag@eie.gr)

**Dr. Constantinos Roussos**, Postdoctoral Research Fellow, Institute for Mediterranean Studies (IMS), [roussos@ims.forth.gr](mailto:roussos@ims.forth.gr)

**Dr. Sophia Zoumbaki**, Research Director, Institute of Historical Research/National Hellenic Research Foundation (IHR/NHRF), [szoumpa@eie.gr](mailto:szoumpa@eie.gr)

---

---

**ΘΕΣΕΙΣ ΕΡΓΑΣΙΑΣ/ΥΠΟΤΡΟΦΙΕΣ –**  
**JOB VACANCIES/FELLOWSHIPS**

**VACANCY FOR SCIENTIST AT THE**  
**NATIONAL GALLERY, LONDON**

Scientist - 35 hours per week

Salary: 36,565 GBP per annum

Application closes on 2 May 2022

Interviews in the week commencing 9 May 2022

The National Gallery seeks to recruit a highly motivated individual to join the Scientific Department to undertake technical examination of paintings in the National Gallery collection to provide interpreted and documented data in support of conservation work and to inform collections care, and other technical research including work for the scholarly cataloguing, exhibition programmes and for public engagement activities.

The jobholder will:

- be an experienced specialist in the field of technical examination of paintings and will conduct analytical research on the Collection, specifically the examination and identification of the materials in easel paintings and investigation of their ageing and deterioration, through analysis of paint micro-samples using a range of scientific techniques, as well as the non-invasive methods available at the National Gallery.
- provide expert advice to conservators based on interpretation of these results within a broad knowledge of the chemical composition and history of use of painting materials, to enable evidence-based decisions during cleaning and restoration.
- initiate and carry out historical technical research to advance knowledge on the collection, pursuing independent research projects developing materials studies relating to paintings.
- represent the National Gallery as an expert in the scientific analysis of works of art, including publishing and presenting research outcomes internally and externally to a variety of audiences at a national and international level.

Suitable candidates will have a first degree in an appropriate scientific field and a postgraduate degree in a relevant subject, or equivalent experience. In addition, you must have experience in a range of appropriate analytical techniques, and a strong knowledge of the materials of paintings coupled with a record of research in this field or another closely relevant field. The successful candidate must have excellent analytical, organisational and problem-solving skills, good attention to detail, and a high level of dexterity. You must have a high level of initiative and self-motivation but also the ability to work effectively in inter-disciplinary teams and to communicate with, and to interpret analytical findings for non-scientists/non-specialists. You will be a member of the Scientific Department and will work particularly closely with other members of this team but will also maintain regular contact with colleagues in the Conservation and Curatorial Departments, with whom joint research work is undertaken. During the course of the

appointment, the jobholder may also have contact with a number of other departments across the organisation both for collection care matters and for public engagement activities.

**Please see the following link for more information and application details:**  
[nationalgalleryjobs.ciphr-irecruit.com/templates/CIPHR/...](https://nationalgalleryjobs.ciphr-irecruit.com/templates/CIPHR/...)

\*\*\*\*\*

Catherine Higgitt  
Principal Scientist  
National Gallery  
London  
[catherine.higgitt@ng-london.org.uk](mailto:catherine.higgitt@ng-london.org.uk)

\*\*\*\*\*



## **JOB OPPORTUNITY: RESEARCH SCIENTIST IN DATA SCIENCE, IMAGE PERMANENCE INSTITUTE**

The Image Permanence Institute (IPI) is looking for an accomplished data scientist to join its preservation research team. Reporting to the Director of Research, this new position offers the opportunity to apply and develop data analytics and modeling within the field of cultural heritage. The appointed researcher will conduct research using advanced data science to generate knowledge from data and address preservation science and cultural heritage challenges relating to environmental modeling and control, material response, and sustainable preservation strategies. The successful candidate will work in a multidisciplinary team, optimizing analytical methodologies and data collection, and analyzing data from a range of measurement and sensing systems to improve our understanding of underlying causes, effects and solutions. A proportion of time will contribute to educational programming, delivering research-led teaching for professional development within cultural heritage.

Learn more about the position (RIT Career Zone, 6678BR) and apply at: [bit.ly/rit-ipi-research-scientist-apply](https://bit.ly/rit-ipi-research-scientist-apply)

### **About IPI**

IPI is a preservation research center in the College of Art and Design at Rochester Institute of Technology, Rochester, NY. IPI achieves its mission to support the preservation of cultural heritage collections through applied research, the development of practical preservation resources and tools, professional-level education and training programs, and through consulting and materials testing services. Learn more at: <http://www.imagepermanenceinstitute.org>

### **Questions**

Please contact Emma J Richardson, Director of Research and Chair of the search committee, if you have any questions about the position: [ejrp@rit.edu](mailto:ejrp@rit.edu)

The application review process will begin **June 13, 2022**. Applications beyond this date are also encouraged.

\*\*\*\*\*

Dr Emma J Richardson  
(She/Her/Hers)

Director of Research  
Image Permanence Institute  
Rochester Institute of Technology  
70 Lomb Memorial Drive, GAN-2000  
Rochester, NY 14623-5604  
(585) 475-5199



[www.imagepermanenceinstitute.org](http://www.imagepermanenceinstitute.org)

\*\*\*\*\*



## **PH.D. SCHOLARSHIP OPPORTUNITY AT** **UNIVERSITY OF WAIKATO**

We are pleased to announce a fully-funded Ph.D. scholarship opportunity at the University of Waikato, New Zealand “Investigating the impact of climate on Māori adaptation using shell archives.”

Chief Supervisor: A/Prof Fiona Petchey (University of Waikato)

Co-supervisor(s) for this project: Prof Conrad Pilditch (University of Waikato).

Collaborators: Prof Atholl Anderson, Dr Louise Furey (Auckland War Memorial Museum), Dr Gerard O’Regan (Otago Museum).

Shells recovered from archaeological sites enable us to study paleoclimate and paleo-environmental change that is directly correlated to human activity.

As part of a larger project investigating temporal change in the marine 14C reservoir, the successful applicant will use shell stable isotopes and elemental data to establish causal links between climate and environmental changes associated with the settlement of NZ (~AD 1250 to AD 1500). The candidate will explore critical questions about Māori settlement and cultural development as people adapted to a unique environment and changing temperate climate. The project will involve periods of intensive laboratory work and data processing and sample excavated material from stored archaeological collections and fieldwork.

Applicants with a background in archaeology or environmental science will be considered. Experience with stable isotopes, biogeochemistry or chronology will be highly valued. Ideal candidates will be highly motivated, curious, innovative, and have strong communication and teamwork skills.

Interested applicants should send a CV and short (< 1 page) statement highlighting their research background and interests to A/Prof Fiona Petchey ([fpetchey@waikato.ac.nz](mailto:fpetchey@waikato.ac.nz)).

Please also include contact information for 2-3 referees. Applications will be accepted until the position is filled.

\*\*\*\*\*

Associate Professor Fiona Petchey

Director

Radiocarbon Dating Laboratory

Te Aka Mātuatua - School of Science

Ph: +64 7 8384278

University of Waikato | Private Bag 3105

Hamilton 3240 | New Zealand

[<http://Waikato> Radiocarbon Lab web page: [www.radiocarbon dating.com](http://www.radiocarbon dating.com)] Waikato

Radiocarbon Lab web page: [www.radiocarbon dating.com](http://www.radiocarbon dating.com)

[<http://Waikato> Radiocarbon Lab web page:  
www.radiocarbon dating.com]Radiocarbon Web-INFO: [www.c14dating.com](http://www.c14dating.com)

[<http://Waikato> Radiocarbon Lab web page: www.radiocarbon dating.com]Electronic  
Sample Submission Form: [www.radiocarbon dating.com](http://www.radiocarbon dating.com)

\*\*\*\*\*

---

---

**POSTDOCTORAL CONSERVATION SCIENCE**  
**FELLOWSHIP AT THE MFAH & MENIL**  
**COLLECTION, ANDREW W. MELLON**  
**POSTDOCTORAL FELLOW AT THE**  
**MUSEUM OF FINE ARTS HOUSTON AND**  
**THE MENIL COLLECTION**

**Application Deadline: Application review will begin on May 23<sup>rd</sup> and will continue until the position is filled**

The Museum of Fine Arts Houston is seeking a postdoctoral researcher in the field of conservation science. This is a term position for 2 years, with a tentative start date of September 1, 2022. Applicants must have recently (within the last 5 years) received their doctoral degree in a physical science or related field. *Non-US citizens and those requiring visas are eligible for this position.*

The Andrew W. Mellon Postdoctoral Fellow is responsible for participating in the scientific analysis and research aimed at understanding, preserving, and interpreting objects from the museums' diverse collection in collaboration with curators, conservators and other museum staff, and in accordance with the AIC code of ethics.

The Museum of Fine Arts, Houston, is renowned for the quality and breadth of its collection, which includes almost 72,000 objects and spans 6,000 years of achievement in the arts. The recently concluded Museum expansion transformed the museum into a significant international forum for exhibitions, scholarship, and art education.

### **Responsibilities**

They will participate in all activities in the science lab including project design and workflow, non-destructive and micro-destructive analysis, data interpretation, generation and dissemination of scientific reports and papers, and instrument acquisition and maintenance. They are responsible for working with the Andrew W. Mellon Research Scientist, curators, and conservators to determine if analysis is warranted, deciding upon the best means for obtaining the requested information, carrying out analysis, interpreting the results, disseminating the findings, and archiving all samples, data files, and reports. They will initiate individual research projects and contribute to collaborative efforts led by the Andrew W. Mellon Research Scientist, the Chairman, Department of Conservation (MFAH) and the Chief Conservator (Menil) that will further scientific and technical art historical research at the Museum of Fine Arts, Houston and the Menil Collection.

### **Requirements and Qualifications**

A Ph.D. degree in chemistry, physics, materials science or similar specialty conferred within the last five years is required. They should have a demonstrated ability to work

both independently and collaboratively and to engage in multi-disciplinary research. A demonstrated interest in organic and inorganic materials used in artworks and their degradation mechanisms is desired, as is a working cross-cultural knowledge of art, art history, artists' materials and techniques, and routine conservation practice. The successful candidate must be highly organized and have experience in spectroscopic and chromatographic techniques commonly used in the scientific analysis of cultural heritage objects (which can include SEM-EDS, XRF, FTIR, Raman spectroscopy, GC-MS etc.). Strong computer skills, with the ability to work with databases, word processing, and data processing are required, and advanced computational and statistical analysis skills are desirable. Excellent written and oral communication skills in English are essential, as is the ability to effectively disseminate and communicate scientific results to non-technical audiences.

Reasonable accommodations will be made to enable individuals with disabilities to perform the essential functions of this position.

### **Primary Responsibilities**

- Conducts scientific examination, identification, and analysis of the museum objects' materials and fabrication techniques to contribute to the broader understanding of the works of art. Performs scientific research in consultation with the Andrew W. Mellon Research Scientist and conservators to support conservation treatment and preservation of the collection. As necessary performs scientific research on works being considered for acquisition.
- Maintains excellent and comprehensive records of research and analysis, manages and archives data, reports and samples. Enters all findings and written documentation in the science lab database. Ensures all samples, data files, images, reports, etc. related to the analyses of objects are properly labeled and stored.
- Communicates regularly with the Andrew W. Mellon Research Scientist to ensure workflow is manageable and on track and that the highest museum standards are being realized in the care and analysis of the collections.
- In consultation with the Andrew W. Mellon Research Scientist helps arrange for purchase of lab supplies and equipment within departmental budget. Helps to maintain extant scientific equipment.
- Communicates research results through written reports, journal publications, and conference presentations aimed at the scientific and art conservation communities.
- Fosters an understanding and assimilation of scientific information among conservators, curators, educators, other museum staff and the general public.
- Works with the Andrew W. Mellon Research Scientist and conservators to advise curators and other museum personnel on the maintenance of a proper environment for the optimum preservation of the museum's collection. This may include monitoring environmental conditions in museum galleries and storage areas, providing information on best materials, and recommending light levels, etc.
- As budget allows, pursues professional development opportunities by attending science workshops and meetings.
- Helps to keep lab organized and clean with all hazardous materials stored and labeled proper according to the Guidelines for Chemical Safety.

- Educates the public on the field of conservation and conservation science. Conducts classes and tours and gives lectures as required. Assist in-house Education and Learning and Interpretation Department with didactics and audio tour contents.
- Answers questions and advises colleagues, scholars and outside callers as needed.

### **Other Responsibilities:**

- Upholds the professional standards of the field. Always acts in a manner that is consistent with the best interests of the museum, protecting and enhancing its reputation and standing within the community of museums.
- Adheres to the museum's code of ethics and avoids any real or perceived conflicts of interest.
- Shows respect for co-workers and visitors and an understanding of and appreciation for the diversity of the museum's staff, volunteers, and audiences.
- Aspires to excellence in all aspects of their work and serves as a model for others. Suggests methods for improvement as appropriate and maintains personal and professional growth.
- Maintain a safe and healthful environment according to OSHA guidelines in a proactive fashion. Reports hazards, concerns and problems to appropriate personnel.
- Confers with supervisor relating to personal needs that may conflict with professional responsibilities.
- Maintains confidentiality.
- Adheres to all MFAH protocols, procedures, rules, and policies.

### **Working Conditions and Physical Demands**

The MFAH is an organization comprised of 600+ employees and 1,000+ docents and volunteers. The museum is more than 100 years old and ranks nationally among the top 10 art museums in exhibition space, memberships, endowments, and attendance, with 1M visitors annually. Our multifaceted institution includes multiple gallery buildings, a sculpture garden, two art schools, and two house museums for decorative arts. The encyclopedic collection numbers more than 65,000 works of art in a wide range of media.

To perform this job successfully, an individual must be able to perform each essential job duty satisfactorily. Essential duties may include the following:

- Occasionally lift and/or move up to 50 pounds in tandem with others.
- Manual dexterity is frequently required as duties call for handling artwork and operation of tools and equipment.
- Standing, walking, sitting, occasional climbing, bending, and kneeling.
- Specific vision abilities required by this job include close, color, and peripheral vision.
- While performing the duties of this job, the employee is occasionally exposed to fumes or airborne particles, toxic or caustic chemicals, and the risk of radiation. (PPE will be supplied.)

### **Equal Opportunities for All**

At the MFAH, we believe that diversity, equity, accessibility, and inclusivity are fundamental to our organization. We welcome all candidates whose experience has prepared them to contribute to our organization and to our pledge for workplace diversity, inclusion, and excellence.

Our commitment to our policy and practice of nondiscrimination represents more than good intentions. It provides for employment decisions that are made without regard to race, creed, color, age, gender, sexual orientation, religion, national origin, gender identity or expression, genetic information, disability, or veteran status, or any other protected characteristic as established by law or any other reason unrelated to your ability to join and contribute to our organization and support our mission to provide a museum experience for all.

The MFAH is equally committed to the full inclusion of all qualified individuals interested in employment with the organization. As part of this commitment, we want to ensure that persons with disabilities are provided reasonable accommodation needed to 1) participate in the job application or 2) interview process; 3) perform essential job functions; and/or 4) participate in the benefits and privileges of employment with the MFAH. If reasonable accommodation is needed, please contact the human resources department: [HR@mfa.org](mailto:HR@mfa.org)

### **Benefits:**

The Museum of Fine Arts, Houston, offers an excellent benefits package that includes: Group health and dental insurance coverage is effective the first of the month following employment with the MFAH for this role. Several programs are available, including:

- *Medical Insurance:* Employee and dependent coverage through a choice of managed health care programs
- *Dental Insurance:* Employee and dependent coverage through two plan choices
- *Vision Insurance:* Employee and dependent coverage through a vision program
- *Life Insurance & AD&D:* Employee coverage at no cost to the employee
- *Long Term Disability:* Employee coverage at no cost to the employee

The MFAH provides a generous schedule for time off under the following benefit categories:

- *Paid Time Off* - Used for absences from work such as vacation, illness, and personal reasons. Hours are accrued biweekly, based on employment status, length of service, and hours worked
- *Reserve Time Off* - Used for extended illnesses. Employees accrue up to 6 days per year, up to a maximum of 120 days
- *Holidays* - ten paid holidays per year
- *Volunteer Time Off* - The MFAH supports activities that enhance and serve the communities in which we live and work. Eligible staff members are eligible to receive up to 40 hours of paid time off annually to give back and volunteer.

Employees may contribute to the MFAH Retirement Savings Plan. Eligible employees contributing to the plan may receive up to a 5% matching contribution from the MFAH after one year of service.

### **Other Benefits**

- *MFAH Membership* - Employees receive a free Family-level membership
- *Discounts* - Employees receive discounts on purchases at the Museum shop and café and the Glassell School of Art

### **Compensation:**

The salary is \$50,000 per year, which includes benefits eligibility. Limited funds for research related travel are available. Funds to support relocation to Houston may also be available.

### **Application Procedure**

Qualified applicants should apply online, which will be the most effective way to ensure consideration. Applications or letters of interest sent via mail, fax, or direct email to a staff member will not ensure consideration.

Visit the MFAH Careers page at - [www.mfah.org/about/careers](http://www.mfah.org/about/careers)

"Click" on *All current employment opportunities*

Scroll through the listings to find this role. "Click" and apply! It's that easy.

### **How to Apply:**

A complete application packet will include:

- A current curriculum vitae
- A letter of application that includes:
  - An explanation of how the candidate meets the qualifications listed above.
  - A summary of the applicant's research interests and intent. It is advised that applicants familiarize themselves with the institutions' collections to in order to inform their response to this prompt.
- A list of three references with contact information. (Letters of recommendation are not required at this time.)

For additional information, please contact Dr. Corina E. Rogge, the Andrew W. Mellon Research Scientist at the Museum of Fine Arts Houston and the Menil Collection, [crogge@mfah.org](mailto:crogge@mfah.org)

\*\*\*\*\*

Corina Rogge  
Andrew W. Mellon Research Scientist  
Museum of Fine Arts, Houston  
Houston TX  
(713) 639-7738

\*\*\*\*\*



## **JOB OPPORTUNITY AT THE UNIVERSITY OF NOTTINGHAM**

The Department of Classics & Archaeology at the University of Nottingham (UK) invites applications for the following post:

Archaeology lab technician (permanent)

<https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.nottingham.ac.uk%2Fjobs%2Fcurrentvacancies%2Fref%2FARTS152022&data=05%7C01%7Caegeanet%40lists.ku.edu%7C586438c0b13040c13a8808da27828747%7C3c176536afe643f5b96636feabbe3c1a%7C0%7C0%7C637865738813742505%7CUnknown%7CTWFpbGZsb3d8eyJWlIjojMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6IjEhaWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=ayiDh2woroheO8UYIWJfTiDRAd2mLxdVNM4E5gMQS1I%3D&reserved=0>

\*\*\*\*\*

Dr Chrysanthi Gallou

Associate Professor of Archaeology

Director of the UoN Centre for Spartan & Peloponnesian Studies  
Director of Education & Student Experience, Classics & Archaeology  
Equality, Diversity & Inclusion (EDI) Rep, Classics & Archaeology  
The University of Nottingham  
Department of Classics & Archaeology  
School of Humanities  
Humanities Building  
Office B28  
University Park  
Nottingham NG7 2RD  
United Kingdom

+44 (0) 115 95 14836

[+|Chrysanthi.Gallou@nottingham.ac.uk](mailto:Chrysanthi.Gallou@nottingham.ac.uk)

\*\*\*\*\*

---

---

## *INTERNET SITES*

# WEBSITE OF THE DIGITAL ROSETTA STONE PROJECT

Welcome to the Rosetta Stone project

Welcome on the website of the Digital Rosetta Stone Project! Here, you could find out more about the ancient artifact, its contents and how research of it progresses in the digital age. We offer you open access resources, articles, and material for study (work in progress).

The "Rosetta Stone" is one of the most famous artifacts of the Ancient World. It is one of the highlights of the British Museum in London drawing the crowds. By the help of this trilingual decree and other sources, J.-F. Champollion was able to decipher Egyptian Hieroglyphs back in 1822.

~\*~\*~\*~\*~\*~\*~\*~\*~\*

Willkommen auf der Website des Digital Rosetta Stone Projekts! Hier können sie mehr über das Monument, seinen Inhalt und moderne Forschung darüber im digitalen Zeitalter herausfinden. Wir bieten Ihnen frei zugängliche Forschungsdaten, Publikationen und Unterrichtsmaterialien an (in Arbeit).

Der „Stein von Rosette“ ist eines der berühmtesten Artefakte der Antike. Er ist das Besucherhighlight im British Museum in London. Anhand dieses dreisprachigen Objekts entzifferte J.-F. Champollion im Jahr 1822 die Hieroglyphen.

Just published: A depth map of the Rosetta Stone.

University of Florida Smathers Libraries Digital Collections (local permalink):  
<https://ufdc.ufl.edu/1/IR00011130/00001>

Humanities Commons (DOI permalink):  
<http://dx.doi.org/10.17613/t1e2-0w02>

Qucosa (URN permalink):  
<https://nbn-resolving.org/urn:nbn:de:bsz:15-qucosa2-390309>

Please visit the site: <http://rosetta-stone.dh.uni-leipzig.de/rs/>

---

## ***ΝΕΕΣ ΕΚΔΟΣΕΙΣ – NEW PUBLICATIONS***

### **REVIEW OF LA NASA, J., DEGANO, I., MODUGNO, F., GUERRINI, C., FACCHETTI, F., TURINA, V., CARRETTA, A., GRECO, C., FERRARIS, E., COLOMBINI, M.P. AND RIBECHINI, E. (2022), " ARCHAEOLOGY OF THE INVISIBLE: THE SCENT OF KHA AND MERIT," JOURNAL OF ARCHAEOLOGICAL SCIENCE 141, PP. 1-14**

Dora Goldsmith, Freie Universität Berlin, Egyptology Seminar

Several media outlets have reported that scientists have reconstructed the smellscape of the 18th Dynasty tomb of Kha and Merit (TT8). However, upon reading the article entitled “Archaeology of the Invisible: The Scent of Kha and Merit”, published in the latest edition of Journal of Archaeological Science, it becomes clear that the article is merely a description of the potential the technology SIFT-MS can offer for the analysis of organic residues, and does not give any insight into the olfactory heritage of the tomb of Kha and Merit. There are two ways of reconstructing the smellscape of an ancient environment: with the help of archaeological evidence or surviving written sources. Both approaches have their advantages and disadvantages. By looking at the written documents, one has the advantage of gaining insight into the odor perceptions of the ancients – their judgements, emotions, and associated meanings. Nevertheless, one must be aware of the fact that the textual record represents what the literate elite deliberately chose to discuss, and as a result, it might not reflect the odor perceptions of the entire society. When employing archaeological evidence to reconstruct ancient smellscape, we are missing the so-called “period nose”, but we might find invaluable pieces of information that are not mentioned in the texts.

(For a detailed description of the advantages and disadvantages of both approaches, see my article “Smellscape in ancient Egypt” in the Routledge Handbook of the Senses.)

Chemical analyses of organic residues, such as the non-destructive SIFT-MS method used by the authors, have enormous potential to reveal information about the olfactory heritage of ancient Egyptian society.

However, two requirements need to be fulfilled: (1) sealed jars need to be opened; (2) researchers must have some luck. Due to the internal museum regulations of the Museo Egizio in Turin, the team of chemists carrying out the analyses did not have permission to open sealed jars.

Unfortunately, most of the jars from the tomb of Kha and Merit were hermetically sealed with linen cloth, thus their contents were not available. By putting the sealed opening of

the vessels in a plastic bag and carrying out a chemical analysis, the researchers only chemically analyzed the linen cloth and modern residues on the jars.

While I understand the reason why the contents of the jars were not available for analysis, the chemical analysis of a linen stopper is not what's exciting about an ancient perfume jar. It is the chemical analysis of the perfume residues themselves that further Egyptological research and the scientific community.

It seems that the chemists did have the opportunity to carry out chemical analyses on a small number of already opened jars. However, in these cases luck was not on their side: the volatile components that would have enabled the precise identification of odor compounds did not survive or were never there. For example, in the case of the amphora S.8526, the authors themselves claim that the chemical compounds present are not conclusive enough for the identification of styrax in the sample (pp. 8 and Fig. 4.). Thus, the authors are left with the following extremely general results: the jars contain "oils or fats", "beeswax" or "non-specific" (Fig. 3.). Should we be really surprised that ancient Egyptian perfumes contained oil, fat and beeswax? That ancient Egyptian perfumes contained oils, fats and beeswax is something that we have known since the beginning of Egyptology. It was the perfume ingredients that made ancient Egyptian perfumes fragrant. Vegetable oils, animal fat and beeswax functioned as base materials in ancient Egyptian perfumery, and have a very faint smell, if any at all. Common perfume ingredients were myrrh (*Commiphora* spp.), styrax resin and bark (*Styrax* and *Liquidambar* spp.), camphor bark (*Ocotea* spp.), mastic (*Pistacia* spp.), cedar resin and bark (*Cedrus* spp.), juniper berries and bark (*Juniperus* spp.), pine resin and bark (*Pinus* spp.), frankincense (*Boswellia* spp.), and nutgrass (*Cyperus* spp.), just to name a few. The perfumers (called nwd "cook" in Egyptian) perfumed the vegetable oil, animal fat and/or beeswax with resins, barks, berries, grasses and rhizomes through cooking, producing strongly scented ointments. My reconstruction of several ancient Egyptian perfumes based on their hieroglyphic and hieratic recipes have all produced very strong scents. Consequently, I find it troubling that the authors decided to give their paper the title "The Scent of Kha and Merit". Their analyses did not detect any scents.

In the tomb of Kha of Merit, floral creations and food supplies would have been another source of smells. As a matter of fact, the authors managed to detect one smell in this regard: that of fish in the bowl S.8321 (pp. 9). Surprisingly, even though their article claims to be about scents, they failed to mention the significance of the stench of fish in ancient Egypt. In my article "Fish, fowl and stench in ancient Egypt", published in 2019, I discuss the utmost importance of the stench of fish for ancient Egyptian society. Fish was the prototype of stench. Every word related to foul odors was classified with a fish classifier. Fish was associated with the enemy and the god of evil, Seth, who was seen as the source of all stinking things.

Furthermore, I would like to highlight a few methodological issues in the article. On pp. 11, the authors claim that the materials identified in the bowls "were in agreement with the ingredients to produce hair ointments, as reported by Dioscorides". Employing Greek and Latin sources to make statements about the olfactory culture of the ancient Egyptians in the 18th Dynasty, as done by Manniche in the book "Sacred Luxuries" published in 1999, is an inaccurate approach that leads to misinformation. There are several ancient Egyptian perfume recipes written in hieroglyphic and hieratic script and these recipes provide a wealth of information on ancient Egyptian perfumery.

(For a discussion of many of these recipes, see my upcoming doctoral dissertation.) It is impossible to gather accurate information using classical sources written hundreds, or even thousands, of years later by representatives of another culture with limited knowledge of ancient Egyptian perfumes. A close look at Greek descriptions of Egyptian perfumes reveals that while the Greeks did have some core knowledge of ancient Egyptian perfumery, they treated the original ingredients with great flexibility, freely changing many to ingredients available at their time. (For more information on this topic, see my article entitled “Eau de Cleopatra: Mendesian Perfume and Tell Timai” published in 2021.) All currently available data considered, the Greek knowledge of Egyptian perfume recipes and the cultural significance of Egyptian perfumes seems quite limited. Thus, I would like to call for caution with utilizing classical sources for making statements about the olfactory culture of the Egyptians, especially in the 18th Dynasty.

Another methodological issue involves a group of alabaster vessels described as “seven sacred oils” by the authors on pp. 12. Based on the article, these vessels are not inscribed with the names of the so-called “seven sacred oils”. Unfortunately, without a label on the jar, one cannot possibly know what the contents were. (Even if the jars are labeled, one must consider the option of secondary use.) There were countless other perfumes and fragrant remedies in ancient Egypt that were not included in the group of the “seven sacred oils”.

The names of many of these perfumes have survived, even if their recipes have not. Thus, one must be very cautious with interpreting a group of finds as the “seven sacred oils” without any labels on the jars. Additionally, in the New Kingdom, the number of the sacred perfumes had already increased to ten. Hence, one should be speaking of and expecting “ten sacred oils” from as early as the 18th Dynasty.

\*\*\*\*\*

### **Bibliography:**

Dora Goldsmith (2022), Smellscapes in Ancient Egypt, in: Kiersten Neumann and Allison Thomason (eds.), *The Routledge Handbook of the Senses in the Ancient Near East*, Abingdon; New York: Routledge, pp. 636-662.

Robert J. Littman, Jay Silverstein, Dora Goldsmith, Sean Coughlin and Hamedy Mashaly (2021), *Eau de Cleopatra: Mendesian Perfume and Tell Timai*, *Near Eastern Archaeology* 84.3, pp. 216-229.

Dora Goldsmith (2019), *The Smell of Mummification*, in: Ryuji Shikaku (ed.), *Mummies and Gods: Afterlife in Ancient Egypt and Mesopotamia*, Okayama: Okayama Orient Museum, pp. 18-23.

Dora Goldsmith (2019), *Fish, Fowl, and Stench in Ancient Egypt*, in: Annette Schellenberg and Thomas Krüger (eds.), *Sounding Sensory Profiles in the Ancient Near East*, *Ancient Near East Monographs* 25, Atlanta, GA: SBL Press, pp. 335-360.

\*\*\*\*\*

**Please visit the site:**

[https://www.academia.edu/76114204/The Scent of Kha and Merit A Review](https://www.academia.edu/76114204/The_Scent_of_Kha_and_Merit_A_Review)

---

## **EΙΔΗΣΕΙΣ - NEWS RELEASE**

# **FROM OPIUM TO SAFFRON, THE ANCIENTS KNEW A THING OR TWO ABOUT DRUGS, BY KAREN POLINGER FOSTER, DIANA STEIN AND SARAH KIELT COSTELLO**

Scholars of antiquity are finding ever more evidence that psychoactive substances played a central role in ancient life.

Thousands of years ago, in spaces darkly enclosed or dazzlingly open, many in the ancient Mediterranean and Near East consumed psychoactive substances that helped transport them into altered states of consciousness. Guided by skilled specialists, they danced, chanted, and drummed, often remarkably adorned and masked. Or they held perfectly still, in the throes of trance or waking dreams. They saw psychedelic art without and hallucinatory visions within. They journeyed near and far to sanctuaries and ritual settings, where individually and collectively they sought an experience beyond the ordinary—what the Greeks termed *ekstasis*.

Most Western scholars have traditionally greeted the idea of such scenarios in the ancient world with polite skepticism or outright resistance. For them, drugs and ecstatic experience were hardly part of the “proper” foundations of Western civilization, long deemed to rest squarely on the intellectual achievements and pristine marble of the sober rationalists of classical Athens.

Over the last 20 years, however, serious cracks have appeared in this model, slowly but surely widening to reveal an ancient past rich in ecstatic experience and as brilliantly colored as those marble temples originally were. There’s now a growing shelf of publications on the archaeology of the senses, emotions, and psychotropic substances. For senior scholars secure in their positions, inquiry into the unorthodox or speculative no longer jeopardizes their careers. For younger scholars, these avenues offer exciting opportunities to blaze new paths in fields like Classics, Assyriology, and Egyptology.

To be sure, the challenges are many. So much was deliberately kept secret from the uninitiated, never written down or explicitly described. In the visual record, the iconography of ecstatic experience often lies hidden behind culture-specific imagery. An animal/human hybrid in an Egyptian tomb, for instance, may be a mythological figure, whereas a similar creature on a Greek vase may be a masked dancer in an altered state of consciousness. Inevitably, there are also gaps in our sources: Materials such as wood and textiles are perishable; organic substances tend to be ephemeral; finds illicitly dug up have lost their contexts, while others await archaeological recovery in as yet unexcavated sites.

Thus we cannot, and should not, expect the world of the distant past to give us an abundance of unambiguous proof for widespread or ritual drug use. Such headline discoveries as the cannabis and frankincense burned on an eighth-century BCE altar in Israel are few and far between. What we can do is lift our eyes from the narrow lens of

canonical texts and major monuments to consider the cumulative knowledge gleaned from the widest possible range of information—from archaeobotanical analyses to ethnoarchaeological work with living populations. In addition, cross-cultural and cross-temporal triangulation is invaluable for interpreting what makes the most likely sense for the phenomena we study, or for changing our minds when new data surface.

Take, for example, two recent revelations about opium. It's been recognized for a while that certain archaeobotanical Cypriot juglets of the mid-second millennium BCE bear a striking resemblance to the poppy's seed pod. Are these vessels the earliest containers designed to advertise their contents? Did they actually hold opium? Successive residue analyses performed on unsealed juglets were inconclusive and cast doubt on the theory. Then researchers at the British Museum and the University of York tested a sealed vessel—and there the opium alkaloids were. So 3,500 years ago in the eastern Mediterranean, savvy opium traders thought about product marketing in a way that seems modern (or should we say timeless?) in its approach.

From ancient Afghanistan comes fresh insight into the opium trade's stakeholders there. In the heart of the Bactrian kingdom of the late first millennium BCE to the early first millennium CE, a Soviet-Afghan archaeological team in the late 1970s found six intact tombs at the site of Tillya Tepe. Their treasures, caught up in decades of war and occupation, have recently received renewed scholarly attention. We now see that many of the gold and turquoise ornaments worn by the elite women in four of the tombs have motifs of poppy flowers and seed pods, whose gold granulation evokes the bead-like appearance of raw opium droplets, oozing out after harvesters have scored the pods. Since neither the warrior nor the very young woman buried in the other two tombs had any such ornaments, there is good reason to think that these notable women were prominent in the opium business, part of a long history of women entrepreneurs in other spheres, stretching back at least into third-millennium Mesopotamia.

A few years ago, it occurred to the three of us that it was time to try to put these and other puzzle pieces together to create a holistic picture, organized thematically across time and space. The resulting volume of essays, *Ecstatic Experience in the Ancient World*, presents for the first time cutting-edge research on what psychoactive substances were used in antiquity, how drugs and ecstatic experience related to the numinous, and what their presence signifies in specific settings.

What emerges is an overwhelming sense of the centrality of ecstatic experience for ancient peoples and cultures. This was not the stuff of marginal groups, foreign migrants, or subversive elements, nor of random consumption, haphazard activity, or spontaneous experimentation. Rather, it was a complex phenomenon, assiduously managed and commemorated, that held societies together, defined their distinctive and shared traits, and melded the individual and the collective into a coherent whole.

Over the millennia, people throughout the ancient world came to recognize that certain plants had desirable culinary or healing properties and could usher their consumers into altered states of consciousness. Archaeobotanical remains, magico-medical texts, visual records, and ethnobotanical observations point to the widespread awareness and use of opium, cannabis, saffron, fly agaric mushrooms, henbane, harmala, mandrake, coriander, dandelion, and ephedra, among other plants.



To cite one example, the saffron crocus was particularly meaningful on the Aegean island of Thera (modern-day Santorini). In the wall paintings preserved in a building buried by the island's cataclysmic volcanic eruption in the mid-second millennium BCE, we see young women in crocus-adorned finery gathering the blossoms in baskets. A bejeweled woman presides on a dais, attended by a monkey and a leashed griffin (a raptor-headed, winged lion). On the level above are psychedelic murals of dizzying red and blue spirals, rosettes, and lozenges, while elsewhere in the building monkeys play musical instruments, a woman self-mortifies, and nude males bear vessels, to describe just some of the images.

Saffron, a mind-altering neurotoxin if taken in quantity or used in conjunction with psychedelic and other sensory stimuli, could certainly have produced the dramatic hallucinations depicted in this building's art and architecture. The small red and blue shapes painted in the whites of both female and male eyes likely give further signs of their altered states. In addition, as a labor-intensive crop, saffron must have commanded as high a price then as it does today, doubtless accounting for its major role in Thera's economic, social, and ritual life. Again, women seem to have been prime movers in the entire venture.

The heirloom marble bowl found in this particular Thera building may well have contained a psychoactive potion, as perhaps did the vessels the nude males bring. In the ancient Mediterranean and the Middle East, wines, beers, and grogs provided an agreeable liquid in which to dissolve the active ingredients of psychotropic plants. They also, of course, had their own intoxicating properties, vividly described in drinking songs, mythological tales, and other literature. Numerous cuneiform texts from Mesopotamia document every process in the manufacture of these beverages, keeping scrupulous track of the amounts of materials used and produced. Residue analyses have yielded traces of alcoholic drinks in presses, vats, and cups, many of them linked to burial and sanctuary rituals as far back as 13,000 years ago. Periodically, experimental archaeology tries its hand at re-creating these beverages, based on their chemical signatures.

A motif commonly seen in the seal art of greater Mesopotamia is the so-called banquet, in which attendees sit side by side or facing each other, sipping liquids through long tubes. While this may have aided in filtering impurities, it is also likely that the practice accelerated and intensified intoxication and other effects. The absence of feasting in these scenes suggests that they show funerary or sacrificial drinking rites, attested archaeologically by the assemblages of cups and flasks found in graves and temples.

A gold version of one of these drinking tubes, conveniently bent at one end, was found among the wealth of goods recovered from the mid-third millennium BCE tomb of Puabi at Ur in southern Iraq. Perhaps a queen or high priestess, Puabi and several of the other notables buried in the cemetery were accompanied by scores of retainers.

Precisely how these courtiers died en masse is uncertain. Later Mesopotamian texts document the preparation of psychoactive plants for narcotic or lethal purposes, so it is possible these people were drugged before meeting their deaths.

While at Ur these substances may have been part of state funerary practices, elsewhere they frequently promoted political, religious, and social agendas for the living. A

splendid example of this comes from a cuneiform tablet of the early 18th century BCE found in the archives of the palace at Mari, located on the Euphrates in present-day Syria. The text gives a rare full account of a royal and community ritual in honor of Ishtar, the principal goddess in the Mesopotamian pantheon, who was responsible for the investiture of the king at Mari, among her other offices.

The ritual began in the evening, with the king spending the night in Ishtar's bed in her temple. The next day, her statue was set up outside, along with those of minor deities and divine emblems, all flashing in the sun. The king made his entrance, magnificently attired, and was seated on a special throne. Hours of chanting, music, and performances of strength and skill ensued in a prescribed sequence. For participants and audience alike, the experience was a multimedia spectacle, arousing highly charged states of mind and body, and surely enhanced by the consumption of psychoactive substances. At the ritual's conclusion, Ishtar was gratified and the religio-political compact renewed, with the king acknowledged as the divinely sanctioned intermediary between the goddess and his subjects.

At one point, there appeared an "ecstatic" or "prophet." Such individuals, both men and women, while they were in an altered state of consciousness (or, as the Mesopotamians termed it, "not in equilibrium"), uttered "the speech of the gods," often concerning the personal welfare of the king and the security of his government. The cuneiform tablets found in the Mari archives record many of these speeches verbatim, together with remarks on the ecstasies' behavior.

How they entered an altered state is not specified. Suggestively, though, several texts describe giving a beverage of some sort to men and women referred to as "answerers," who were then asked questions of a political nature, to which they were to reply with a simple yes or no. Presumably this drink contained psychoactive substances, perhaps mixed with wine, as Mari was a key center in the wine trade.

The examples we've touched on here represent just the tip of the current research and thinking on these topics. There is much more to be learned: One very promising area stems from the revival of clinical interest in the efficacy of psychedelic drugs in the treatment of affective conditions. Related advances in neuroscience have shed considerable light on how and why the human brain, under the influence of psychoactive stimuli, consistently produces initial visions of tunnels, whorls, petaloids, and other geometric patterns, known as "form constants." This inspired one of us to compare, for the first time, modern psychedelic art with Minoan ceramics made in the Cretan palaces of Knossos and Phaistos in the 18th century BCE. The spectacular parallels, even down to their glossy black backgrounds, point us in fascinating directions for future inquiry into psychedelic imagery elsewhere in the ancient world.

For many, recognition of the fundamental, positive role played by drugs and ecstatic experience may run contrary to the negative bias shaped by the backlash against the counterculture of the 1960s. Thus far, we find no ancient evidence for hostility or stigmatization.

Instead, drug use seems to have been an integral feature of community life, as well as an accepted way, on occasion, for some to shed societal constraints. By the same token, it seems clear that the principal and most significant use was in carefully orchestrated constellations of events and purposes, typified in the vignettes we've given here.

As for our skeptical colleagues, we would encourage them to start looking beyond the usual suspects to see in past Western civilizations an ancient world diverse in its beliefs, elastic in its practices, and exuberant in its celebrations of the human mind and spirit. We see no need to abandon the rationalist constructs so carefully maintained over the years, but instead to enrich them by placing them in a much broader context and—this is crucial—by acknowledging that they possess no immutable values of cultural superiority.

We who study the long ago are often asked what relevance it has for our modern age. As our corporate overlords attempt to lure us into a metaverse of their own design, and as fragmentation replaces community, it may bring solace to reflect on the unities that bind us, past and present. If we today seek to overcome alienation and divisive discourse through meditation, spirituality, and altered states, we are not alone in using ecstatic experience and, yes, drugs to do so.

Across the millennia, we humans have sought myriad ways to expand the dimensions of our consciousness, to reach other levels of being within ourselves, to express creatively what we find there, and to invoke ecstatic experiences for the individual and collective good. To echo the opening lines of the Babylonian Epic of Gilgamesh, full knowledge of it all may we gain.

\*\*\*\*\*

Karen Polinger Foster, a retired lecturer at Yale University, specializes in the art of the Aegean, Egypt, and the ancient Near East.

Diana Stein, associate lecturer at Birkbeck, University of London, specializes in seals and sealing practices in the ancient Near East.

Sarah Kiehl Costello, associate professor of art history at the University of Houston–Clear Lake, focuses on early Mesopotamian and Cypriot art and archaeology.

[Together, the authors edited the anthology *Ecstatic Experience in the Ancient World*, published by Routledge in December 2021.]

\*\*\*\*\*

Please visit the site: <https://www.thenation.com/article/society/ancient-world-drugs/>  
[Go there for pix]

## **4000-YEAR-OLD BOAT EXCAVATED NEAR THE ANCIENT CITY OF URUK**

A team of archaeologists from the Iraqi German Mission of the State Board of Antiquities and the Orient Department of the German Archaeological Institute have excavated a 4000-year-old boat near the ancient city of Uruk.

Uruk, also known as Warka was an ancient city of Sumer (and later of Babylonia), situated on the dried-up ancient channel of the Euphrates River.

Uruk played a leading role in the early urbanisation of Sumer in the mid-4th millennium BC, emerging as a major population centre until it was abandoned shortly before or after the Islamic conquest of AD 633–638.

The boat was first discovered during a study of the Uruk-Warka environs in 2018, where it was photogrammetrically documented, however, the threat of road traffic near the site has led to a rescue excavation to preserve the remains.

Constructed from reed, palm leaves and wood, the boat was covered in bitumen, a substance produced through the distillation of crude oil that is known for its waterproofing and adhesive properties.

Measuring 7 metres in length and 1.4 metres wide, the archaeological context shows that the boat sank on the banks of a river around 4000-years-ago and became buried in layers of sediment.

In accordance with Iraqi antiquities law, it was taken to the Iraq Museum in Baghdad for further scientific study and conservation.

**Please visit the site: <https://www.heritagedaily.com/2022/04/4000-year-old-boat-excavated-near-the-ancient-city-of-uruk/143307> [Go there for pict]**

---

## **WHY ARCHAEOLOGISTS VIRTUALLY RECONSTRUCTED AN ANCIENT HOUSE IN POMPEII, BY JANE RECKER**

The team hopes to simulate how visitors would have experienced the space and gain a stronger understanding of the motivation behind Roman designs

“[T]his study show[s] how the owner of the house stimulated the visitor’s senses to convey a message about its power and wealth,” says co-author Danilo M. Campanaro in a statement. *Antiquity*, 2022

Researchers in Sweden are using virtual reality (VR) to envision what a lavishly decorated home in Pompeii might have looked like before its destruction in 79 C.E., reports Ariel David for *Haaretz*. As Danilo M. Campanaro and Giacomo Landeschi, both archaeologists at Lund University, write in the journal *Antiquity*, the ongoing project seeks to shed light on Roman architectural practices by showing how ancient visitors would have experienced the estate.

To create the VR model of the so-called House of the Epigrams, the duo drew on data from Lund’s Swedish Pompeii Project, which “uses drones and laser scanners to map an entire neighborhood in the ancient city,” per Sarah Cascone of *Artnet*. The archaeologists then plugged their VR recreation into the video game engine Unity, which also hosts *Pokémon Go*.

Discovered in the 1870s, the House of Epigrams derives its name from the mythical frescoes and inscriptions that adorn its walls.

Researchers hypothesize that the home belonged to a man named Lucius Valerius Flaccus, whose signet ring was found in the ruins.

The domus, or house, was clearly the residence of an important patrician family. According to *Haaretz*, excavations at the site have yielded around 160 domestic artifacts, including jewelry, bronze and clay lamps, a set of silverware, and a Pan flute. Standing two stories tall, the building was designed to impress.

“Work and daily activities were intermingled during the day,” says Campanaro in a statement. “The house communicated to people about the personal power and status of the owner and his family.”

Campanaro and Landeschi wanted to figure out how the house’s impressive design functioned—in other words, how visitors would have seen and interacted with it. The co-authors simulated this experience by asking volunteers to “walk” through the house under two different lighting scenarios: dawn on the winter solstice or noon on the summer solstice. To map these volunteers’ “visual impressions,” in the words of *ARTnews*’ Shanti Escalante-De Mattei, the pair recorded three data points with eye-tracking technology: the head position of the user (gaze), what users’ eyes focused on when relatively still (fixation) and the duration of each session (event).

The Antiquity study outlines the researchers’ methodology but leaves the specific results of their study largely unaddressed. Campanaro and Landeschi plan to offer a more detailed analysis in an upcoming paper, but for now, they simply tell Haaretz that the best decorations, paintings and architecture were reserved for areas of the home that were only accessible to the owner’s closest friends and family.

“[T]his study show[s] how the owner of the house stimulated the visitor’s senses to convey a message about its power and wealth,” says Campanaro in the statement.

Eventually, the team’s findings may add to the list of architectural techniques used in Roman home design. Per the statement, previous research has shown that some ancient homeowners used angled walls and raised floors to make their houses’ interior look larger to passersby peering through the front door. Next, the researchers say they might expand the VR experience to incorporate simulated smell and sound.

“VR is often used to improve the visitor experience at a museum or an archaeological site,” Landeschi tells Haaretz. “This is a very noble goal, but we wanted to show that together with other technologies it can be used as a research tool rather than just an educational tool.”

\*\*\*\*\*

Jane Recker is a writer for Smithsonian.com and The Chicago Sun-Times. She is currently at Northwestern University studying journalism and opera.

\*\*\*\*\*

Please visit the site: <https://www.smithsonianmag.com/smart-news/why-archaeologists-virtually-reconstructed-an-ancient-house-in-pompeii-180979857/>

---

---

## **ANCIENT SMELLS REVEAL SECRETS OF EGYPTIAN TOMB JARS CONTAINED FISH, FRUIT AND BEESWAX BALM TO SUSTAIN THE TOMB'S RESIDENTS IN THE AFTERLIFE, BY COLIN BARRAS**

More than 3,400 years after two ancient Egyptians were laid to rest, the jars of food left to nourish their eternal souls still smell sweet. A team of analytical chemists and archaeologists has analysed these scents to help identify the jars' contents<sup>1</sup>. The study shows how the archaeology of smell can enrich our understanding of the past — and perhaps make museum visits more immersive.

The 1906 discovery of the intact tomb of Kha and Merit in the Deir el-Medina necropolis near Luxor was a landmark moment in Egyptology.

The tomb of Kha — a 'chief of works', or an architect — and Merit, his wife, remains the most complete non-royal ancient burial ever found in Egypt, revealing important information about how high-ranking individuals were treated after death.

"It's an amazing collection," says Ilaria Degano, an analytical chemist at the University of Pisa, Italy. "Among the objects, there are even examples of Kha's ancient Egyptian linen underwear, embroidered with his name."

Unusually for the time, the archaeologist who discovered the tomb resisted the temptation to unwrap the mummies or peer inside the sealed amphorae, jars and jugs there, even after they were transferred to the Egyptian Museum in Turin, Italy. The contents of many of these vessels are still a mystery, although there are some clues, says Degano. "From talking with the curators, we knew there were some fruity aromas in the display cases," she says.

### Odour analysis

Degano and her colleagues placed various artefacts — including sealed jars and open cups laden with the rotten remains of ancient food — inside plastic bags for several days to collect some of the volatile molecules they still release. Then the team used a mass spectrometer to identify the components of the aromas from each sample. They found aldehydes and long-chain hydrocarbons, indicative of beeswax; trimethylamine, associated with dried fish; and other aldehydes common in fruits. "Two-thirds of the objects gave some results," Degano says.

"It was a very nice surprise."

The findings will feed into a larger project to re-analyse the tomb's contents and produce a more comprehensive picture of burial customs for non-royals that existed when Kha and Merit died, about 70 years before Tutankhamun came to the throne.

This isn't the first time that scent compounds have revealed important information about ancient Egypt. In 2014, researchers extracted volatile molecules from linen bandages that are between 6,300 and 5,000 years old that were used to wrap bodies in some of the earliest known Egyptian cemeteries<sup>2</sup>. The molecules confirmed the presence of embalming agents with antibacterial properties, showing that Egyptians were experimenting with mummification some 1,500 years earlier than had been thought.

Odour analysis is still an underexplored area of archaeology, says Stephen Buckley, an archaeologist and analytical chemist at the University of York, UK, who was involved in the 2014 study. "Volatiles have been ignored by archaeologists because of an assumption they would have disappeared from artefacts," he says. But "if you want to understand the ancient Egyptians, you really want to go into that world of smell".

For example, sweet-smelling incense derived from aromatic resins was essential for the ancient Egyptians. "Incense was necessary for temple ceremonies and for some mortuary rituals," says Kathryn Bard, an archaeologist at Boston University in Massachusetts. Because resin-producing trees didn't grow in Egypt, this necessitated ambitious long-distance expeditions to obtain supplies.

### Enriched exhibits

Aside from revealing more about past civilizations, ancient smells could add a dimension to the visitor experience at museums. "Smell is a relatively unexplored gateway to the collective past," says Cecilia Bembibre at University College London. "It has the potential [to allow] us to experience the past in a more emotional, personal way."

But reconstructing ancient smells is not easy, says Bembibre. Degradation and decomposition can be a smelly business, so the scents from an artefact today do not necessarily match what Bembibre calls the original "smellscape" of a tomb.

With the right knowledge and understanding, it should be possible to pull the original and the decomposition scents apart, says Buckley.

Whether visitors would actually want to experience the full and potentially unpleasant smellscape of an ancient tomb is still up for debate. "Curators might want to give people a choice over how far they want to push the smell experience," says Buckley.

\*\*\*\*\*

### References

La Nasa, J. et al. *J. Archaeol. Sci.* 141, 105577 (2022).  
Jones, J. et al. *PLoS ONE* 9, e103608 (2014).

\*\*\*\*\*

Please visit the site: <https://www.nature.com/articles/d41586-022-00903-z> [Go there for pix]



## **ANCIENT GREEKS LEFT THEIR MARK IN EGYPT IN 591 BC – IN GRAFFITI, BY PATRICIA CLAUS**

Graffiti is usually viewed nowadays as a modern scourge, a blight on buildings and highway overpasses in our cities that should be eradicated. However, the urge to leave your mark for posterity is nothing new, as ancient Greek graffiti carved into the Temple of Abu Simbel in Egypt clearly shows.

Ancient Greece and ancient Egypt were intertwined in many ways, starting millennia ago as Greek mercenaries were hired to fight for the pharaohs, culminating in the installation of Macedonia's Ptolemaic dynasty on the throne of Egypt.

Many Greeks of that time were clearly literate, even including the soldiers of fortune who traveled to Egypt since they left their names and historical descriptions of their campaigns on temples and other buildings.

Graffiti reveals the footprint of the Greeks in ancient Egypt. On the imposing statue of Rameses II at Abu Simbel, Greek words and names can be seen clearly even today, millennia after they were left there.

The statue for the great Egyptian leader, who was also known as the "Governor of the Two Lands," bears clear ancient graffiti referring to the military campaign fought by Egyptian King Psamatik II in 593 BC in Nubia. His fighting forces consisted of both Egyptian and Greek soldiers, who were led by commanders from each of these lands.

The Egyptian soldiers were led by an officer named Ahmose, who the Greeks called "Amasis," while the Greek soldiers were led by an officer called "Botasimto," but this name appears to be a Greek distortion of the Egyptian name "Ba-de-Sema-Tawy," meaning "The gift of the two lands."

It should come as no surprise that the two great civilizations had a large amount of interaction even since the earliest times. There is a great deal of evidence that even as far back as the Bronze Age, there was significant contact between Minoan Crete and Egypt.

It seems, however, that beginning in the 600s BC, a new era dawned, in which much closer ties developed between the two Mediterranean powers, as Egypt began to reopen its kingdom to contact with the wider world.

Egyptian pharaohs from the Saite dynasty, which was established by the reign of Psamtek (Psammetichos) I (664–610 BC), began this metamorphosis in Egyptian political culture, and its markings have survived to this day.

Egypt would never be the same after this contact led to profound change in its society; this would, in later centuries, lead to the establishment of the Ptolemaic dynasty of which Cleopatra was the last ruler in this ancient land.

It has been shown by historians that Greek city-states and islands, including Aigina, Athens, Sparta, Miletos, Samos, Phokaia, and cities on the island of Rhodes, figured heavily into this cultural exchange.

Egyptian products and objects, including amulets, are known to have been used and traded in Greece as far back as the ninth century BC.

More importantly, there were “diplomatic” gifts bestowed by Egyptian pharaohs, including Necho II (610–595 BC) and Amasis (570–526 BC) to major the Greek religious sanctuaries at Miletos/Didyma, Rhodes, Samos and Sparta as early as the 6th century BC.

Greece and Egypt and the traces of an ancient interaction In Egypt itself, traces of Greek culture can be found in the numerous wine amphorae found throughout the Nile Delta and Upper Egypt, from the mid to late 7th century and onward. In fact, the Greek historian Diodorus Siculus recorded that both Greek and Phoenician traders had been working in Egypt since the time of Psammetichos.

However, wars brought a great many individuals from East Greece to Egypt, and these mercenaries actually formed a significant part of the Egyptian army of the 26th Dynasty, particularly after the establishment of the alliance between Psammetichos I and the Lydian king Gyges in 662 – 661 BC.

A few of these Greek warriors occupied high ranks in the Egyptian army’s foreign battalions, including a man called Pedon, who recorded the rewards he received from Pharaoh Psammetichos on an Egyptian statue, dedicated most likely in the early 6th century BC in an Ionian sanctuary.

Perhaps the most striking recorded example of Greeks in Egypt is that of Psammetichos, the son of Theokles, who was most likely a second-generation mercenary since his name appears to have been inspired by that of Egyptian Pharaoh Psammetichos (Psamtek) I.

His name is preserved forever in the ancient graffiti carved into the leg of Ramses II at Abu Simbel left in 593 BC by Greeks in the army of Psammetichos (Psamtek) II.

Other finds dating back to the sixth century BC, including grave stelae of both Greeks and Carians from Saqqara, the necropolis of the city of Memphis, clearly show motifs from both the Greek and the Carian traditions.

The historian Herodotus himself mentions the presence of Greek traders in Egypt, and it is known that foreigners at that time already occupied posts in the administrative and religious life of the kingdom. Clearly, long before the Ptolemies gained power over the ancient realm of Egypt, Greeks had made their mark in this remarkable place as they have throughout the world ever since that time.

**Please visit the site: <https://greekreporter.com/2022/04/06/ancient-greeks-left-their-mark-in-egypt-in-591-bc-in-graffiti/> [Go there for pix]**

## **ANALYSIS OF ROMAN COINS UNCOVERS EVIDENCE OF FINANCIAL CRISIS**

New scientific analysis of the composition of Roman denarii has brought fresh understanding to a financial crisis briefly mentioned by the Roman statesman and writer Marcus Tullius Cicero in his essay on moral leadership, *De Officiis*, and solved a longstanding historical debate.

Researchers at the University of Warwick and the University of Liverpool have analyzed coins of the period and revealed a debasement of the currency far greater than historians had thought, with coins that had been pure silver before 90BC cut with up to 10 percent copper five years later.

Dr. Ponting at the University of Liverpool said: "The Romans had been used to an extremely fine silver coinage, so they may well have lost confidence in the denarius when it ceased to be pure. The precise level of debasement might have been less important to contemporaries than the mere realization that the coin was adulterated and no longer made of true 'silver.'"

Professor Butcher at the University of Warwick said "The discovery of this significant decrease in the value of the denarius has shed new light on Cicero's hints of a currency crisis in 86BC. Historians have long debated what the statesman and scholar meant when he wrote 'the coinage was being tossed around, so that no one was able to know what he had.' (*De Officiis*, 3:80) and we believe we have now solved this puzzle."

The reference is part of an anecdote describing self-serving behavior by Marius Gratidianus, who took credit for a proposal for currency reform worked out jointly by the tribunes and the college of praetors and became hugely popular with the public as a result. But what was the cause of the coinage being "tossed about," and what were the solutions for which Gratidianus took credit?

Rome and the Coinages of the Mediterranean 200 BCE—64 CE, a five-year research project funded by the ERC aims to increase our understanding of the economies of classical Rome and other Mediterranean states by analyzing the composition of their coins and cross-referencing the findings with the historical record.

The research team includes Professor Kevin Butcher at the University of Warwick, Dr. Matthew Ponting at the University of Liverpool, and Dr. Adrian Hillier at ISIS Neutron and Muon Facility, STFC Rutherford Appleton Laboratory.

Dr. Ponting said: "Our minimally invasive sampling technique used to take samples from these important coins has revealed a significant decline in the value of the denarius— from being a pure silver coin, the denarius first dropped to under 95% fine, and then it fell again to 90%, with some coins as low as 86%, suggesting a severe currency crisis."

Professor Kevin Butcher explains the context: "In the years after 91 BC the Roman state was in danger of becoming bankrupt. The Romans were at war with their own allies in Italy, and by the conclusion of the war, in 89 BC, there was a debt crisis.

"By 86 BC there appears to have been a crisis of confidence in the currency, too. Cicero related how the Roman tribunes approached the college of praetors to resolve the crisis, before Gratidianus claimed sole credit for the collective effort.

"One theory is that Gratidianus fixed the exchange rate between the silver denarius and the bronze as (which had only recently been reduced in weight). Another is that he published a method for detecting fake denarii, and so restored faith in the coinage.

"Unfortunately, Cicero's choice of words is too obscure for historians to determine exactly what was going on. His purpose in writing about it wasn't to illuminate monetary history; he was just using the incident as an illustration of a Roman magistrate behaving badly by taking credit for the work of others.

"It has long been thought that there was a very slight devaluation of the denarius between 89–87; but was it enough to trigger a currency crisis?"

The results of the metallurgical analysis suggest that the financial difficulties experienced by Rome in these years led to a relaxation of standards at the mint in 90 BC, with the result that the silver content of the coinage declined in two stages, so that by 87 BC the coinage was deliberately alloyed with 5–10% copper.

Professor Butcher added: "This could be the meaning of Cicero's words: that the value of the coinage was 'tossed about' because nobody could be certain whether the denarii they had were pure or not.

"It is all the more noteworthy that around the time Gratidianus published his edict, the standard of fineness rose sharply, reversing the debasement and restoring the denarius to a high-quality currency.

"Although the precise chronology remains uncertain, the new scientific data suggest that it could have been the main aim of Gratidianus' edict, rather than something to do with exchange rates between silver and bronze or detecting forgeries."

In the decades that followed, the Romans avoided debasing the denarius again, until the state once again faced huge expenses during the civil war between Pompey and Julius Caesar. Even then, the Roman mint did not go as far as it had in the time of Gratidianus.

These findings are part of a larger EU-funded study that aims to examine the financial and monetary strategies of Mediterranean states from c. 150 BCE to a major coinage reform in c. 64 CE by providing a detailed and reliable set of analyses of the chemical composition of all major silver coinages of that period.

Source: University of Warwick [April 06, 2022]

Please visit the site: <https://archaeologynewsnetwork.blogspot.com/2022/04/analysis-of-roman-coins-uncovers.html> [Go there for pix]

## **ANCIENT GREEK MASTERPIECES WERE PAINTED IN DAZZLING COLORS, BY PHILIP CHRYSOPOULOS**

It is nearly impossible to imagine the sparkling white sculptures of ancient Greece painted in a variety of bright colors.

Marveling at the ancient Greek masterpieces today, there is a notion ingrained in our minds that all those magnificent sculptures were originally spotless white marble and time has robbed some of them of their glorious sheen.

We tend to think that iconic statues such as Hermes, the Winged Victory, and the Venus de Milo were plain marble sculptures that are just missing some parts, as well as their gleaming white skin.

However, it is now certain that ancient Greek sculptors used bright colors, as well as gold and ivory, to further beautify the magnificent structures they created.

In fact, most of them were dazzling in their color schemes, which was essential to the overall impact the sculptures were intended to create.

Ancient Greek sculptures were painted many bright colors. Phidias, the celebrated sculptor who created the masterpiece of the Parthenon, had sculpted a huge statue of Athena Parthenos to stand inside the great building.

Although the statue has long since been destroyed, there is a description of it in the writings of the ancient historian Pausanias, who wrote that the statue was “chryselephantine” or, in other words, covered in gold and ivory.

There is also a verse in Euripides’ tragedy “Troades” (The Trojan Women), written in 415 BC, in which Helen says:

My life and fortunes are a monstrosity, Partly because of Hera, partly because of my beauty.

If only I could shed my beauty and assume an uglier aspect  
The way you would wipe color off a statue.

The last line clearly indicates that all sculptures had been colorfully painted and that this must have been essential to their beauty and impact.

Praxiteles, the creator of the famous Hermes and the Infant Dionysus, was once asked to identify his favorite statues. His reply was “The ones painted by Nikias.”

Unfortunately, after centuries of lying on the ground, the paint on the statues has been irreparably lost. Yet, there are remnants that, although not all visible to the naked eye, can be detected with modern technology.

Technology reveals the long-lost colors and paint of ancient Greek sculptures

Using non-destructive techniques, such as multifaceted imaging and elemental analysis with X-ray fluorescence, archaeologists and restorers are now able to largely recreate the original colorful appearance of the painted ancient Greek sculptures.

There was a pattern in the depiction of Ancient Greek sculptures: the gods had blonde hair which signified their nobility, and warriors had brown hair and skin while women, on the other hand, had white skin signifying the glory of their youth. Additionally, women were depicted also wearing makeup.

The “Peploforos,” or “Peplos Kore” in the Acropolis Museum has been reproduced along with her original vivid colors, according to the painstaking research of a team of conservationists.

She has auburn hair, scarlet lips, and brown eyes, and there are colorful decorative ribbons on her clothing.

As mentioned in a new article on the website of Smithsonian Magazine, German archaeologist Vinzenz Brinkmann has devoted intense effort to the reproduction of Ancient Greek sculptures in their original, dazzling colors. Using high-intensity lamps, ultraviolet light, cameras, plaster casts, and powdered minerals, Brinkmann has attempted to revive the brilliant glory of ancient Greece.

Brinkmann has also created full-scale plaster or marble copies which have been hand-painted in the same mineral and organic pigments employed by the ancients: green from the stone malachite, blue from azurite, yellow and ocher from arsenic compounds, red from cinnabar, and black from burned bone and vines.

Replicas of colorful Greek art displayed in museums around the world Brinkmann has exhibited his collection of replicas in several museums around the world. His greatest honor was when his works were exhibited at the National Archaeological Museum of Athens, with top Greek government officials and renowned archaeologists attending the opening.

It was then when he had the opportunity to have some of his works photographed in front of the Parthenon, such as the brilliantly colored, exotic-looking Archer, a replica of a 490 BC Greek sculpture.

Today, with the aid of this modern technology, ancient Greek masterpieces can be reproduced as the polychromatic sculptures they were meant to be.

We are already amazed at the perfection of the white or ivory-hued ancient sculptures that we have seen for centuries and perhaps find it hard to believe any pigments could possibly enhance the perfection of these masterpieces.

Nonetheless, if more and more of these meticulously-accurate, painted copies begin to be exhibited in museums and other exhibition spaces, people will be once again be able to see them just as the ancient artists intended them to be viewed and admired.

Please visit the site: <https://greekreporter.com/2022/04/06/ancient-greek-masterpieces-were-painted-in-dazzling-colors/> [Go there for pix in livid color]

---

---

## **RESEARCHERS PROPOSE A 'DAY ZERO' FOR THE OLDEST COMPUTER EVER DISCOVERED, BY KATIE WICKENS**

Built some time between 200 BC and 60 BC, the Antikythera mechanism is the oldest known computer mechanism in existence. This ancient, geared device for tracking the heavens is in pretty bad shape after all that time.

But, despite the rust, researchers may have finally revealed the date it was first set ticking—also known as "Day Zero."

The mechanism is actually a hand-wound clock, used to calculate the sun, moon and planets' movements, and predicting eclipses. It was discovered over a century ago in a shipwreck, says NewScientist, after a gale blew divers off-course to the barren islet of Antikythera—hence the name.

Since then, the mechanism has made waves in our understanding of how technologically advanced the ancient Greeks were. It's proven that their technical ability was far beyond what we initially thought.

Archimedes himself may have even had a hand in the original design of mechanisms like this one, since it has links to his home city of Syracuse.

Mathias Buttet, Director of Research and Development at Hublot, who helped recreate a wearable version of the mechanism([opens in new tab](#)) says the "Antikythera mechanism includes ingenious features which are not found in modern watchmaking." That all points to the ancient Greeks having been better at measuring time than we ever imagined.

But as with any mechanism that measures, calibrations are needed. For a clock like this the calibrations would require a start date to ensure the device's accuracy.

Recent advancements([opens in new tab](#)) have pointed to the calibration date having been around the time the moon was in its apogee position, its furthest position in orbit from the Earth, which causes a kind of solar eclipse.

Aristeidis Voulgaris of the Thessaloniki Directorate of Culture and Tourism in Greece supposed the calibration date was around [[Go there for pix](#)], backing it up with the fact that a bunch of other culturally important astronomical events happened simultaneously. The winter solstice is one event that helped push the team toward their conclusion, particularly as the mechanism's inscription mentions it specifically.

Four independent calculations have been made by other researchers, which place the device's calibration closer to 204 BC, however. These calculations relied on the period where the mechanism's astronomical predictions were most accurate, but place the date in the summer. That potential has researchers scratching their heads over the prominence of the device's winter solstice inscription.



Looks like there's still a way to go before researchers agree on a Day Zero for the Antikythera mechanism, then. Still, it's good to know this ancient precursor to modern tech isn't being forgotten about, even after all these years.

\*\*\*\*\*  
Screw sports, Katie Wickens would rather watch Intel, AMD and Nvidia go at it. She can often be found admiring AI advancements, sighing over semiconductors, or gawping at the latest GPU upgrades. She's been obsessed with computers and graphics since she was small, and took Game Art and Design up to Masters level at uni. [...]

\*\*\*\*\*

Please visit the site: <https://www.pcgamer.com/antikythera-mechanism-day-zero-calibration-date/> [Go there for pix]



## **BATTLE OF PLATAEA: THE DECISIVE VICTORY AGAINST PERSIA THAT SAVED GREECE, BY PHILIP CHRYSOPOULOS**

The Battle of Plataea was the final clash of the second Persian invasion of Greece with the victory of the allied Greek forces putting a final end to Persian military ambitions. This decisive battle occurred in the city of Plataea in Boeotia in 479 BC.

The battle was fought between an alliance of Greek city-states, including Sparta, Athens, Corinth, Megara, and others against the Persian army of Xerxes I along with a large number of pro-Persian Greeks, mainly from Thebes.

Plataea was an ancient city located in southeastern Boeotia south of Thebes.

The previous year, the invading Persian force, led by the Persian king himself, had scored victories at the Battles of Thermopylae and Artemisium and conquered Thessaly, Boeotia, and Attica.

However, at the ensuing Battle of Salamis, the Allied Greek Navy had won an unlikely yet total victory, therefore preventing the conquest of the Peloponnese.

Xerxes then retreated with most of his army, leaving his general, Mardonius to finish off the Greeks the following year. After all, the Persians controlled a big part of Greece, and their Army was almost intact.

Greeks assemble allied army to kick out Persians In the summer of 479 BC, the Greeks assembled a huge allied army, marching out of the Peloponnese to push the Persians out once and for all.

According to Herodotus, the Greek hoplite forces for the Battle of Plataea were divided as follows: 8,000 Athenians; 5,000 Corinthians; 5,000 Lacedaemonians; 5,000 Spartans, 3,000 Megarians; and 3,000 Sicyonians.

There were: 1,500 Tegeans; 1,000 Phleians; 1,000 Troezenians; 800 Anactorians/Leucadians; 800 Epidaurians; 600 Orchmenians; 600 Plataeans; 500 Aeginetans; and 500 Ambraciots joining them.

A total of 600 Eretrians/Styrians; 400 Chalcidians; 300 Hermionians; 300 Potidaeans; 200 Lepreans; 200 Paleans, and an unspecified number of Thespians joined these forces, totaling 38,700 hoplites.

### **The Persian forces at Plataea**

Although the historian Herodotus did not provide specifics on the Persian Army for the Battle of Plataea, the numbers are estimated to have come to 110,000.

The Persian forces were divided into units of various nationalities with their estimated numbers showing 40,000 Persians, 20,000 Medes, 20,000 Bactrians, Indians, and Sacae.

There were also 50,000 pro-Persian Greeks, mostly Thebans, accounting for a total of 110,000 troops with a combined cavalry force 5,000 strong.

Upon the approach of the Greeks, the Persian forces retreated to Boeotia and built a fortified camp near Plataea.

The Greeks, who had no cavalry at all, refused to be drawn into the prime cavalry terrain around the Persian camp.

### **Battle strategies**

The Persian general, Mardonius, was confident that the outnumbered Greeks were easy prey for his vast army and were potentially divided.

Persian warfare favored long-range assault using archers followed up with a cavalry charge while Greek warfare was based on heavily-armored hoplites fighting in tight formation at least eight men deep, called the phalanx.

Each hoplite carried a heavy round bronze shield and fought at close quarters using spears and swords.

The Persian infantry, on the other hand, carried lightweight wicker shields and were armed with a long dagger or battle ax, a short spear, and composite bow.

In addition, the Persian forces included the Immortals, an elite force better protected with armor and armed with spears.

The Persians also had a cavalry armed with bows and an additional two javelins for throwing and thrusting. The horsemen attacked on the flanks of the main battle, causing the opposing infantry to land into disarray after the repeated salvos from the archers.

The Greeks, knowing that the Persians preferred open terrain for the way they fought – with archers and cavalry – chose the advantages of broken terrain.

In addition, the light arrows of the Persian archers were hardly effective against the heavy armor and shields of the Greek hoplites.

Fighting at close quarters with the heavy armor, longer spears and the rigid discipline of the phalanx formation meant that the Greek hoplites would have an advantage on broken terrain.

“Greek hoplites attack the Persian Army,” by John Steeple Davis (published 1900).  
Wikimedia Commons Public Domain

### **The Battle of Plataea**

The Greek forces moved into position, forming a 7 km (4.3 miles) long front just 3-4 km opposite the Persians below the low hills of Cithaeron.

Mardonius lined up his army with the Persians holding the right flank, and the Medes and the Bactrians, Indians, and Sacae in the center. On the left flank, he lined up the pro-Persian Greeks. The cavalry forces waited slightly back, one group on each flank.

On the opposite side, the Spartans, Tegeans, and Thespians held the right flank and the Athenians, Megarians, and Plataeans held the left flank, with everyone else in the center.

Once in position, the two armies waited with each side remaining in their preferred terrain: the Persians on the plain and the Greeks in the broken terrain near the hills.

After two days of a stand-off, the Battle of Plataea began with Mardonius sending in his cavalry to attack the side of the Megarians and Athenians. The Athenian archers helped the Greeks to hold their lines.

In the attack, the Greeks managed to kill the Persian commander, Masistius, thus boosting the morale of their forces.

After this slight victory, the Greeks advanced to the northwest just south of the river on the Pyrgos ridge, to obtain a better water supply, but Mardonius did not respond.

Both sides then held position for another week or so with both remaining on their advantageous terrain, as no commander wanted to risk battle on unfavorable terms.

Mardonius then sent his cavalry on a mission around the right flank of the Greek forces where the supply column was situated.

The Persians slaughtered the poorly-armed Greeks and burnt the supplies, dealing a heavy blow to the hoplites by cutting off their food and water.

The Spartan General Pausanias, in order to reach a water supply under the cover of darkness, moved the Greek center back to the base of the Cithaeron hill just in front of Plataea.

After two days, Mardonius unleashed his cavalry in a full frontal attack on the Greek lines. At the same time, the Persians blocked access to the Gargaphia spring which was the Greeks' main source of water.

The Greek battle-line fragmented and seemed to be in full retreat. Mardonius ordered his forces to pursue them and finish them off.

At this point, the cavalry had withdrawn, probably to rearm themselves with fresh arrows. The Persian foot soldiers tried to chase the retreating Greeks.

Instead, however, the Spartans, Athenians, and Tegeans halted and counter-attacked, routing the lightly-armed Persian infantry and managing to kill Mardonius, after a Spartan hoplite Arimnestus simply hurled a rock at him.

The remnants of the Persians were forced back across the river in disarray. However, the pro-Persian Theban cavalry intervened and allowed them to reoccupy their fortified camp.

The pro-Persian Greek hoplites on the right flank were also forced to retreat under pressure from the Athenians, taking up position behind the walls of Thebes.

The Athenians, Spartans, and Tegeans then stormed the Persian camp, causing more heavy casualties amongst the invaders, slaughtering many, and forcing the rest to flee.

The destruction of the invading army, and the remnants of the Persian navy – apparently on the same day at the Battle of Mycale – put an end to the Persians' ambitions to take over Greece.

The Greeks then turned to Thebes and stormed and sacked the city, punishing the Thebans for siding with the Persian invaders.

### **Aristodemus redeems himself in Plataea**

Among the victorious Greeks, there was one Spartan hoplite, Aristodemus, who had survived the Battle of Thermopylae. He did not die alongside King Leonidas and his brave 300 Spartans.

His returning to Sparta alive while all his fellow warriors were killed in battle was the ultimate act of treason for Spartans.

The coward was not punished, but he was treated as if he did not exist; he was invisible and no one would touch him.

According to Herodotus, before the heroic battle, Aristodemus and Eurytus had been stricken by an eye disease and became blind. King Leonidas deemed them unfit to fight and ordered them to return home before the battle.

Eurytus, however, turned back to the battlefield, and though literally blind, met his valiant death very early on in the battle.

Aristodemus, who duly returned to his homeland, was regarded as a coward and subjected to humiliation. He was even called "Aristodemus the Coward" from then on.

Herodotus believed that had both Aristodemus and Eurytus returned to Sparta alive, or Aristodemus alone been ill and excused from combat, the Spartans would have ascribed no blame to him.

To redeem himself and shed the stigma of being a coward, Aristodemus chose to seek a glorious death at the Battle of Plataea only just one year after Thermopylae.

There, it was recorded that he fought fiercely and bravely, desperately trying to get rid of his shame and clear his name.

His courage and bravery did not go unnoticed. Unfortunately for him, however, the military leaders also saw a recklessness that was completely incompatible with the discipline required for the success of the Spartan phalanx.

Every move outside the battle plan was viewed as jeopardizing the lives of fellow warriors.

Once again, Aristodemus was in a difficult position and was forced to apologize for his stance. Although very seriously injured in the battle, he was deemed insane.

### **Aftermath**

Although the Battle of Plataea was in every sense a decisive victory, it has not been attributed the same significance as the victory at the Battle of Marathon, the victory in Salamis, or even the Allied heroic defeat at Thermopylae.

With the Plataea victory, the Greeks had sent a message to Xerxes that Greece would not allow herself to be subjugated to any foreign invader.

The victories at Marathon, Salamis, and Plataea had ensured the survival of Greece and allowed for Greek civilization to flourish and become the foundation upon which all Western cultures would be based.

Please visit the site: <https://greekreporter.com/2022/04/09/battle-of-plataea/>

---

---

## **WAS THE ACROPOLIS A HAREM? A MYTH OF ORIENTALISM, BY JANRIC VAN ROOKHUIJZEN**

New research makes a case for reexamining the way 15th-century Turks used the Acropolis of Athens—and the role of Western beliefs in exoticizing the people of the Ottoman Empire.

The Acropolis of Athens counts among the world's greatest architectural and artistic monuments. Visitors come to admire the marble buildings that testify to the glory of ancient Greece more than 2,000 years ago. Typically, only little attention is paid to the site's rich medieval and Ottoman history. But one of the few stories commonly told about this period concerns the temple with six iconic sculptures of maidens, the so-called Caryatids.

Ancient Athenians built the temple with the Caryatids as the holiest shrine for Athena, the goddess of wisdom. In the medieval period, it was used as a church. But its fate supposedly changed dramatically following the Ottoman Turkish conquest of Athens in the 15th century.

The story goes that the Muslim Turks had no interest in preserving the temple's sacrality and instead converted it into something radically different: a harem. This was said to be the residence of the Turkish castle warden's wives and sometimes thought of as a place of seduction.

But my new research shows this information might need to be revised.

As part of this study, I analyzed all relevant historical sources about the Acropolis from the Ottoman period. It turns out the idea of a Turkish harem here originated in the 17th century with two visitors from France and England. They published popular books in which they asserted that the building was a harem. These visitors, however, did not even enter the building and gave contradictory, possibly speculative information about it.

Fantasy or not, the notion of the harem has long fascinated Western audiences, who've enjoyed these exotic tales of the Orient. Later authors simply repeated the information. This was even the case after the building had fallen to ruin in the Venetian bombardment of 1687.

My research also included several understudied Turkish sources. None of these mentions anything like a harem in the temple of the Caryatids either. But they do seem to say that it was in use as some kind of palace. All in all, there is little to suggest that the temple was ever converted into a place of erotic encounters.

### **HAREMS AND TEMPLES**

Stories about harems in the temple of the Caryatids already existed in the time of the ancient Greeks—many centuries before the Turks arrived. The striking Caryatids themselves appear like petrified women in front of the building. They likely played a role

in the creation of such tales. Time and again, visitors to the Acropolis have given meaning to the mysterious building based on these sculptures.

Anthropological research shows that impressive statues like the Caryatids can stir the imagination, prompting wild stories that are sometimes mistaken for “factual” history. To the casual onlooker, the Caryatids could serve as evidence for the harem.

Five striking statues, known as the Caryatids, feature prominently in the Temple of Athena Polias, a famous monument of the Acropolis. The sixth Caryatid is in the British Museum. Yair Haklai/Wikimedia Commons

But the idea of the harem is also deeply problematic as it continues a long-lived Western stereotype of the Turks as violent, sacrilegious barbarians. This stereotype originates in the many centuries of warfare between Christian European countries and the Muslim Ottoman Empire. Then, too, developed the popular fantasy that Turkish harems were mysterious, erotic places of seclusion.

The idea that the temple of the Caryatids became a decadent harem fit right into this negative Western sentiment about the Turks. That sentiment had dire consequences: Shortly after the young Greek state’s conquest of Athens in the 19th century, it led to the complete annihilation of the Turkish town that stood on the Acropolis. The same attitude led Lord Thomas Elgin, a British nobleman, to remove many Acropolis sculptures in the early 19th century—including one of the Caryatids.

### **IMPRISONED SISTER**

Still today, these sculptures reside in the British Museum in London, to the dismay of many (in Greece and elsewhere) who wish to see them returned to Athens. Though the Caryatids still continue to fire the imagination: Local legend claims the marble girls who remain in Athens can be heard crying out at night in lament for their imprisoned sister in London.

The notion of a Turkish harem ties in with the current meaning of the Acropolis as an important archaeological site and a symbol of Greece and Western civilization. But this symbolism has a dark side: Anti-Eastern stories continue to be told at the expense of the Turks.

The Turks are typically portrayed as the villains of the Acropolis, but my research shows this is a crude interpretation of more than three centuries of Turkish presence. And it doesn’t do justice to their actual attitudes: Historical sources show that the Turks were not always the violent barbarians they are often made out to be.

Rather, they were just as fascinated about the antiquities as modern tourists are today.

Please visit the site: <https://www.sapiens.org/archaeology/acropolis-harem/>



# **WHAT DID THE ANCIENT BABYLONIANS DISCERN IN THE SKIES ABOVE?**

## **BY M. WILLIS MONROE, EDITED BY SAM HASELBY**

Almost 2,700 years ago, a Babylonian astronomer wrote on a clay tablet the observations he had just made from the top of the ziggurat: ‘The Sun and Moon were in opposition at sunset, Mercury had its last appearance in Pisces (before disappearing behind the Sun) and Saturn also had its last appearance in Pisces.’ Glancing at the overcast skies, the writer added: ‘The day was cloudy, I did not watch.’

So many thousands of years ago and with no instrumentation other than eyes and mind, and despite cloudy weather, this astronomer produced an accurate observation of two planets. What does it mean to record an observation that you did not actually see? How does the co-mingling of scientific theories and our sense of sight produce observations of the world around us?

The way in which we see the world is as much a product of the stimuli generated by our optic nerve as by our mental models of how things work. Astronomical records from ancient Mesopotamia give us the first evidence in history of scientific observation as a way of seeing dependent on theoretical understanding. We can begin to gain a better appreciation of the history of the relationship between observation and theory from the records left by the highly skilled astronomers of ancient Babylonia. They wrote thousands of cuneiform tablets in ancient Mesopotamia, which were buried for millennia. Modern translations of their work give us a window into a highly technical practice of observing the sky with ancient eyes and complex theory, or in other words the practice of celestial ‘observation’.

Babylonian astronomers wrote observations in cuneiform, a complex script invented around 3200 BCE and in continuous use up until the 1st century CE. They lived in southern Mesopotamia (modern-day Iraq) in the cities of Babylon and Uruk around the second half of the 1st millennium BCE (500-0). They were the inheritors of thousands of years of scholarship and theory about the sky above them. To note that they watched the sky religiously is not a pithy antiquated characterisation of their work, but a matter-of-fact description of their theoretical conception of the world: the planets as gods moved through the heavens by divine design.

There is no way to separate religion and science in the ancient world. Their observational practice was recorded on clay tablets called ‘regular watching’ (*našāru ša ginê*), which compiled together hundreds of years of records about movement in the sky, water level in the rivers, economic prices and historical events. They also wrote procedural and theoretical works about how to calculate the movement of planets and, importantly, the meaning behind their appearance in certain places of the sky (ie, astrology). They invented the idea that configurations of the heavens could have an impact on one’s personal life, also known as horoscopes. The astronomers of ancient Babylonia were equal parts astronomers and astrologers, there was no distinction in the ancient world, the two (modern) fields worked in close harmony.

As far as we know, astronomers of ancient Mesopotamia lacked any instrumentation that would make sighting objects in the sky any easier than naked-eye astronomy. They worked only with their eyes and the theoretical knowledge in which they had spent most of their lives training. And here is the crux of the historical and theoretical problem: how did their sense of sight (as in the capacity for their eyes to transmit images to their brain) interact with their (highly trained) sense of astronomical movement? Modern scientists in lab settings do something similar; they read instrumentation or observe colour change and impute scientific knowledge from the sensory data combined with their theoretical understanding of the conditions. A chemist or biologist reading the marks on a graduated cylinder uses their eyes to locate where the bottom meniscus of the liquid intersects with the lines present on the glass. This involves both the sense of sight and a theoretical understanding of how the surface tension of liquids behaves in restricted spaces. Another example, closer to the work of ancient astronomers, is the understanding of redshift (ie, the increase in wavelength as objects move apart) as determining the relative speed of objects in our galaxy. Colour perception, as recorded by the eyes of the observer, is used as the input data for a theoretical understanding of how wavelength and frequency change, based on relative velocity.

So what was the theoretical understanding of ancient Babylonian astronomers? Their models of celestial movement were remarkably accurate and accommodated the complex dynamics of planetary motion. Of course, fundamentally, they described a solar system that we now know is not accurate. For them, celestial bodies moved across the sky in giant arcs, sometimes reversing in what we now call retrograde motion; they were less interested in the configuration of the solar system than the regularities of its movement. But, over the course of the 1st millennium BCE, they iterated and improved upon their systems of prediction by leveraging an increasing amount of observational data and continuous testing of predictions.

They deduced systems that modelled the appearance of the Moon throughout a lunar month that included the variability in velocity near the new Moon. Their models for planetary motion preceded developments thousands of years later by Sir Isaac Newton and others in the invention of calculus. They understood that the velocity of planets changed over time. By averaging the velocity between known points, they could calculate something similar to a wave function that predicted velocity at any point during a planet's orbit.

All of these theoretical developments took time. There is a clear progression in complexity from the early to late models. Scribes trained for years by copying out procedure texts and taking observations as apprentices to senior scribes (usually their fathers or uncles). Though their models of the sky were wrong, they produced discrete results so accurate that they formed the basis of astronomy up until the Copernican revolution. We should always remember that aspects of science now can be accurate but flawed in their theory (sometimes in undetectable ways). For those looking at the sky night after night, it wasn't all clear skies and bright stars. A cloudy night or a dust storm would prevent the astronomer from seeing the heavenly bodies they intended to locate.

In these cases, the scribes wrote the Sumerian phrase 'NU PAP' in their texts, meaning 'I did not watch.' Yet, they still included an observation of the celestial body's location in the sky. Similarly, they might be copying earlier records of observation and encounter a

damaged section of text: by filling in the data based on the theoretical models, they could complete a previously missing observation. Their theoretical knowledge was sophisticated enough that it allowed them to chart the movement of celestial bodies in the absence of any direct sensory evidence. We can contrast this with examples when they ‘did not watch’ the river level. In these cases, they lacked a theoretical model for river level over time; so, if they were not able to see the river bank, there was no observation to report and thus no data to record.

The way we see the world is as much a product of our senses as it is of our culturally mediated ways of understanding what is around us.

For the ancient Babylonians, it was the combination of technical knowledge and their sense of sight that created a scientific way of viewing the heavens above. They of course would not have called it ‘science’: for them, it was the practice of ‘tupšarrūtu Enūma Anu Enlil’, literally meaning the ‘scribal art of the [textual series] “When [the gods] Anu and Enlil...”’. It was a discipline that covered both the scientific prediction of planetary movement as well as the auspicious meaning behind their appearance at certain locations within the sky.

But just as they watched the sky using highly trained technical skills, they also told stories of the god Marduk creating the world and setting the Moon in its phases. Astronomy, astrology and religion were all ways that ancient Mesopotamians observed and reported on the world around them. While we may see these as separate (and likely invalid) fields of enquiry, it is important to recognise how even modern science can be dependent on cultural perspectives. Observation, whether of the stars above or of liquid in a beaker, is mediated by features of our complex and many-faceted identities.

\*\*\*\*\*

M Willis Monroe is a historian of the ancient Near East with a focus on the science and scholarship of 1st millennium Mesopotamia. He is a research associate at the University of British Columbia, and the author of *The Micro-zodiac Texts from Seleucid Babylonia* (under contract). He lives in Vancouver, Canada.

\*\*\*\*\*

Please visit the site: <https://psyche.co/ideas/what-did-the-ancient-babylonians-discern-in-the-skies-above> [Go there for pict]

## **ROMAN INVENTIONS THAT INFLUENCE OUR LIVES TODAY**

Sewer systems, underfloor heating, cement buildings: Roman inventions are standard modern-day technologies. A new exhibition celebrates the legacy of such ancient ingenuity.

### **The Roman aqueduct in Segovia still delivers water to the Spanish city**

Ancient Rome reached its high point some 2,000 years ago. But today you can still find remnants all over Europe, North Africa and the Middle East of what was once the biggest and most powerful empire of the ancient world.

In Nimes in southern France, for example, Roman aqueducts tower above the landscape, tall as any modern apartment building; while in Pompeii in southern Italy, the columns of an ancient bath stand straight and unbroken after millennia.

Such structures testify to pioneering Roman construction techniques, skills that are the focus of a new exhibition at the Landesmuseum Mainz located southwest of Frankfurt.

Entitled "High Tech Romans," the exhibit is a showcase of Roman technological innovation exploring everything from the first floor-heating system in history, to revolutionary sanitation facilities, to a wind and weatherproof concrete that still survives.

The exhibition 'High Tech Römer' has interactive and digital elements that bring Roman inventions to life

### **Building for eternity**

Roman inventiveness certainly helped develop an unprecedented empire, no more so than in the realm of building and architecture.

Romans built aqueducts and the first multistory residential buildings using "opus caementicium," from which the modern word "cement" is derived.

So-called Roman concrete was so durable that some buildings remain standing today, including Emperor Nero's luxurious Domus Aurea (Golden House) complex, the Roman Colosseum, and the Pantheon with its massive concrete dome.

It wasn't until the 19th century that concrete was rediscovered as a construction material. But the modern variant lasts only for around 50 years before it begins to soften and crack. Researchers have discovered that Roman concrete contained a special ingredient that gave it incredible durability: volcanic ash.

The Pantheon's giant dome uses Roman concrete Long-lasting concrete was not the only Roman building innovation.

Though the empire's construction methods depended heavily on human and often slave labor, they also utilized complex mechanical wooden cranes, for example — a working model of which is on show in Mainz.

But with the fall of the empire, such Roman construction equipment, tools and materials fell into obscurity.

### **Luxury construction with all mod-cons**

As construction on Emperor Nero's 80-hectare (198-acre) Domus Aurea reached its conclusion, he is said to have remarked: "Now I can finally start to live like a human being."

Yet whether the young emperor who committed suicide in 68 BC actually ever lived in the grandiose palace known as "Golden House" remains unclear.

What is certain is that when it came to Roman construction, comfort was important. The first floor-heating system was developed by the Romans whereby warmed air passed through a system of masonry pipes located under the floor tiles. It was yet another pioneering Roman invention used in baths, private homes and public buildings.

The Romans used an underground pipe system made of brick or stone to allow hot air to circulate, heating the floors directly above

### **All road networks lead to Rome**

Aqueducts, streets and urban planning: The Romans were masters in building sophisticated infrastructure networks.

Urban design was built around a network of roads, some dead straight, that connected isolated corners of the empire with the capital in Rome. Some modern road systems today are partly orientated on ancient Roman precursors, including in London.

Cities were also planned out in great detail. They featured residential grids and civic squares such as the forum in the city center.

### **The Forum Romanum was the center of life in Rome**

The forum was a rectangular plaza where large public buildings were located, such as the courthouse, the temple, theaters and administrative offices. The Forum Romanum in the heart of Rome, for example, served as a model for many other cities of the empire.

### **Advanced wastewater system**

One of the most important networks of the Roman era was the underground sewer system. In Rome, this was called the "Cloaca Maxima," and it was originally used to drain the swampy land around the city's seven hills.

However, the Romans quickly realized the myriad potential co-functions of such an underground wastewater system.

Underground aqueducts can still be found under the streets of Rome today

In the first century, all 11 Roman aqueducts were connected to the sewer system, and the wastewater canals were later used to empty latrines and channel away rain water.

The system quickly became the standard for all Roman cities from Milan to Paris to London. Parts of the Cloaca Maxima are still in use in Rome today.

### **Hygiene as a high priority**

Hygiene and cleanliness played important roles in Roman society, explaining the popularity of public bath houses and bathing complexes known as thermae.

The city of Bath, England, takes its name from its Roman bathing complex, or thermae

Also considered the first wellness centers, baths were places where Romans socialized as they were intended to serve families without private sanitation facilities.

They were so popular that the Roman emperor even dropped by on occasion to spend time — and be seen spending time — among the populace.

The "High Tech Romans" exhibition aims to bring all these achievements of Roman ingenuity to life. And it's no coincidence that the show is in Mainz: The Romans founded the city as a legionary camp more than 2,000 years ago before it went on to become a regional center of the empire.

The exhibition "High Tech Romans" runs through January 15, 2023 at the Landesmuseum in Mainz.

\*\*\*\*\*

This article has been translated from German.

\*\*\*\*\*

Please visit the site: <https://www.dw.com/en/roman-inventions-that-influence-our-lives-today/a-61499759>

## **HOW DID BRONZE AGE GREEKS KNOW ABOUT MONKEYS FROM ASIA? BY TASOS KOKKINIDIS**

Scientists have debated the reason why Bronze Age wall paintings at the ancient settlement of Akrotiri on the Greek island of Santorini depict monkeys that existed thousands of miles away in Asia.

Some claim the works of art suggest that ancient cultures separated by great distances had clearly been trading and exchanging ideas for some time despite barriers and difficulties involved.

Akrotiri was a settlement of the Minoan civilization in Bronze Age Greece buried by ash from a volcanic eruption which occurred around 1600 BC.

Many of the paintings on the walls of buildings there clearly portray monkeys; yet, there is no archaeological evidence of monkeys in Greece at the time.

Most of the monkeys in the artwork have been identified as Egyptian species, such as olive baboons.

This makes sense because Egypt is known to have had contact with the Minoan civilization, which occupied several Aegean islands.

Credit: Zde/ Wikimedia Commons/ CC BY-SA 4.0

Monkeys depicted on Bronze Age Greek Frescoes from Indus Valley

However, as a New Scientist report recently revealed, the other primates depicted on the walls were grey langur monkeys. Their habitat includes southern Asia, or what is now Nepal, Bhutan, and India—and particularly the Indus Valley, home to one of the greatest ancient Bronze Age civilizations.

Somehow, the artist who painted the monkey mural must have seen a grey langur for himself.

Did Minoan Greeks visit the Indus Valley? “I wouldn’t be surprised if someday in the future we found evidence for that kind of direct contact,” says Marie Nicole Pareja at the University of Pennsylvania in Philadelphia.

Of course, it is also possible langur monkeys were brought to Greece, but again, there is no evidence, Pareja adds in her interview with the New Scientist.

Instead, it may be that Greece and Indus were connected via Mesopotamia, another great Bronze Age civilization centered in what is now Iraq.

Langurs may have been imported to Mesopotamia, where they were seen by visiting Greeks, for menageries.

“It’s evidence of this far-reaching trade, these relationships with these far-flung areas,” says Pareja. Hence, even in the Bronze Age, it seems there indeed was a great deal of exchange between these seemingly disparate and completely separated civilizations.

**Please visit the site: <https://greekreporter.com/2022/04/14/bronze-age-greeks-know-about-asian-monkeys/>**

---

---



## **WORKERS DISCOVER ‘UNPRECEDENTED’ PHOENICIAN NECROPOLIS IN SOUTHERN SPAIN**

Preliminary surveys in Osuna have turned up eight burial vaults as well as staircases

Subterranean limestone vaults have been discovered in Osuna, where the Phoenicians who lived on the Iberian peninsula 2,500 years ago laid their dead. Photograph: Andalucía regional government Sam Jones

Workers upgrading water supplies in southern Spain have come across an “unprecedented” and well-preserved necropolis of subterranean limestone vaults where the Phoenicians who lived on the Iberian peninsula 2,500 years ago laid their dead.

Archaeologists exploring the site – which was discovered amid the Roman ruins in the town of Osuna, 55 miles (90km) east of Seville – say the Phoenician-Carthaginian cemetery dates back to the fourth or fifth century BC and is highly unusual as such sites are normally found in coastal areas rather than so far inland.

Although the local ruins of the Roman city of Urso are well known, the discovery of the Phoenician necropolis has stunned archaeologists and locals. The only similar finds have been made around the coast of Cádiz, which was founded by the Phoenicians in 1100BC and which is one of the oldest continuously inhabited cities in Europe.

Preliminary surveys have so far turned up eight burial vaults as well as staircases and areas that are thought to have served as atriums.

The culture and historical heritage department of the Andalusian regional government, which is overseeing the excavations, said its archaeologists had discovered “a series of remains of unquestionable historical value” that were “unprecedented in inland Andalucía”.

The lead archaeologist, Mario Delgado, described the discovery as very significant and very unexpected. “To find a necropolis from the Phoenician and Carthaginian era with these characteristics – with eight well tombs, atriums and staircase access – you’d have to look to Sardinia or even Carthage itself,” he said.

“We thought we might find remains from the imperial Roman age, which would be more in keeping with the surroundings, so we were surprised when we found these structures carved from the rock – hypogea [subterranean vaults] – perfectly preserved beneath the Roman levels.”

Rosario Andújar, the mayor of Osuna, said the find had already prompted a re-examination of the area’s history.

“We all know that excavations in certain parts of our town are pretty likely to turn up remains that have varying degrees of historical value, but we’ve never gone this deep before,” said Andújar, who visited the site on Monday.

The new evidence of a Phoenician-Carthaginian presence in the area, added Andújar, “doesn’t change history – but it does change what we’d known until now about the history of Osuna, and it could be a turning point”.

The mayor said that while more research needed to be done, the luxurious nature of the necropolis suggested it had been built for those at “the highest level” of the social hierarchy.

“The operation isn’t over yet and there’s still more to be discovered,” she said. “But the team has already come up with reliable information that attests to the historical importance of all this.

Both the graves themselves and the ritual spaces that are being examined suggest that this wasn’t any old burial site.”

Osuna, which has a population of nearly 18,000, found a worldwide audience eight years ago when parts of the fifth season of Game of Thrones were filmed in the town.

**Please visit the site:**

<https://www.theguardian.com/world/2022/apr/26/unprecedented-phoenician-necropolis-osuna-spain>

---

---

# **THE SHIPWRECKS REWRITING ANCIENT HISTORY, BY ALESSIA FRANCO AND DAVID ROBSON**

For centuries, historians believed that any physical evidence of the pivotal Battle of the Aegates was long gone. Then came a chance discovery – which led to dozens of shipwrecks.

Dentists are not normally known for changing history. And yet a dentist in Sicily has played a small part in rewriting the history of one of Europe's most important battles.

In the early 2000s, the late archaeologist Sebastiano Tusa was visiting the home of a dental surgeon in the town of Trapani when he noticed the bronze beak of a Roman ship, known as a rostrum, on full display. The dentist told him that it had come from a fisherman – who had paid for the work on his teeth with the ancient artefact.

The dentist may not have recognised the rostrum's significance, but Tusa suspected that it had originated from the famous Battle of the Aegates, which took place between the Roman Republic and the Carthaginians in 241BC. It was, after all, the era's only known battle to have taken place in the Sicilian waters around Trapani.

The event marked the end of the First Punic War and the beginning of Rome's dominance over the Mediterranean – an era that would last for almost 700 years.

Previously, historians hoping to understand the Battle of the Aegates had to rely on ancient historical accounts. Assuming, perhaps, that any relics would have long since disappeared, archaeologists simply hadn't looked hard enough for the physical remains. But the chance finding in that dentist's house, combined with divers' anecdotes of other underwater treasures, inspired Tusa and his colleagues to launch dedicated underwater archaeological expeditions in the sea around Sicily – with enormous success.

The team have now unearthed the relics from dozens of shipwrecks – findings that are now painting a detailed picture of the battle. "No other naval battle from antiquity has been documented this well," says Ferdinando Maurici, archaeologist and the head of Sicily's Soprintendenza del Mare, a section of the Department for Cultural Heritage and Identity which overlooks the discovery and protection of cultural artefacts found in the sea around the island.

## **The rise of Rome**

The First Punic War started in 264BC. In the previous decades, the Roman Republic had been expanding aggressively and now covered almost all of the Italian peninsula. Around the rest of the Mediterranean, however, Carthage controlled a large swathe of territory.

Beginning as a Phoenician city-state in modern-day Tunisia, Carthage had established colonies on the coast of North Africa, in southern Spain, and in Sardinia. Along the way,

it had forged many trade networks with surrounding territories. "It was the economic benefits that pushed Carthage to make new conquests and form new colonies," explains Francesca Oliveri, a historian and one of Soprintendenza del Mare's archaeologists.

"Both the governments of Rome and Carthage were rivals for the dominance of the Mediterranean," says Oliveri. "The Mediterranean basin was full of resources and materials that could serve these 'superpowers'."

By 264BC, that rivalry began to centre on Sicily. The west of the island had been controlled by Carthage for centuries, while the east was occupied by Greek communities. A small group of mercenaries, known as the Mamertines, had a foothold in the city of Messana (modern-day Messina). In an ongoing dispute with the Greeks at Syracuse, the Mamertines asked both Carthage and Rome for support. Both obliged, moves that ultimately disrupted the delicate power balance in the region and triggered what would become a 23-year war.

While Rome had a stronger military force, they had largely fought on land, says Oliveri: "At the start of their expansion, they didn't feel the need to have a fleet of ships and were not prepared for this naval war." The Carthaginians, in contrast, had a large commercial fleet of ships that they could quickly convert for military use.

For both sides, the bronze rostrums – also known as naval rams – at the ships' prows were the primary naval weapons. Weighing hundreds of kilograms, they could cause considerable damage when they hit the enemy boat. In some cases, the aim would be to sink the ship. In others, the rostrum would jam the oars so that the enemy ship could not escape as the soldiers took it over and plundered its resources.

The years of war proved to be extremely punishing to both the Carthaginians and the Romans. "It was very costly, both in terms of human life and economically," says Oliveri. "In the last phase Rome even had to ask for a loan from the most well-to-do families to arm the fleet and build new boats."

The last battle took place around the Aegadian Islands off the western coast of Sicily, when Romans intercepted ships carrying much-needed supplies to Carthaginian troops caught in a siege on Monte Erice. The exhausted army had no choice but to surrender. "And Sicily became Roman," Oliveri says.

Oliveri says that many factors – including the strength and direction of the wind – contributed to the Roman victory, and world history may have been very different if the Carthaginians had instead triumphed.

"Rome could have been limited to the Italian peninsula, while Carthage would have established more new colonies surrounding the Mediterranean – arriving, to the east, at the edge of the Persian Empire." If they had not been weakened, they might have even extended their sphere of influence northwards, she suggests – perhaps as far as Britain.

### **Blood-red rocks**

For millennia, the primary account of this world-changing battle had been the work of the Greek historian Polybius, writing in the 2nd Century BC. Unfortunately, he was rather

vague on some of the essential details, such as where exactly it took place. "We were handed down a narrative that certainly cited the Aegadian Islands, but it didn't specify the precise location," explains Maurici.

According to legend, the battle took place near Cala Rossa, a cove on the island of Favignana – the largest of the Aegadian Islands. Cala Rossa is so-called because of the intense colour of the rocks, which were said to have been dyed by the blood of the Carthaginians who died in the battle. In reality, it is simply red algae that have coloured the rocks. "The story was without foundation," says Maurici.

Tusa, for one, was unconvinced that Favignana was the site of the battle – thanks, in part, to his visit to the dentist's house. The dentist told him that the rostrum had been discovered off the coast of Levanzo, an island to the north of Favignana.

This seemed to tally with another diver's report that around Capo Grosso on the north of the island, you could find around 100 anchors on the sea, all perfectly aligned. "It was as if the ropes had been cut so that the boats could sail away as quickly as possible," says Salvatore Emma, one of Tusa's close collaborators and a spokesperson for the Soprintendenza del Mare. Perhaps the Romans had been hiding their fleet behind one of Levanzo's cliffs – allowing them to launch a stealthy attack as the Carthaginians approached.

Inspired by these reports, Tusa and the Soprintendenza del Mare began rigorous underwater excavations near Levanzo in earnest in the early 2000s. Not only did they confirm the presence and location of the anchors – they've started to unearth countless other relics from the famous battle, as well.

Divers examine war helmets underwater at the site of the Battle of the Aegates (Credit: Jarrod Jablonski/Soprintendenza del Mare)

Many of their discoveries have only been possible with advanced technology provided by the RPM Nautical Foundation, a non-profit devoted to maritime archaeology around the Mediterranean.

The research takes place on a boat called Hercules, which is equipped with sophisticated multibeam sonar which sends sound waves through the water beneath the boat. By measuring the reflected soundwaves, the team can build a topographical map of the seafloor. To fill in the fine details, an autonomous underwater vehicle or AUV, developed with the University of Malta, travels closer to the bed and highlights any small anomalies on the seabed that might signal the site of a shipwreck.

Once they have identified areas of interest, a small remotely operated vehicle (ROV) travels to the region and captures photos of the underwater environment – information that will help to guide divers to the potential artefacts.

Researchers examine naval artefacts on the seabed from the ship Hercules (Credit: Salvo Emma/Soprintendenza del Mare)

The use of this technology has vastly accelerated the archaeological research. "An ROV can remain underwater all day or longer and with continuous video feed to the control

room," says James Goold, the chair of RPM Nautical Foundation. "We cover up to 5km (3.1 miles) day of searching the seabed [for artefacts] with all of it recorded on video and with continuous exact location reporting." Human divers, in contrast, can only operate safely for about an hour at a time, and they can't cover the same distances – so it's much more efficient to only engage them once a precise location has been identified.

Through this research, the team have so far discovered 25 fallen rostrums. Goold tells me that the wood has disintegrated, leaving only the bronze. Strangely, the divers have found that the hollowed-out insides are often filled with small objects such as coins. This, he says, is the work of octopuses, who have turned the rostrums into temporary dens. They have a magpie-like tendency to pick up treasure – and fill their homes with trinkets. "They are inveterate collectors," he says. "They'll take anything they can get their hands – or tentacles – on."

The rostrums themselves are often inscribed. For the Roman remains, the inscriptions often include the names of Roman officials such as magistrates, who may have approved the building of the ships – discoveries that are helping historians to understand the bureaucracy and governance of the Republic at that time. The Carthaginian engravings were more likely to invoke the god Baal, with curses against the Romans – although some do also offer the names of important personages, says Oliveri, which might offer us insights into the structure of their society.

Besides the bronze rostrums, the archaeologists have also uncovered around 40 helmets from both sides of the battle. "They are very evocative, because each one could correspond to an identifiable person," Goold told BBC Future as he showed us a map charting the finds. "We've saved sediment from inside some of the helmets to have it tested for DNA – because theoretically, it could have survived." This could tell us a bit more about the kinds of people who were fighting.

Goold shows us lead projectiles that would have been fired from a sling. Each one weighs as much as a .30-calibre bullet, he says – and could have travelled at up to 100mph (160km/h).

The team also have uncovered large numbers of amphorae that will have carried food supplies and the tableware used by the shipmates, says Oliveri. "We are finding so many things that help to illustrate a little better the world of the 3rd Century BC," she says. "It's the first site of a naval battle, in the world, that has been scientifically documented like this, and it will continue to be documented – because the area of interest is very large... It will take at least another 20 years to explore it fully."

### **Tragedy and hope**

Sadly, Sebastiano Tusa will not be able to see the final results of his research – and of his intuition. He died in the crash of the Ethiopian Airlines Flight 302 in 2019 while travelling to a Unesco conference. Eerily, the crash occurred on 10 March, commonly thought to be the anniversary of the Battle of the Aegates.

This year, the Soprintendenza del Mare opened exhibitions in Favignana and Palermo to celebrate Tusa's life and work. The day of his death was marked as "Sicilian Cultural Heritage Day", with free public access to the island's museums, galleries and libraries.

Tusa's friends, family and colleagues remember him as a meticulous scholar who drew on many different sources. He listened attentively to the stories of local fishermen and divers, whose observations of the sea environment helped him to identify the island of Levanzo as the starting point of the battle. "He knew how to talk to everyone," says his wife, Valeria Li Vigni, who initially took over the management of the Soprintendenza del Mare after Tusa's death, before retiring this year. "And it was this ability, and his tenacity, combined with the historical sources and the archaeological data, that allowed him to confirm his theories about the Battle of the Aegates."

Tusa's legacy, then, is not only his astonishing contributions to ancient history. His life and work should remind us to always follow our curiosity, to leave no stone unturned in our search for the truth.

\*\*\*\*\*

Alessia Franco is an author and a journalist focusing on history, culture, society, storytelling and its effects on people. She is @amasognacredi on Twitter.

David Robson is a writer based in London. His most recent book is The Expectation Effect: How Your Mindset Can Transform Your Life, published in early 2022. He is @d\_a\_robson on Twitter.

\*\*\*\*\*

Please visit the site: <https://www.bbc.com/future/article/20220426-battle-of-the-aegates-the-shipwrecks-rewriting-roman-history> [Go there for pix]

---

---

## **DEAD SEA SEDIMENT ANALYSES SHOW 15,000-YEAR-OLD CLIMATE PHASE PERIODS, BY JUDY SIEGEL-ITZKOVICH**

The sediments at the edge of Lake Lisan near the archaeological site of Masada and from the bottom of the Dead Sea are unique witnesses to this development.

While blessed rains since December have filled the Kinneret almost to the top, anyone who has viewed the Dead Sea over recent decades has noticed how it has shrunk, with dangerous sinkholes developing around its circumference.

The level of the Dead Sea is currently dropping by more than a meter every year. But this is not new, according to German and Israeli researchers who maintain that the level of the salty lake also dropped millennia ago. At the end of the last ice age, for example, the water level dropped by 250 meters within a few thousand years.

A study just published under the title “Phases of stability during major hydroclimate change ending the Last Glacial in the Levant” in the journal *Scientific Reports* provides new insights into this process. Due to its pivotal location as the cradle of ancient cultural developments, climatic reconstructions using Dead Sea sediments explain causes for human migration as well as cultural rises and declines.

Dr. Daniela Müller and Prof. Achim Brauer from the German Research Centre for Geosciences (GFZ) in Potsdam, together with Dr. Yoav Ben Dor of the Hebrew University of Jerusalem, studied 15,000-year-old sediments from the Dead Sea and the surrounding area using newly developed methods. With unprecedented accuracy, they showed that the long period of drought was interrupted by wet periods lasting 10 to 100 years. This also offers new insights into the settlement history of this region, which enables better assessments of current and future developments driven by climate change, they wrote.

In highly sensitive regions such as the Eastern Mediterranean, where water availability is an important factor for socioeconomic and political development, it is crucial to understand how the water cycle is changing. Geologists can achieve this by assessing strong hydroclimatic changes that occurred several millennia ago, they said.

For example, during the transition from the last ice age to the Holocene, the water level of Lake Lisan dropped by about 240 meters in the period from 24,000 to 11,000 years ago, eventually leading to its transition into today’s Dead Sea.

The sediments at the edge of Lake Lisan near the archaeological site of Masada and from the bottom of the Dead Sea are unique witnesses to this development, the authors continued. New, high-resolution analytical methods including x-ray fluorescence scanners, were developed for the study at the GFZ to collect precise information from the stratification of the sediments and their geochemical composition.



To prepare the sediments for analysis, the moisture had to be removed by freeze-drying, a complicated task given the Dead Sea's high salt content and its affinity for water. The sediments are then impregnated in synthetic resin and thin sections were made from them without changing their microstructure.

The researchers found out that the dramatic, long-term drop in the lake level due to increasing dryness was interrupted several times by wetter phases when climate change took breaks. "We were able for the first time to precisely determine the duration of these phases with several decades and in one case up to centuries by counting annual layers in the sediment," said lead author Müller. The exact reason for these pauses in the climate change of this region still remain elusive, but the team suspected possible links to the climate in the north Atlantic Ocean.

"What was particularly surprising was that during these wetter phases, in some cases over several decades, we did not even find any traces of extreme floods, which are typical for this region even today and during wetter times in the past," Müller explained.

These results are of further interest for archaeological considerations, they wrote, because they coincide with the time when the Natufian culture settled in this region 11,500 to 15,000 years ago. "Climatically stable phases could have favored the cultural developments," they said.

"The study shows that strong climatic changes in the past have been very dynamic and included phases of relative stability," Brauer concluded. "We learn from this that climate change is not linear, but that phases of strong changes alternate with calm phases."

Please visit the site: <https://www.jpost.com/science/article-705318> [Go there for pix]

---