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# Πληροφοριακό Δελτίο της Ελληνικής Αρχαιομετρικής Εταιρείας

**- Ιανουάριος 2025 -**

**ΕΥΤΥΧΙΣΜΕΝΟ ΤΟ ΝΕΟ ΕΤΟΣ 2025!  
HAPPY NEW YEAR 2025!**

## Newsletter of the Hellenic Society of Archaeometry

**- January 2025 -**

**Nr. 286**

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

**CALL FOR A FUNDED PHD SCHOLARSHIP**  
**AT NEWCASTLE UNIVERSITY, UK**

I'd be grateful if list members could please circulate this call to any suitable candidates. Apologies for any cross-posting.

Newcastle University (UK) announces a call for a PhD scholarship on a project titled **Technological choice and variability in prehistoric metalworking: a transdisciplinary investigation**, funded by the AHRC Northern Bridge Doctoral Training Partnership as a Collaborative Doctoral Award. The partner organisation is ISIS Neutron and Muon Source, Rutherford Appleton Laboratory, STFC, UKRI.

**Project Summary**

This project investigates variability and social choice in prehistoric metalworking through an innovative transdisciplinary approach that integrates experimental archaeology, materials science, and a critical review of social studies on craft practice. The student will develop a novel understanding of artisan skill, sensory perception, communities of practice, and craft specialisation in prehistoric bronzeworking. The research will provide new insights into the social context of early European metallurgy, reassessing the enduring link between metallurgy and the rise of social complexity. Through this work, the student will acquire a unique transdisciplinary skillset that will significantly enhance their intellectual profile and employability.

Prospective candidates are advised to look at the full project proposal here: <https://northernbridge.ac.uk/applyforstudentship/cda/>

**Value and duration of the award**

**Tuition fees** paid at a rate equivalent to the UK home fee. For international students, Newcastle University will generously cover the difference between home and international fees through the university's Global Scholarships Scheme. Costs for relocating to the UK cannot be covered.

**A yearly stipend** paid in regular instalments. Awards increase every year, typically with inflation. As an indicator, the level for 2024/2025 is £19,237.

**A contribution to research costs of £600 per annum.** Additionally, award holders can apply to a Northern Bridge fund reserved to support primary research costs.

**Duration of the award:** 3.5 years full-time or 7 years part-time. Funding can be extended up to 4 years by undertaking a placement at the partner organisation or another non-higher-education institution. The maximum duration of a UK PhD is 4 years full-time (8 years part-time).

## Eligibility criteria

**Education and Professional qualifications.** *Essential:* Master's degree in Archaeological Science, Heritage Science, or similar, or an MSc in a relevant science degree, e.g., materials science (Merit or Distinction, or international equivalent). *Desirable:* BA/BSc in Archaeology, Heritage Studies, or similar, or a BSc in a relevant science degree, e.g., materials science.

**Research experience and training.** *Essential:* Foundational knowledge of metallurgy and materials. *Desirable:* Background knowledge of later prehistoric Britain/Europe. Understanding of material characterisation techniques and metalwork microstructure, e.g., optical and scanning electron microscopy, metallography and neutron techniques.

**Professional Practice.** *Desirable:* Bronze casting and working experience. Other professional experience in any of the fields intersected by the project.

**Interpersonal Skills.** *Essential:* Excellent verbal and digital communication skills; teamworking; ability to deliver high-quality work to deadlines.

**Other Criteria.** *Essential:* Excellent written English; excellent numeracy; IT literate; independence; excellent time management. *Desirable:* An ability to work across disciplinary boundaries, especially humanities/social sciences vis-à-vis the natural/materials sciences.

## How to apply

Expressions of Interest must include:

A **covering letter** stating the candidate's suitability for the project in no more than two sides of an A4 (minimum font size: 10 point). The first page should detail how the candidate meets the eligibility criteria, while the second page should discuss what they would contribute to the project, including any suggestions for improvement.

A **2-page CV** (minimum font size: 10 point).

**Contact details of two referees.**

**Transcripts of previous qualifications in English** (with a breakdown of course grades, where possible).

Complete Expressions of Interest must be sent to [andrea.dolfini@ncl.ac.uk](mailto:andrea.dolfini@ncl.ac.uk) as a single PDF or MS-Word document no later than **Monday 3<sup>rd</sup> February 2025**, midnight (UK time).

Shortlisted candidates are expected to be interviewed by videoconference on **Friday 7<sup>th</sup> March**.

**NB:** Please do not apply through the Newcastle University application portal at this stage.

### Further information and contact details

For further details on this scholarship, please see <https://northernbridge.ac.uk/applyforstudentship/cda/>

For Newcastle Archaeology, please see <https://www.ncl.ac.uk/hca/about/archaeology/>  
Please send informal enquiries to [andrea.dolfini@ncl.ac.uk](mailto:andrea.dolfini@ncl.ac.uk)

\*\*\*\*\*

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## **FULLY FUNDED PHD OPPORTUNITIES AT ARTS UNIVERSITY BOURNEMOUTH, UK**

We are thrilled to announce **three fully funded PhD positions** at Arts University Bournemouth (AUB) in the UK, starting in October 2025. These positions are part of our cutting-edge work at the Plastics Innovation and Curation (PlastIC) Centre.

If you're passionate about **heritage science, conservation science, material science or history**, and want to contribute to groundbreaking research in these fields, we encourage you to apply!

**Deadline for applications:** 28th February 2025

Learn more and apply here: [AUB PhD Studentships](#)

Feel free to share this opportunity with anyone who might be interested.

We look forward to welcoming passionate researchers to our vibrant academic community!

\*\*\*\*\*

Dr Erato Kartaki  
Research Fellow Heritage Science  
Centre for Plastics Innovation and Curation (PlastIC)  
Arts University Bournemouth  
Bournemouth, UK

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## **2025 PEF ANNUAL RESEARCH GRANTS**

The PEF Annual Research Grants for 2025 are now open.

Applications will next be accepted until late February 2025.

The Committee welcomes applications for grants to support research into the archaeology and history, ethnography, anthropology and culture, topography, geology, and natural sciences of Palestine and the Levant. Research projects involving the PEF's own collections and archives are welcome. We accept applications from researchers of all nationalities. Membership of the PEF is a prerequisite for application.

Grants, normally between £450 and £2,000, are available to support field work (including museum, and archival work).

Applicants must be current members of the Palestine Exploration Fund (see <https://www.pef.org.uk/join-us/membership/> for more details). Projects must avoid political, religious, or ideological bias, and must respect International laws relating to antiquities and archaeological activity in the Occupied Territories. Projects incorporating interviews with living subjects must ensure that proper procedural and safeguarding protocols are followed. Applications are welcomed from mid December to late February the following year, and awards will be announced in mid-March. Please see our website for more details (<https://www.pef.org.uk/grants/>), and/or email [execsec@pef.org.uk](mailto:execsec@pef.org.uk) if you have any questions or require further information.

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## **ΝΕΕΣ ΕΚΔΟΣΕΙΣ – NEW PUBLICATIONS**

# **CLIMATE-DRIVEN VERSUS ANTHROPOGENIC INDUCED EROSION OF THE LAST 3000 YEARS FROM AN ANCIENT LAKE IN THE SOUTHERN PHOKIS PLAIN (DESFINA), GREECE, BY GEORGIOS S. POLYMERIS, MARIA GERAGA, GEORGE PAPTODOROU, IOANNIS ILIOPOULOS, TOMÁŠ PLUHÁČEK, KAREL LEMR, ZHEN QIN, SPYROS SERGIU, XENOPHON DIMAS AND IOANNIS LIRITZIS**

The Holocene 1–15, 2024

DOI: [10.1177/09596836241275024](https://doi.org/10.1177/09596836241275024) [journals.sagepub.com/home/hol](https://journals.sagepub.com/home/hol)

### **Abstract**

The timing and causes for erosional events at the Kastrouli (Greece) archeological site – a Late Mycenaean with reuse in later periods – are presented. Two borehole sediment cores (max 6 m depth), collected from the footsteps of the settlement hill plain, were studied. Sedimentary analysis and luminescence dating techniques investigate and identify periods of soil aggradation in this record. Moreover, optically stimulated luminescence (OSL) dating confirmed the concept of an ancient lake during Kastrouli settlement times. Macroscopic overview of the stratigraphic structure for each core, included lithological and textural evaluation of the core sediments, assessments of grain size, and determination of the geochemical and mineralogical composition of the sediments. X-ray powder diffraction (XRPD), X-ray fluorescence (XRF), and Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) techniques were applied for the mineralogical and geochemical analysis. OSL ages from seven sediment horizons spanned from the Ottoman period to archaic times. All lithological findings correlate with the results of the electrical tomography survey conducted in same area. Extrapolation of the Logarithmic fitting of the data back in time of prehistoric Late Mycenaean era of Kastrouli verifies a lake deeper than 10 m, with a considerable enhancement in soil aggradation of 1.2 cm/year. Attempts to dry out the area are evidenced by the hydraulic works found in two engineering sinkholes. Sedimentation changes had occurred in the local environment over the last 2500 years, and soil aggradation underwent significant fluctuations in the two studied cores. The Roman period (a wet period) and the Byzantine period experienced high aggradation rates. By contrast, soil aggradation rates in southern Phokis (Kastrouli region) have remained exceedingly low from the Ottoman era (circa 13th century) to the present. In the context



of the Phokis case study, it appears that the sedimentation rates, driven by climate, have strengthened anthropogenic activities.

**Keywords:** aggregation, anthropogenic, borehole, climate, Kastrouli, OSL dating, sedimentation

**Please visit the site:**

<https://journals.sagepub.com/doi/abs/10.1177/09596836241275024>

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**THE NEOLITHIC IN TURKEY 10500-5200 BC**  
**ENVIRONMENT, SETTLEMENT, FLORA,**  
**FAUNA, DATING, SYMBOLS OF BELIEF,**  
**WITH VIEWS FROM NORTH, SOUTH, EAST**  
**AND WEST, PETER I.KUNIHOLM, MEHMET**  
**ÖZDOĞAN, NEZİH BAŞGELEN (ED.)**

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İlhan KAYAN - Paleogeography of the Coastal Regions of Turkey During the Neolithic Period

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Please visit the site: <https://zerobooksonline.com/urun/The-Neolithic-in-Turkey-10500-5200-BC-Environment-Settlement-Flora-Fauna-Dating-Symbols-of-Belief-with-views-from-North-South-East-and-West/26553>

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**MOLLUSCAN REMAINS AS INDIRECT  
PROXY FOR IDENTIFYING  
DISINTEGRATED MUDBRICKS IN AEGEAN  
BRONZE AGE ARCHAEOLOGICAL  
CONTEXTS, BY RENA VEROPOULIDOU &  
MAUD DEVOLDER**

Environmental Archaeology  
The Journal of Human Palaeoecology

**Abstract**

The highly perishable nature of earthen architecture in the Bronze Age Aegean, where walls were largely built of sundried mudbricks set on a stone socle, has hindered an accurate perception of buildings in this period and region. The recent proliferation of research on mudbricks is slowly recognising their systematic use in construction, but primary evidence is still difficult to collect. Here, we explore the potential of marine shells to generate data for the reconstruction of architecture in the Bronze Age Aegean, especially on Crete. We argue that tiny molluscan shells were inadvertently incorporated along the seagrasses used as vegetal temper in the mudbricks matrix. Seagrasses offer an ideal environment for specific molluscan taxa; the latter are considered by geological and archaeomalacological studies as indirect indicators for marine plants in the fossil and in the archaeological record respectively. Relying on archaeomalacological material from Early and Middle Bronze Age (3rd and early 2nd millennium BCE) contexts in the Minoan settlement at Malia and setting it in perspective against broader ethnographic, historical and archaeological evidence, the aim of this paper is to showcase the potential of specific molluscan taxa to serve as an indirect proxy for identifying the presence of disintegrated mudbrick walls.

**Please visit the site:**

<https://www.tandfonline.com/doi/pdf/10.1080/14614103.2024.2434427>

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**AN AGE-SPECIFIC BURIAL PRACTICE  
REFLECTED IN ANCIENT DNA PRESERVATION  
IN NEOLITHIC ÇATALHÖYÜK, BY AYÇA  
KÜÇÜKAKDAĞ DOĞU, FATMA KUCUK  
BALOGLU, MACIEJ CHYLEŃSKI, ELINE  
SCHOTSMANS, MUHAMMED SIDDIK KILIÇ,  
KIVILCIM BAŞAK VURAL, EREN YÜNCÜ, DAMLA  
KAPTAN, MERVE NUR GÜLER, MERVE N.  
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ANDERS GÖTHERSTRÖM, IAN HODDER, FÜSUN  
ÖZER, SCOTT D HADDOW, CHRISTOPHER  
KNÜSEL AND MEHMET SOMEL**

DOI: [10.1101/2024.12.13.628343](https://doi.org/10.1101/2024.12.13.628343)

**Abstract**

Selective funerary practices can inform about social relationships in prehistoric societies but are often difficult to discern. Here we present evidence for an age-specific practice at the Neolithic site of Çatalhöyük in Anatolia, dating to the 7th millennium BCE. Among ancient DNA libraries produced from 362 petrous bone samples, those of subadults contained three times higher average human DNA than those of adults. This difference in organic preservation was also confirmed by FTIR analysis. Studying similar datasets from seven prehistoric and historical sites, we found a similar age-related difference in only one cemetery. We propose that the organic preservation difference with age was caused by the special treatment of chosen corpses before interment, such as defleshing or drying, which was more frequently applied to Çatalhöyük adults and promoted organic decay.

Please visit the site: <https://colab.ws/articles/10.1101%2F2024.12.13.628343>

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## **EΙΔΗΣΕΙΣ - NEWS RELEASE**

# **ANCIENT INSCRIPTION UNEARTHED AT CYPRUS ARCHAEOLOGICAL SITE, BY LUIS MENDOZA**

Through a recent excavation at Kouklia-Martello in Palaepaphos, Cyprus, scientists have unearthed an ancient inscription in the Cypriot syllabary. The inscription was carved onto a wall that dates back to the Cypro-Archaic period between 750 and 480 B.C.

This discovery was the landmark achievement of the fourth excavation period for 2024 at the site, as The Department of Antiquities of the Deputy Ministry of Culture announced its completion.

The excavation was funded by the Department of History and Archaeology of the National and Kapodistrian University of Athens (NKUA). Additionally, it is worth noting that the excavation was carried out by a team of 12 undergraduate, postgraduate, and doctoral students.

The site at which the inscription was unearthed in Cyprus has been investigated for almost a century

The Martello excavation site has been investigated by various missions for almost a century. The site was first investigated by British archaeologists between 1950 and 1955, followed by a German-Swiss archaeological mission that investigated the site on three different occasions.

The first one was between 1966 to 1973, the second was in 1985, and the final excavation for this mission took place between 1992 and 1995. The most recent excavation prior to the 2024 excavation was carried out by the University of Cyprus between 2006 and 2008.

Archaeological site of Kouklia-Martello in Palaepaphos, Cyprus, Credit: Department of Antiquities of Cyprus / Archaeological Research Unit UCY.

These excavations uncovered a massive wall that spanned 168 meters, but its meticulous excavation had remained stagnant, as it was never completed.

Initially, the 2024 excavation focused on exploring a tunnel that crossed the wall at a depth of 2.3 meters. The excavation will most likely provide researchers with a better understanding of the wall's geology and could potentially allow them to date some of the wall's later phases.

New findings would support the theory that the wall underwent repairs during the Cypro-Archaic period

One of the most popular theories that have been brought forward regarding the findings at the Marstello site is that the wall underwent repairs during both the Cypro-Archaic and Cypro-Classical periods.

In contrast, as of right now, dating the tunnels has not been possible, though they are thought to have been built between 499 to 498 BCE during the siege of Palaepaphos. Additionally, based on newly unearthed evidence, experts have also found a monument north of the wall, which is now thought to be a religious site rather than a fortification system.

Excavation site at Kouklia-Martsello in Palaepaphos, Cyprus. Credit: Department of Antiquities of Cyprus / Archaeological Research Unit UCY.

Evidence suggests the structure was built during the 12th and 11th centuries BCE and was abandoned during the Cypro-Geometric period between 1050-750 BCE. Researchers have theorized the structure was repaired during the Cypro-Archaic period in the 6th century BCE.

This excavation mission is being carried out by the NKUA in cooperation with the University of Cyprus, and the fifth excavation period is scheduled for 2025.

**Please visit the site: <https://arkeonews.net/archaeologists-discovered-a-fragmentary-inscription-in-cypriot-syllabary-found-dating-to-the-cypro-archaic-period/> [Go there for pix]**

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## **THE ANCIENT CURSE TABLETS FOUND IN ATHENS WELL, BY NICK KAMPOURIS**

A major, and somewhat spine-tingling, archaeological discovery of a trove of ancient curse tablets was made recently in Athens' downtown neighborhood of Kerameikos (Ceramicus) by archaeologists from the German Archaeological Institute of Athens.

A total of thirty well-preserved curse tablets dating back to the Classical period (2,500 years ago) were found in an ancient well which was originally discovered back in 2016, when other everyday objects—but not the tablets—were found.

The ancient tablets have curses engraved on them which Athenian citizens would pay to have made against other people, a practice which was relatively common in ancient Greece.

### **Kerameikos full of ancient artifacts**

The German Archaeological Institute, which has been conducting continuous research in the broader Kerameikos area since the early 1900s, has discovered more than 6,500 burial sites there, indisputably making Kerameikos the main burial site of ancient Athens.

The curse tablets were accidentally found in 2020 while archaeologists were investigating the supply of water to a 1st-century BC bathhouse that was close to the well.

Ancient Greeks were known to use the method of engraving curse tablets and attaching them to wells or tombs in order to put a curse on someone with whom they had serious disputes.

Love and Hate: A curse tablet was created against a newlywed woman named Glykera. The curse, which focuses on her vagina, was made by someone who envied the woman's marriage.

### **Curse tablets and sorcery in ancient Athens**

The tablets would be placed near tombs because they believed that the souls of the dead would carry these curses to the gods of the underworld.

Sorcery was not an accepted practice in Athens, so this was seen as an alternative for any who believed in the power of evil. Namely, the gods of the underworld, who would make the curse a reality, would be invoked.

Normally, people would place curses on people they either hated for personal reasons or with whom they perhaps had legal court disputes.

Lead objects found at the bottom of the Kerameikos well dating back to the 5th century. BC. Photo credit: Dr. Jutta Stroszeck – German Archaeological Institute



Apparently, athletes also tended to engage in this unique practice in an attempt to bring bad luck upon opponents.

Merchants were also known to curse the owners of rival businesses in an effort to incite good luck upon their stores while bringing bad luck to their competition.

According to archaeologists, in Ancient Greek curse tablets, the name of the individual who placed the curse was never mentioned; rather, it was only the name of the curse's victim who was ever mentioned.

**Please visit the site: <https://greekreporter.com/2024/11/29/ancient-curse-tablets-athens-well/> [Go there for pix]**

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## **BREAKTHROUGH AS HUGE ROMAN SEWER BIG ENOUGH TO WALK IN UNEARTHED IN ANCIENT CITY, BY EMMA MACKENZIE**

A massive sewer dating back to Ancient Rome has been unearthed in Turkey, in a historic place dubbed the 'City of Gladiators' - and it is reportedly big enough for humans to walk through

A huge, ancient sewer has been unearthed during archaeological excavations in Turkey - and it's still in working order. Expert archaeologists discovered the sewage system in the historic city of Stratonikeia in Muğla, and have reportedly estimated that it is around 2250 years old - dating back to ancient empires. One section of the system was a massive sewer beneath a theatre, that is so big human beings can even walk through - per the Jerusalem Post. The system works by moving water from beneath the theatre towards a nearby stream and amazingly it still does the job - something that the archaeologists who discovered it were excited to learn.

"Water is still flowing away by itself even after 2,250 years. That's why we are incredibly happy," explained Dr. Bilal Söğüt - who heads up the Stratonikeia Ancient City Excavation Team, an area that has been explored by archaeologists for decades since 1977.

"All these sewage systems are connected to the streets and flowed towards the stream, discharging without causing any discomfort to the city," the expert reportedly said, adding: "The discovery of the sewage system reveals the historical richness of the region and the lifestyle of ancient settlements".

Stratonikeia has been dubbed 'The City of Gladiators' and every archaeological discovery has provided more insight to experts about the sophisticated engineering that was present in the ancient civilizations who used to call the area home. Parts of the sewage system were initially found back in 2019, and the complex system has been tracked from the North city gate, through a Roman bath and a library.

According to UNESCO's website - to whom an application to make the ancient city a World Heritage site was launched back in 2015 and they added it to the 'tentative list' - it is one of the most significant archaeological sites in Asia Minor, and has been continuously lived in since 1500BC - meaning that it has been inhabited throughout the Hellenistic, Roman, Byzantine, and Ottoman period, making it one of the places most rich with history in the world.

The nickname 'City of Gladiators' came from discoveries about the ancient civilisation. UNESCO explains: "Stratonikeia has been known as the city of eternal love and gladiators throughout the ages. It was a centre where gladiators were trained, did demonstrations, and spent their life after retirement. Sport was clearly important to Stratonikeians, who built what might be the largest gymnasium in antiquity in the 2nd century BC just west of the north gate. The 105-metre wide and 267-metre-long complex

served both as a sports center and a classroom, where history and philosophy classes were given in the past."

Please visit the site: <https://www.mirror.co.uk/news/world-news/breakthrough-huge-roman-sewer-big-34248785> [Go there for pix]

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## **ANCIENT PHOENICIAN SHIPWRECK** **FOUND OFF SPAIN FINALLY RECOVERED,** **BY CHRISTOPHER GOMEZ**

The ancient Phoenician shipwreck known as Mazarrón II, a marvel from the ancient world, was recovered off the coast of Murcia, Spain.

The ship's structure was found in October in exceptional condition, providing a glimpse into the past like never before. Researchers can now study the intricacies of Phoenician shipbuilding techniques, as they now have a better historical context in relation to how the boats were designed and utilized. The Phoenicians were expert sailors in their own right, but they are often overshadowed by the ancient Greeks and other Mediterranean cultures.

### **Ancient Phoenician shipwreck is a unique discovery**

The ship dates back to around 600 BC. Researchers have suggested that the vessel capsized after a sudden storm hit it off the coast of Murcia, completely engulfing it in sand.

“This sandy substratum is the chest that has preserved it to this day. What was, at the time, a great misfortune, is today a great blessing for archaeology,” said University of Valencia (UV) researcher Carlos de Juan Fuertes.

Thanks to its sound preservation in the sand, the ship's many features remain almost perfectly intact, especially the vessel's carpentry which interests researchers greatly. While ancient Greek ships are well documented, researchers have not had the same luxury when it comes to those of the ancient Phoenicians.

However, the UV team of researchers has also faced challenges. While the boat was in stellar condition in October, when it was found, it has since had some wear and tear as a result of the excavation.

“The protection by the sand that the wreckage enjoyed for centuries has changed in recent decades due to the anthropization of the coastline,” said Juan Fuertes. “Coastal constructions have been erected without appropriate prior studies and the sea current has changed, thus creating a scenario in which the wreck must be urgently rescued.”

Juan Fuertes added, “The wreckage can no longer remain where it is because its sand protection is now disappearing. [It] has survived for centuries, but now it is time to...ensure that we can continue to enjoy this asset of cultural interest.”

First observations and analysis of the shipwreck remnants have yielded some intriguing results. The team found that the ship's timber and construction method as a whole utilized ancient Phoenician techniques along with design methods specific to sailing through the waters of the Mediterranean Sea.

This combination proves that ancient shipbuilders and carpenters did not simply adopt ancient cultural practices but carefully thought things through in terms of how they could best advance their work and ensure their creations were best suited for their purpose.

**Please visit the site:** <https://greekreporter.com/2024/12/11/ancient-phoenician-shipwreck-spain-recovered/> [Go there for pix]

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## **AN ALTERNATIVE TIMELINE FOR THE COLOSSUS OF RHODES, BY MICHAEL DENIS HIGGINS**

The Colossus was a 30-metre-high bronze statue of the god Helios, built to commemorate the victory of the Rhodians over Demetrius of Macedonia, and considered one of the Seven Wonders of the Ancient World. Completed in 282 BCE, it fell in an earthquake only 56 years later in 226 BCE. The usual story is that the fragments remained untouched for 880 years until the invasion by the Umayyad caliph Muawiya I. However, literary and geological evidence suggest a more complex, and more likely, story involving several reconstructions, finishing with a devastating earthquake in 142 CE.

### **Creation of the statue**

In 305 BCE, the Macedonian army laid siege to Rhodes, and after their defeat, they left behind their military equipment, including several huge siege engines. These towers were made of wood, with bronze fittings, and sheathed in iron plates. Some of these materials must have been recycled for the construction of the statue and the rest was sold to pay for the project.

The little we know about the statue comes from the frustratingly brief writings of Philo (280-220 BCE, or possibly much later), Strabo (64 BCE-24 CE) and Pliny (23-79 CE), however none of these authors describe what it actually looked like, apart from its height. It is generally assumed that the head of Helios resembled that on Rhodian coins (Fig. 1) and that it topped a rather austere vision of the god, perhaps holding a torch with a spear or military cloak (Fig. 2).

It was built on a framework of iron bars and stone slabs to which bronze castings were fitted. The dimensions of the statue resemble those of the siege towers, suggesting that the towers may have been repurposed as scaffolding for the project.

In popular imagination, the Colossus stood astride the harbour entrance with ships sailing between his legs. This idea was first mentioned by an Italian pilgrim in 1395, who wrote that the Colossus stood with one leg at the end of the mole with the windmills and the other near St John's chapel, later a fort (Fig. 3). These sites are 750 metres apart, necessitating a statue 1500 metres high — a truly colossal edifice even by modern standards. This concept may have led to more recent ideas that the Colossus stood near the St John fort. There is little evidence for this and it is not an ideal spot, as it would have been exposed to the corrosive effects of salt spray. A more recent idea is that it stood on a small mound where the Palace of the Grand Masters now stands. Here it would be a bit farther from sea-spray and at a higher elevation, making it visible from a greater distance. It would be difficult to verify this hypothesis without demolishing much of the modern palace, restored somewhat too imaginatively by the Italians in 1937-40.

### **History of the Statue**

There is no doubt that the Colossus collapsed during a major earthquake around 226 BCE. Strabo, writing 250 years later, remarked that only the calves remained, poking up from the ruins. We know something about this earthquake because the military ship sheds that lined the western edge of the small harbour subsided by about one metre and were subsequently rebuilt. We also see evidence of this movement in the cliffs south of the city (Fig. 4). Now, one metre of movement is large and the accompanying seismic waves would have been enough to topple the Colossus — it was not designed with earthquakes in mind as there had been no significant events here for a long time. This is revealed by the well-developed erosional notch that corresponds to sea level when the Colossus was built.

The oft-repeated story is that after the collapse the Rhodians consulted an oracle, who said that Helios was displeased and hence the statue should not be rebuilt. The offer of resources by Ptolemy III of Egypt — bronze metal, skilled workers and subsistence funds — did not change their minds. The account continues that the bronze fragments of the statue were left untouched on the ground for 880 years until the invasion of the Arabs in 654 CE (Fig. 5). They gathered the remains, transported them to Syria and sold them to a Jewish merchant. However, this seems a very unlikely scenario and the story was probably invented at a much later date for political reasons.

The yearly chronicle of the Greek historian Eusebius, composed in ~325 CE, suggests a shorter and more complex story (Fig. 5). The first restoration seems to have been shortly after the earthquake in 226 BCE, perhaps using the resources offered by Ptolemy. Eusebius states that the Colossus fell for a second time during an earthquake in 107 BCE, and Strabo's comments may refer to these ruins. This earthquake must have been relatively minor as it did not leave a notch in the cliffs (Fig. 4), so maybe the statue was corroded and ready to fall. Later Byzantine historians relate that the Colossus was restored during the reign of Vespasian (69-79 CE) and again during Hadrian's time, perhaps in association with an official visit in 123 CE. The latter may have been better described as repairs, as we do not know of a nearby earthquake between the reigns of Vespasian and Hadrian.

Such restorations would have involved considerable effort, but little in the way of new resources. The first step would have been to dismantle the remains and determine which bronze castings could be remounted and which needed to be recast. The iron frame would have been severely corroded by salt spray and would have had to be re-smelted and re-forged.

If Hadrian did restore the Colossus then its final collapse must have been in 142 CE during an earthquake that raised the land by 4.8 metres. This huge earthquake must have generated a tsunami and affected the coast to the east as an international aid effort was organised. Rhodes's harbours must have been unusable, cutting off trade and access to the wealth needed to restore the statue.

Eusebius relates that in 189 CE Emperor Commodus removed the head of a colossus and substituted his own. Some people hold that this shows that the Rhodian statue was still standing, but geological evidence shows that this was not possible. Hence, the comment must refer to another colossal statue, probably in Rome.

We know nothing about the fate of the ruined statue but it seems unlikely that such a quantity of valuable metal would go unclaimed for long. The most likely story is that the bronze was taken by state officials and used to mint money. It would certainly have been needed to rebuild the city and harbour after the disaster of 142 CE. However, aspects of the conventional story may reveal some truths.

The Byzantine authorities constructed a fort in the late 6th century where the Crusaders would later build their Palace of the Grand Masters (Fig. 3). When the Colossus collapsed in 142 CE, some bronze and iron fragments may have been buried deep under the rubble, concealed from the workers recovering the metals. If these fragments were recovered during the construction of the fort then they may have been set aside and later removed by the Arabs, inspiring parts of the conventional story.

### Conclusions

It is impossible to know the true history of the Colossus, but we can at least choose the most likely timeline. The 226 BCE earthquake that first brought down the statue is well-attested by geological and literary evidence. It deepened the harbour and must not have affected trade significantly. Ptolemy III offered help to rebuild the statue and it seems unlikely that the Rhodians would refuse. Literary allusion to an earthquake in 107 BCE that brought down the Colossus is not attested by geological evidence. The statue must have been quite corroded by this time and could have fallen in a storm or a minor tremor. The literary evidence for restoration by Vespasian and Hadrian is disputable, but emperors, especially Hadrian, did like to leave their mark on their foreign tours. Geological and literary evidence agree that the earthquake in 142 CE was huge. It must have wrecked the town and rendered the harbours useless for trade. If the Colossus still existed and fell, then there would have been no financial resources or indeed interest in reconstruction.

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Michael D. Higgins is an emeritus professor at the Université du Québec à Chicoutimi, Canada. His book, *The Seven Wonders of the Ancient World: Science, Engineering, and Technology*, was published by Oxford University Press in 2023.

### Further reading

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Please visit the site: <https://anetoday.org/colossus-of-rhodes/> [Go there for pix and  
figs]

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