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- Σεπτέμβριος 2020 -

**It is during our darkest moments that we must
focus to see the light. (Aristotle)**

Newsletter of the Hellenic Society of Archaeometry

- September 2020 -

Nr. 234

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ΘΕΣΕΙΣ ΕΡΓΑΣΙΑΣ/ΥΠΟΤΡΟΦΙΕΣ –
JOB VACANCIES/FELLOWSHIPS

POSTDOCTORAL POSITION IN
CHEMISTRY/MATERIALS SCIENCE,
UNIVERSITY OF NEUCHÂTEL,
SWITZERLAND

The University of Neuchâtel are looking for a highly motivated postdoctoral researcher to participate to a research project on the conservation of waterlogged wood and archaeological iron.

This research focuses on innovative biological methods of stabilization for the preservation of artistic and archaeological iron artefacts. The research team will exploit the unique properties of some microorganisms to remove iron reactive compounds from corroded surfaces. This research will rely on recent advances achieved within a project on the biotechnological stabilization of iron corrosion. To this purpose, two different strategies will be adopted: 1) reduction of iron species and 2) complexation of iron species.

This project focuses on innovative bio-based methods for the preservation of waterlogged archaeological wood and iron artifacts. The research team will exploit the unique properties of some bacteria or metabolites for anticipating the extraction of sulfur compounds from wood when it is still wet and in parallel for preventing iron artefacts from the formation of voluminous unstable corrosion products upon exposure to oxygen. To this purpose, three different strategies will be adopted: 1) oxidation of sulfur species, 2) complexation of iron species and 3) iron reduction.

The successful candidate will hold a doctorate in materials science or chemistry at the start of the project and have research skills related to the theme and activities of the project. A good understanding of the challenges and practices in conservation of waterlogged archaeological wood and of archaeological iron would be an advantage. The ideal applicant will have technical analytical skills (including FTIR/Raman microscopy, XRD, SEM-EDS, XRF and Synchrotron XAS) and experience in dealing with microorganisms and metabolites extraction.

In addition, he/she will be able to communicate results in a multidisciplinary and multicultural environment. In particular, the candidate will assist in teaching Bachelor students, in particular for the preparation and supervision of laboratory courses in chemistry. A good knowledge of English is required and French language proficiency is desired.

Funding is assured by the Swiss National Science Foundation for a maximum of 2 years. The postdoctoral researcher will be based at the University of Neuchâtel, under the supervision of Edith Joseph.

The University of Neuchâtel is a university on a human scale, with about 4,500 students. Its small size enables it to provide high-level training and to foster relationships between students and professors. It is one of the most international universities in Switzerland, with about 100 nationalities present and more than a fifth of the student body coming from abroad. Ideally located midway between Geneva and Zürich, in the heart of Europe, it is a perfect place to study or undertake high-level research in an idyllic setting between lake and mountains.

The University of Neuchâtel is an equal opportunity employer. Please send your complete application including a letter of interest, curriculum vitae with a list of publications, copies of diplomas and work certificates, and the names and contact information of two references to: Edith Joseph edithjoseph@unine.ch

Application deadline: October 16, 2020

Short-list selection: October 19-23, 2020

Phone Interviews: October 26-30, 2020

Final decision and communication of approval: November 2-3, 2020

Claudia Chemello
Co-founder/Senior Conservator
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Coordinator ICOM-CC Metals Working Group



RECRUITING 15 INTERNATIONAL PHD STUDENTS IN MARIE CURIE ITN SUBLIME (SUSTAINABLE BUILDING LIME APPLICATIONS VIA CIRCULAR ECONOMY AND BIOMIMETIC APPROACHES)

Dear Colleagues,

We are looking for dedicated and highly motivated Early Stage Researchers (ESR), who will join our team to craft the future of lime mortars/plasters in new construction and conservation of the built heritage.

We are recruiting **15 international PhD students** to be trained as European experts in Sustainable Building Lime applications via Circular Economy and Biomimetic Approaches (SUBLime). **SUBLime** is an European Training Network (ETN) program that will start in February 2021, as a Marie-Sklodowska-Curie action (Innovative Training Network - ITN) involving 9 countries in Europe.

This is an excellent opportunity to enhance your international career prospects: Original research projects within a Marie-Sklodowska-Curie Innovative Training Network (Horizon 2020 grant 955986)

- Consortium of 17 European partners (6 highly specialized universities and 11 worldwide leading Industrial Partners)
- Collaboration with network partners including visits during secondments
- Participate in worldwide training workshops
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- Enrolment in host institutions' PhD programs

Apply before September 14, 2020! For more information please check the SUBLime website: <https://sublime-etn.eu/job/>

Contact: Project Manager of SUBLime : Dr. João Pereira: jpereira@civil.uminho.pt

Beneficiaries Leaders: Prof. Paulo B. Lourenço (University of Minho, Portugal, Coordinator); Prof. Carlos Rodriguez-Navarro (University of Granada, Spain); Prof. Guang Ye (TU Delft, Netherlands); Prof. Nele De Belie (Ghent University, Belgium); Prof. Jan Kubica (Silesian University of Technology, Poland); Prof. Eddie Koenders (Technische Universität Darmstadt, Germany)

ΑΝΑΚΟΙΝΩΣΕΙΣ - ANNOUNCEMENTS

ΚΟΙΝΟ ΜΑΣΤΕΡ ΜΕ ΤΙΤΛΟ «ΕΦΑΡΜΟΣΜΕΝΕΣ ΑΡΧΑΙΟΛΟΓΙΚΕΣ ΕΠΙΣΤΗΜΕΣ» ΣΤΗΝ ΕΛΛΗΝΙΚΗ ΓΛΩΣΣΑ ΜΕΤΑΞΥ ΠΑΝΕΠΙΣΤΗΜΙΩΝ ΑΙΓΑΙΟΥ ΚΑΙ UNINETTUNO ΙΤΑΛΙΑΣ

Αγαπητοί Φοιτητές/τριες,

Το κοινό Μάστερ με τίτλο «ΕΦΑΡΜΟΣΜΕΝΕΣ ΑΡΧΑΙΟΛΟΓΙΚΕΣ ΕΠΙΣΤΗΜΕΣ» στην ελληνική γλώσσα μεταξύ Πανεπιστημίων Αιγαίου και UNINETTUNO Ιταλίας έλαβε το ΦΕΚ: 3 Αυγούστου 2020 ΤΕΥΧΟΣ ΔΕΥΤΕΡΟ Αρ. Φύλλου 3215, και ανοίγει η πλατφόρμα για αιτήσεις υποψηφίων έως 15 Σεπτ. θα ξεκινήσει στο Οκτ/Νοε 2020 .

Πληροφορίες σχετικά με το πρόγραμμα και άλλα σχετικά θέματα στην ιστοσελίδα <https://archsci.aegean.gr/>.

Όσοι ενδιαφέρονται να απευθύνονται στον Επιστημονικό Υπεύθυνο-Συντονιστή Καθ. Ιωάννη Λυριντζή, Πανεπιστήμιο Αιγαίου (liritzis@rhodes.aegean.gr, κιν.6932275757).

Από σήμερα (2 Αυγ.2020) μπορείτε να υποβάλλετε αιτήσεις. Ο αριθμός των επιλεγέντων περιορίζεται σε 40.

Με βάση το ΦΕΚ το Διοικητικό και Οικονομικό έργο διεκπεραιώνεται από το Ιταλικό ΑΕΙ.

Καλή Συνέχεια

Καθ Ιωάννης Λυριντζής
Επιστ Υπευθ- Συντονιστής

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Index updated: 30th June 2020.

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New! Search all the world's academic repositories, full-text and records alike.

In the right hand sidebar of AWOL (those of you reading this in feed aggregators or by email will need to click through to see this) is a search box giving access to the data curated by JURN.

Please visit the site: <http://ancientworldonline.blogspot.com/2009/06/jurn-access-to-free-ejournals-in-arts.html> [Go there for linx]

PHOTOGRAPHS IN THE CMS-SERIES

To all colleagues interested in the study of Minoan and Helladic seals, signet rings and sealings:

In recent years I undertook the time-consuming effort to improve the quality of the photographs of original seals, signet rings and sealings as well as that of modern impressions.

Many new photographs of impressions were made. In addition a better quality of the already existing photographs as published in the volumes of the CMS series was achieved by using Photoshop. Colleagues should now use the photographs of ARACHNE

(<https://nam10.safelinks.protection.outlook.com/?url=http%3A%2F%2Farachne.uni-koeln.de%2Fdrupal%2F&data=02%7C01%7Caegeanet%40lists.ku.edu%7C24fe9d22f9b34433407708d842ba4439%7C3c176536afe643f5b96636feabbe3c1a%7C0%7C1%7C637332715075810355&sdata=As5juMHPUnVIk0khevP2WFMpmvgCvtjQEvgHjxiR%2BE%3D&reserved=0>)

or get scans, at present from Professor Diamantis Panagiotopoulos at Heidelberg University, Faculty of Philosophy (diamantis.panagiotopoulos@urz.uni-hd.de)

In the near future a small amount of colour photographs will be available, too.

Ingo Pini

Email: pini@mail.uni-marburg.de

ΝΕΕΣ ΕΚΔΟΣΕΙΣ – NEW PUBLICATIONS

THE MYCENAEAN CITADEL AND ENVIRONS OF DESFINA-KASTROULI: A TRANSDISCIPLINARY APPROACH TO SOUTHERN PHOKIS

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Mediterranean Archaeology and Archaeometry Vol. 20, No 3, (2020), pp. 47-73

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Abstract

Despite its ubiquity in historical and mythological narratives, the ancient region of southern Phokis in central Greece has been approached primarily as a backdrop for more prominent neighbors (e.g. Delphi, Boiotia), whose roles have been codified in extant histories. Archaeological research has been likewise limited, with the result that southern Phokis has remained largely untouched and unintegrated into the larger narratives of each of the major periods of antiquity. Recent work by the Southern Phokis Regional Project (SPRP) in the Desfina Plain is correcting this lacuna. SPRP is blending the strongest attributes of several disciplinary approaches (e.g. classics, archaeochemistry, digital humanities) to produce a comprehensive transdisciplinary study of the natural and cultural landscape of the region, thereby illuminating the important role of southern Phokis during some of the richest epochs of human history.

Our 2018 study of Desfina's natural and cultural environs, bolstered by excavations at the Mycenaean citadel of Kastrouli (ca. 1350-1000 B.C.E.), is revealing that southern Phokis served as a major, if not the primary, gateway to points south and west for northern Phokis, western Boiotia, and perhaps even eastern Lokris by securing access to the Corinthian Gulf. Our survey has documented ambitious engineering works that include a major hydrological project reminiscent of the Kopais Basin and "Cyclopean" terrace walls that sculpt the landscape. These achievements testify to a level of socio-cultural complexity and interconnectivity previously overlooked. In the shadows of Mount Parnassos, Desfina makes the best case yet to be not only the home of

Echedameia, destroyed by Philipp II during the Third Sacred War, but also Homeric Anemorea.

Please visit the site:

[HTTPS://WWW.ACADEMIA.EDU/43756454/THE MYCENAEAN CITADEL AND ENVIRONS OF DESFINA KASTROULI A TRANSDISCIPLINARY APPROACH TO SOUTHERN PHOKIS](https://www.academia.edu/43756454/The_Mycenaean_Citadel_and_Environs_of_Desfina_Kastroli_A_Transdisciplinary_Approach_to_Southern_Phokis)

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In Radiocarbon at Cambridge University Press FirstView

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INSTRUMENTS - OBSERVATIONS - THEORIES: STUDIES IN THE HISTORY OF ASTRONOMY IN HONOR OF JAMES EVANS

Authors: Jones, Alexander, Carman, Christián

Issue Date: 2020

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Appears in Collections: Alexander Jones' Publications

Please visit the site: <https://archive.nyu.edu/handle/2451/61288> [Go there for download link]

EΙΔΗΣΕΙΣ - NEWS RELEASE

EGYPT'S ANCIENT PHARAOHS, THE FIRST TO DISCOVER GOLD, BY ANGY ESSAM

The first to discover gold was the Pharaohs, through excavations in the Eastern Desert, Red Sea and Nubia. Ancient Egyptians excelled in manufacturing gold and it had a strong presence in their life.

In this context, Director of the Antiquities Museum at the Bibliotheca Alexandrina, Hussein Abdel-Basir, said that the Pharaohs discovered gold in ancient times, as the ancient Egyptians discovered about 125 mines in the Eastern Desert, the Red Sea and Nubia, which means the land of gold in the ancient Egyptian language.

Abdel-Basir added that Pharaonic Egypt was rich in gold; one of the rulers once said to King Amenhotep III, "Send me a quantity of gold because gold in your country is like sand."

The director of the Antiquities Museum at the Bibliotheca Alexandrina added that it is evident that the pharaohs excavated in the Eastern Desert, where the golden papyrus in the Egyptian Museum in Turin, Italy that dates back to the reign of King Seti I of the 19th Dynasty refers to gold mines scattered in the Eastern Desert.

The successive archaeological discoveries reflected the ancient Egyptians' vast experience in the field of gold prospecting and quarrying, as well as its manufacture, as they used fire and containers made of porcelain to melt it.

Among the examples of the Pharaohs' ingenuity in gold making is the golden dome of Queen Hetepheres I tomb, the 11- kilogram mask of King Tutankhamun, and his sarcophagus that weighs about 110.5 kilograms of pure gold.

Abdel-Basir explained that Ancient Pharaohs did not worship gold but on the other hand sanctified the golden color that symbolized the color of sunlight, because its color does not change over time.

The gold industry was one of the most important Egyptian crafts and gold was associated with funerary rites.

It is worth mentioning that acclaimed archaeologist Zahi Hawass has finished the script for Tutankhamun Opera, set to debut in the opening ceremony of the Grand Egyptian Museum 2021.

Hawass announced that one of the most important scenes in Tutankhamun Opera revolves around Nefertiti's attempt to kill Tutankhamun and snatch the throne for one of her six daughters.

Composed by Zamboni, the opera's score will be completed this December, according to Hawass.

Hawass added that November 4, 2022 will be the centenary of the discovery of Tutankhamun tomb, who is an important king to the whole world not Egypt only.

He stated that the DNA tests will reveal a lot of information about the death of Tutankhamun and that he will announce to the whole world in 2020 how the golden king died.

Hawass previously said in an interview with Italia 1 Channel that the temporary exhibition of King Tutankhamun that was displayed at the Grande Halle La Villette in Paris broke the records of turnout of the French cultural exhibitions.

It was the most visited exhibition in France, as recounted by Hawass.

In his interview with the Italian channel, Hawass revealed a number of important facts about the family of the Golden Pharaoh, announcing that his father is King Akhenaten and that the mummy of his mother is located at tomb number 35 where the grandmother of Tutankhamun, Tiye, was buried.

Hawass added that Tutankhamun was suffering from lack of blood reaching the feet, flatfoot and malaria.

Grand Egyptian Museum witnessed a celebration of breaking a new record at Guinness world Record by drawing a portrait of King Tutankhamun's mask made from 7260 coffee cups on Saturday, December 28.

King Tutankhamun, the child ruler who died at the age of 19, turned into a famous figure whose luster has not yet disappeared.

Since the early 1960s, mobile exhibitions displaying pieces of the golden king tomb have created a new global feeling.

The ongoing exhibition, which began at the Science Center in California in 2018 and then moved to Paris recorded unprecedented turnout for exhibitions in France.

The previous record was also for an exhibition of Tutankhamun, which sold 1.4 million tickets.

Please visit the site:

<https://www.egypttoday.com/Article/4/90185/Egypt%E2%80%99s-Ancient-Pharaohs-the-first-to-discover-gold>

MUMMIES AMONG US, BY MICHAEL PRESS

Before death became a source of disgust and denial, Europeans cheerfully painted with – and ingested – human remains

The pharaoh was dead. Now the embalmers and the priests went to work over the next several weeks, they prepared the body at length. They removed the internal organs, and inserted plant resins and spices into the body. The body was dried out with natron, a natural salt compound; it was washed; covered with oil and spices and more plant resins. Then they wrapped the body in layers of linen sheets and bandages, and these too were covered with resin and oil. They placed the body in a coffin and brought it in a funeral procession to the tomb. For thousands of years, Egyptians practised variations of this basic process, for royalty as well as other elites – all with the care fit for the body of a god. ‘Egyptian ingenuity was more unsatisfied, contriving their bodies in sweet consistences, to attend the return of their souls,’ wrote the English doctor Thomas Browne in 1658. ‘But all was vanity, feeding the winde, and folly.’ These elaborate efforts to prepare the bodies for eternal life in their tombs would fail.

The mummies couldn’t stay hidden forever. Royal or non-royal, however secret the burial place, hundreds of generations of tomb-robbers hunted them. Those that survived have been left for archaeologists to remove. And today, mummies are all around us. They are so common that we take their display for granted. They have been exhibited in museums in Europe and North America for the past two centuries. During that time, scholars have used ever more powerful tools, from unwrapping and dissection to X-rays and most recently CT scans, to study their insides. They have provided us with information about both life and death in ancient Egypt that was unimaginable just 200 years ago. But mummies have been taken out of Egypt and collected in the West for much longer than this. When we look at the entire history of mummy collecting, we look into a mirror that reflects some dark truths.

Mummies tell us not just about ancient Egyptians but also about ourselves.

For most of the history of European collection of mummies, the primary thing Europeans did with them was grind them up. At first, Europeans ate them – mummies were considered a drug. ‘Mummie is become Merchandise, Mizraim cures wounds, and Pharaoh is sold for balsams,’ as Browne wrote. But it all started with a ghastly translation error.

The word ‘mummy’ comes from the Arabic and Persian *mumia*, meaning bitumen, a form of petroleum. (This in turn might have come from the Persian word *mum*, ‘wax’). Medieval Arab physicians such as Ibn Sīnā (known in Europe as Avicenna) thought that *mumia*, bitumen, had medicinal value. They inherited this view from classical authors. Some of these medieval physicians suggested that *mumia* – sometimes meaning bitumen, but more often some combination of resin and spices – was used in embalming ancient Egyptian bodies. When these ideas continued to circulate, in the Middle East and especially in the Latin translations and handbooks of European doctors starting in the 12th century, they were generally misinterpreted. The European writers thought that *mumia* was a product of the corpses: the embalming resin and spices mixed with juices

from the bodies. After a time, many thought that the corpse itself was the medical mumia.

By the 15th and 16th centuries – the height of the European Renaissance – there was a thriving trade in mummy. The production took place on almost an industrial scale: European travellers to Egypt were regularly taken to burial grounds at Saqqara near Cairo, where they witnessed local Arabs digging up mummies to be shipped to Europe. Some tried to take the process into their own hands. The German traveller Johann Helffrich spent two days at Saqqara digging for mummies in vain. In 1586, John Sanderson, an English merchant, bought 600 lbs of mummy and brought it back to London, to sell to the apothecaries. In Europe, mummy found eager consumers. It was used at the English court of Edward IV. Francis I of France was reported to never go anywhere without some mummy combined with rhubarb. By the late 17th century, Russia – which had been a late holdout – came to embrace mummy too.

Mummy was not the only form of dead human that Europeans believed possessed valuable medicinal qualities. Medical books from the 16th and 17th centuries mention drinking blood and ingesting moss growing on skulls, among other remedies. Pierre Pomet, chief druggist of the Sun King Louis XIV of France, expressed scepticism of mummy, but praised ‘Man’s Grease’ (that is, ordinary human fat) as good for gout and nerves. Mummy, however, was the most celebrated and most widely used form of medical cannibalism. And it had many uses. ‘Mummy hath great force in Stanching of Bloud,’ wrote Francis Bacon in 1626. For one authority, it was ‘an excellent remedy against diseases arising from cold and moisture’; for another, it cured any sort of ulcers and stones. Pomet added ‘Epilepsies, Vertigoes, and Palsies’ to the list of conditions for which it was prescribed.

Even in the heyday of mummy medicine, there were protests against its use. For one English visitor to Egypt in the 16th century, Saqqara was an uncomfortable reminder of the drug: ‘These dead bodies are the Mummie which the Phisitians and Apothecaries doe against our willes make us to swallow.’ By the 18th century, complaints were widespread, and doctors were prescribing it less, and fewer apothecaries were stocking it. It was said to be increasingly hard to get authentic mummies, because Egyptian authorities had supposedly prohibited their removal, or because the supply had been exhausted. Instead, European writers speculated that recent travellers who died in the Arabian desert, or executed criminals in Europe, were filled with resins and bitumen and passed off as mummies.

In all the complaints and warnings over mumia, few seemed bothered by the fact that people had been ingesting human beings. The use of mumia didn’t really decline because cannibalism caused people misgivings – it stopped because doctors and druggists doubted that it had any medicinal value. Many experts weren’t sure what mumia was at all, and for good reason. Mummy could be a liquid – like Othello’s handkerchief (‘dyed in mummy, which the skillful/Conserved of maidens’ hearts’) – or it could be a powder, as in Ben Jonson’s comedy *Volpone* (1606):

‘Sell him for mummia – he’s half dust already.’ A lawsuit over the Duchess of Norfolk’s unpaid pharmacy bills glossed mummy as ‘Mannes ffleshe dried’; the 15th-century Egyptian historian al-Maqrizi reported how some residents of Cairo were arrested for boiling corpses into oil to sell to the ‘Franks’. Encyclopaedias and reference works of the

18th century – including Samuel Johnson’s celebrated A Dictionary of the English Language – quoted all these definitions and more, adding to the confusion, but references to mummy’s medicinal use were quickly becoming outdated.

Though no longer fashionable as a medicine in Enlightenment Europe, ground-up mummy now had value as a pigment for artists. The supposed difficulty of acquiring Egyptian mummies didn’t hamper the wide use of ‘mummy brown’. The pigment was popular with European painters for hundreds of years, starting by the end of the 1500s. Within two centuries, it had made its way across the Atlantic. The artist Benjamin West advised his American colleagues, such as John Singleton Copley, to glaze their paintings with it. ‘The finest brown used by Mr West in glazing,’ observed his fellow painter James Forrester, ‘is the flesh of mummy.’ West’s advice was circulated widely over the next several decades. A poem dedicated to West’s contemporary Angelica Kauffman spent some 25 pages celebrating her use of dead Egyptians in her paintings (‘The pulveriz’d Nitocris now/May grace some Queen’s majestic Brow’). In the 1800s, the French Romanticist Eugène Delacroix painted with it; so did English Pre-Raphaelites such as Edward Burne-Jones. Copley’s painting The Death of the Earl of Chatham (1781) and Delacroix’s decoration (1851-54) of the Salon de la Paix in the Hôtel de Ville, Paris are two of the specific works that we can say were painted with mummy in this period.

As with medicinal mummy, people kept debating about mummy brown and how to make it. Which part of the mummy was best? Was it really made of authentic Egyptian mummies? Some suggested that mummy brown was largely bitumen with some animal remains mixed in. Others disagreed.

We are told by Forrester that ‘the most fleshy are the best parts’ – he added that ‘the thread of the garments, or any dirt which may prevent its grinding, must be intirely [sic] cleared away.’ One English chemist insisted that the typical procedure is to grind up all of the mummy together, including the bones, to give the pigment greater solidity. In 1926, the colour-maker C Roberson & Co still advertised its own version: ‘A pigment prepared by grinding together the Bitumen and Bones of an Egyptian Mummy.’

Is it the ancient dead that we’re respecting, or our own present-day sensibilities about death?

It is hard to know what to make of these duelling 19th- and early 20th-century claims. Should we take them seriously and, if so, which ones or how many? Some of them are quite glib – one artists’ handbook frowned on mummy brown by insisting that there is ‘nothing to be gained by smearing our canvas with a part perhaps of the wife of Potiphar’. Some are quite graphic, with lurid anecdotes of London colour-makers grinding up mummies in their mills. Here we read that genuine Egyptian mummy can be obtained at colour shops; there, that it is increasingly scarce, because of a familiar reason: Egyptian antiquities laws. Adeline’s Art Dictionary (1891) warns that what ‘the druggists of the Levant palm off upon Western Europe is not genuine ... but is obtained from the bodies embalmed by both Jews and Christians in the Levant.’

Now, stop for a moment.

Step back and think about what you've just read. Maybe you were captivated, maybe repulsed, maybe some of both? Take a moment to think about why that might be. How different are we from people who used to eat and paint with mummy? Extraction of mummies is still tomb-robbing, whether for medicine or for science. When an ancient sarcophagus discovered in Alexandria, Egypt was opened in 2018 and a red liquid found inside, a petition circulated on Change.org with tens of thousands of signatures to 'let people drink' what in fact was probably leaked sewage. The widespread trade in mummies and other human body parts in online platforms such as Facebook and Etsy suggests that the gulf between past mummy users and ourselves is smaller than we might at first imagine. It's important to remember, though, that mummy-eating and painting were once socially acceptable activities in Europe and the US. Today, wishes to drink mummy juice are highly eccentric. Maybe there is a fundamental difference between past and present after all.

One recent change is that archaeologists and museum professionals, in ethical codes, exhibitions and publications, now emphasise the concept of 'respect' for the ancient dead and the need to recognise them as human. Yet Egyptologists still carry out much the same research on mummies as before. Museums still display mummies, sometimes unwrapped, and usually alongside pictures of their insides. In exhibitions, the most visible changes include prohibiting photography of unwrapped human remains and putting up signs warning that human remains will be on display. With such gestures, is it the ancient dead that we're respecting, or our own present-day sensibilities about death? If we recoil from an unwrapped mummy – or from reading about what modern humans have done to them – it might not be out of respect for them so much as disgust at the thought that we might let our own bodies come into contact with ancient human flesh. The remarkable thing, then, is that so many human beings 500 or even 200 years ago didn't share this disgust. What happened?

Since Philippe Ariès in the 1970s, the history of death has been its own field of scholarly study. And since Ariès, scholars have shown that attitudes toward death have transformed dramatically over the past few centuries. One of many critical changes is how we interact with dead bodies themselves. Before the previous century, death could strike at any time – childbirth for newborns and young women, epidemics for anyone. Death was familiar, intimate even. Bodies might pile up in an epidemic, but they were also present in the home.

Families took care of loved ones in their last moments, and of their bodies after death.

Over the past 200 years, in industrialised countries, all of this has changed. With improved public health has come a drastic fall in infant mortality; with vaccines and other medical advances, the curbing of many epidemics – with occasional deadly exceptions. Death is more and more confined to old age. It takes place in the hospital. Between the nursing home, the hospital and the funeral home, the entire process of caring for family members before and after death has been moved out of the home, and out of the sight of most people.

These changes in when and where people die have brought a major shift in attitudes towards death, and towards the dead body. Until very recently (two centuries ago at

most), death was seen as inescapable, a natural part of life. People were used to dead bodies. There was a ‘promiscuity’ between the living and the dead, as Ariès has put it. Now, death is invisible. We are much less used to dead bodies, much more apt to recoil from death – and from the dead. Between the distance we feel from death and the rise of germ theory, we might shudder at the thought of painting with or swallowing human flesh.

Let’s consider an example, a custom of how we live with the dead. For hundreds of years, middle- and upper-class families throughout Europe (and eventually in the US) had postmortem portraits made of their loved ones – especially, but not only, their children. These portraits showed the deceased lying peacefully as if in sleep instead of death, first as paintings, then as photographs. Today, the practice strikes many as a Victorian oddity. But in fact a version of it continues to be practised – just not among the upper classes. Postmortem portraits, taken by professional artists advertising for this particular service, were once framed and put on display in homes or kept in family photo albums; now they are more hidden. The anthropologist Jay Ruby, among others, has shown this custom’s durability, in the US at least. It is now practised primarily by the lower-middle class, and the ignorance of many as to its existence might have to do with a restricted knowledge of other classes. Postmortem photographs today also focus more on the funeral party as a whole, instead of a close-up of the deceased. But what is key is that this practice is no longer socially acceptable for many who see this intimacy – what Ariès called this ‘promiscuity’ – with the deceased as quite alien.

Practical changes in medicine and hygiene have had dramatic consequences for how we think and feel about death. They have made both modern and ancient dead more distant and foreign alike. Just as postmortem portraits are no longer a publicly acknowledged practice, just as drinking mummy juice is not socially acceptable, so there has been a move towards restricting public displays of mummies. When mummies first went on show in museums two centuries ago, people in Western countries were likely to have more direct experience with dead bodies. If it was acceptable to display photos of dead loved ones in the home, it was acceptable to display the ancient dead in a museum.

Mummy display has gone on for so long that we now take it for granted.

But there have been changes in how both professionals and public see them, however subtle. Consider the transition from spectacles of public mummy unwrappings in the early to mid-19th century, to a more clinical procedure for specialists, to increased reliance on imaging the insides. The technologies used to study them might represent less and less destructive ways of viewing mummies and their insides – but they also reflect greater distance from direct contact with the dead body itself. In recent years, museums have occasionally tried to change how they display mummies. The Manchester Museum briefly covered some unwrapped mummies in modern cotton shrouds in 2008, saying that it wanted to raise awareness about the ethical issues of displaying dead bodies; the coverings were removed within a few weeks, however, as visitors complained about the change.

At least some displays of dead bodies in museums continue to be popular. Mummy exhibitions are huge draws. Starting in the mid-1990s, a series of exhibitions under the title Body Worlds has displayed corpses and body parts preserved by a process called plastination (replacing body fat and water with plastic, so that the bodies don’t decay)

and arranged in various lifelike poses. Tens of millions of people have visited these exhibitions and the various knockoffs they have inspired. But mummies aren't like ordinary dead bodies; they are the long-ago deceased of another civilisation, ones we often see as artifacts more than as people. Body Worlds, meanwhile, does everything it can to make the bodies on display look unlike corpses. Far from putting dead bodies on show, it hides them – it makes death invisible.

If changes in how we treat mummies really reflect practical changes in how we experience dead bodies – changing what we then project on to an ethical plane – what does this mean for how we might treat mummies in the future? Thinking about these issues seems especially appropriate now, when routines of daily life and the rituals of death have, for so many of us, been upended in a short time. We know that attitudes toward the dead, both ancient and modern, have changed drastically at multiple points in history. They might be about to change again.

Please visit the site: <https://aeon.co/essays/when-we-lived-with-death-mummies-were-medicine-and-paint> [Go there for pix]

ANCIENT ARTISANS IN ARABIA, THE AMERICAS INVENTED SAME TECHNOLOGY INDEPENDENTLY NEW RESEARCH SUGGESTS STONE FLUTING SERVED DIFFERENT PURPOSES IN THE TWO REGIONS, BY ALEX FOX

Various types of North and South American fluted points (Crassard et al.).

Archaeologists once thought that 12,000-year-old stone spear tips and arrowheads with fluting—a central channel of chipped-away material used to bind them to a shaft—were a uniquely American invention. But around the turn of the new millennium, researchers discovered 8,000-year-old fluted stone tools at several sites on the Arabian Peninsula.

Now, a new analysis of these artifacts suggests the ones found in Arabia served a different purpose than the arrowheads and spear tips unearthed in the Americas, reports Ruth Schuster for Haaretz.

“Given their age and the fact that the fluted points from America and Arabia are separated by thousands of kilometers, there is no possible cultural connection between them,” says co-author Michael Petraglia, an anthropologist at the Max Planck Institute for the Science of Human History, in a statement. “This is then a clear and excellent example of cultural convergence or independent invention in human history.”

Petraglia and his colleagues examined tools from Manayzah in Yemen and Ad-Dahariz in Oman, as well as examples from across the Americas, according to Brooks Hays of United Press International (UPI).

“We recognized this technique as ... probably the most famous of the prehistoric techniques used in the American continent,” lead author Remy Crassard, archaeologist at the French Center for Archaeology and Social Sciences, tells UPI. “It took us little time to recognize it, but it took us more time to understand why fluting was present in Arabia.”

In the Americas, the fluted stones were fashioned to facilitate hafting—the process of fastening an arrowhead or spear tip to a wooden shaft. But as the researchers write in the journal PLOS One, the Arabian fluted points don’t appear to have been crafted with hafting in mind.

These stones’ fluting is mainly found toward the tip of their points, per Haaretz. Producing the fluted shards would have required masterful abilities in chipping away flakes of stone—a technique called knapping.

To investigate how the tools might have been made, the team recruited a master flintknapper. When fluting was added to the mix, the researchers found that even this expert broke many of the points he was attempting to shape.

“He made hundreds of attempts to learn how to do this,” says co-author Joy McCorrison, an anthropologist at Ohio State University, in a statement. “It is difficult and a flintknapper breaks a lot of these points trying to learn how to do it right.”

Given the costly loss of materials that producing fluted points likely entailed, as well as the fact that the Arabian tools’ fluting was in the wrong location for hafting, the researchers propose a less practical explanation: As Crassard tells UPI, “We tried to argue that it was more related to a form of ‘bravado’ or display of skill” than a purely functional purpose.

Speaking with Haaretz, Crassard adds that the finely crafted objects may have played a “sociocultural role,” in that the flashy fabrication demonstrated “this person being part of a group who can then show to other groups their very special skills. It’s a whole virtuous circle of social connections.”

But Metin Eren, an anthropologist at Kent State University who wasn’t involved in the research, tells Seder el-Showk of Nature Middle East that because the study didn’t include functional tests, the researchers can’t be certain the Arabian fluting didn’t entail some practical advantage.

Eren also doesn’t see the proposed explanations of fluting found in Arabia and the Americas as mutually exclusive. He says, “It’s important to emphasize that fluting could be both functional and symbolic or a skill demonstration at the same time.”

Alex Fox is a freelance science journalist based in Washington, D.C. He has written for Science, Nature, Science News, the San Jose Mercury News, and Mongabay. You can find him at Alexfoxscience.com.

Please visit the site: <https://www.smithsonianmag.com/smart-news/stone-age-tech-invented-separately-america-and-arabia-served-different-purposes-180975503> [Go there for pix]

EXCAVATION UNCOVERS: PREHISTORIC MIGRATION ROUTE FROM AFRICA PASSED THROUGH DIMONA

Evidence of the path of modern humans leaving Africa 100,000 years ago discovered in Dimona

Local youths working with the Israel Antiquities Authority uncovered the Stone Age site during the summer * This is the first place in Israel where in situ evidence has been found of the special stone knapping technology used by humans who left Africa * The discovery was revealed in an archeological excavation facilitating construction of a solar energy field and was underwritten by the Israel Electric Company.

Recent excavations conducted by the Israel Antiquities Authority together with local youths from Dimona, in preparation for the construction of a solar energy field and funded by the Electric Company, discovered a Middle Paleolithic flint knapping site that existed between 250,000 - 50,000 years ago. Those who helped uncover the unique prehistoric site were youths from the city, who worked in the excavation as a summer job during the economically challenging period of the Covid 19.

The newly discovered site in near Dimona is small. Prehistoric humans seemingly arrived here in order to access the abundant natural flint, from which they made their tools.

The site here is unique because of the flint knapping technology, known as 'Nubian Levallois', which originated in Africa. Researchers trace the path of this technology in order to understand the migration routes of modern humans from Africa to the rest of the world, about 100,000 years ago.

According to the excavation directors, the prehistory researchers Talia Abulafia and Maya Oron from the Israel Antiquities Authority, "This is the first evidence of a 'Nubian' flint industry in an archeological excavation in Israel. The knapped flint artifacts remained right in the original place where the humans sat and created the tools. This manufacturing is identified with modern human populations who lived in East Africa 150-100 thousand years ago and migrated from there around the world. In the last decade quite a few Nubian sites have been discovered in the Arabian Peninsula. This has led many scholars to claim that modern humans left Africa through the Arabian Peninsula. The Dimona site appears to present the northernmost example of Nubian flint output found in situ, thus marking the migration route: from Africa to Saudi Arabia, and from there, perhaps, to the Negev.

The excavation took place while dealing with the challenges presented by Covid 19, which affect the health and economy of Israeli citizens in general, and the residents of Dimona in particular. According to Svetlana Talis, Northern Negev District Archaeologist at the Israel Antiquities Authority, "Dimona is one of the most severely affected towns in the second wave of the Corona outbreak and was even on the verge of lockdown. After wondering what to do about summer holidays, local youths from Dimona came to the excavation to work and help their families, and to uncover a site of

particular importance. All of this is part of a project promoted and directed by the Israel Antiquities Authority in recent years, which seeks to bring our youth closer to their own cultural heritage.”

Please visit the site: <https://www.israelnationalnews.com/News/News.aspx/284714>
[Go there for many pix]

BURNT REMAINS FROM 586 BCE **JERUSALEM MAY HOLD KEY TO** **PROTECTING PLANET,** **BY AMANDA BORSCHEL-DAN**

A new analysis of 1st Temple-era artifacts, magnetized when Babylonians torched the city, provides a way to chart the geomagnetic field – physics’ Holy Grail – and maybe save Earth

The Bible and pure science converge in a new archaeomagnetism study of a large public structure that was razed to the ground on Tisha B’Av 586 BCE during the Babylonian conquest of Jerusalem. The resulting data significantly boosts geophysicists’ ability to understand the “Holy Grail” of Earth sciences — Earth’s ever-changing magnetic field.

“The magnetic field is invisible, but it plays a critical role in the life of our planet. Without the geomagnetic field, nothing on Earth would be as it is — maybe life wouldn’t have evolved without it,” Hebrew University Prof. Ron Shaar, a co-author of the study, told The Times of Israel.

In the new study published in the PLOS One scientific journal, lead author and archaeologist Yoav Vaknin harvested data from pieces of floor from a large, two-story building excavated in the City of David’s Givati parking lot. Minerals embedded in the dozens of floor chunks were heated at a temperature higher than 932 degrees Fahrenheit (500 degrees Celsius) and magnetized during the slash and burning of ancient Jerusalem, and therefore offered up geomagnetic coordinates.

“No comparable floor from the Iron Age has ever been found in Jerusalem or other sites in the southern Levant,” says the PLOS One article.

The coordinates taken from the floor give a rare “peephole” of the Earth’s magnetic field during Tisha B’Av 586 BCE, said Tel Aviv University PhD student Vaknin.

“The floor of the structure is filled with magnetized minerals that absorbed the [magnetic] field that was on Earth at the time. Since the magnetic field changes all the time we’re trying to reconstruct it.

Here, we have a little peephole, accurate to the day, of the ancient magnetic field from 2,600 years ago,” said Vaknin.

There is a general consensus among scholars that the arson and wanton destruction depicted in 2 Kings, 25, 8-9 took place on Tisha B’Av. “I don’t know of anyone who doubts the historicity of the event,” said Vaknin. However, even gaining “surety to the month, and even to the year is very rare” when speaking of events that took place 2,600 years ago, said Vaknin.

Archaeological findings such as pottery sherds, bricks, roof tiles and furnaces essentially record the Earth’s magnetic field as they are burned, according to a TAU press release. This is because the artifacts are constructed of magnetic minerals — such as calcite in the

floor — that are re-magnetized in the high temperature to the direction and magnitude of the field when they were heated.

According to Vaknin, the importance of his study goes well beyond the ability to explain to archaeologists how to use another hi-tech technique that helps date the tricky First Temple period. Due to a plateau spanning from circa 800-400 BCE, otherwise reliable radiocarbon dating is less useful.

He said the techniques of archaeomagnetism allow scientists to measure burnt features or artifacts for magnetic intensity and direction and compare the results.

“For the past two years, I’ve been sampling destruction layers and other burnt materials. In addition, we’re sampling materials from excavations that took place in the past,” he said.

Knowing the dates for the Babylonian destruction allows archaeologists to more securely date other Iron Age artifacts.

TAU PhD student Yoav Vaknin takes measurements of a floor that collapsed during the 586 BCE destruction of Jerusalem by the Babylonians at excavations in the City of David Park in Jerusalem.

(Shai Halevi/Israel Antiquities Authority)

“The archaeomagnetic method has implications for future research. If we find a similar destruction layer with similar pottery at another site tomorrow, we will be able to compare the magnetic fields recorded at the two different sites, enabling us to determine whether the other site was also destroyed by the Babylonians,” said Vaknin.

But what is more important, he said, is that the gathered data allows physicists to use pinpointed coordinates to build more complete computer models of one of the most enigmatic subjects in physics, the magnetic field.

“Archaeology gives us an incident that we can date very, very accurately,” said Vaknin. “Archaeology gives us very accurate information on the time axis of when Jerusalem is burnt.” The physicists take over from there.

What is the geomagnetic field?

According to Hebrew University’s Shaar, a co-author on the study, “The magnetic field is generated by chaotic electrical and fluid currents at the Earth’s core. We geophysicists are trying to understand how it changes with the time, because it is constantly changing, and we are trying to understand why, and what are the mechanisms that drive the changes.”

According to a NASA website, “Every magnet produces an invisible area of influence around itself. When things made of metal or other magnets come close to this region of space, they feel a pull or a push from the magnet. Scientists call these invisible influences ‘fields.’”

If you've ever seen the experiment in which iron chip sprinkles on a piece of paper are sculpted by a magnet moved under a piece of paper, you've seen a magnetic field.

The study of the magnetic field has many reverberations outside pure physics and may be key in comprehending climate change: The magnetic field serves as Earth's shield from cosmic radiation and charged particles from the sun. It is also used as a navigation tool by man — think compass — and by many birds and marine mammals who are naturally attuned.

Since the study of the magnetic field is still a relatively young discipline that began with Carl Friedrich Gauss in the 1830s, there is a data blackout from before scientists began charting its coordinates.

The ability to gather geomagnetic coordinates from a specific date 2,600 years ago is exceptionally rare, said Shaar.

The ability to chart the past may allow scientists to predict the geomagnetic field's future behaviors, which perhaps may help the future of humankind.

“The magnetic field of Earth actually changes its polarity over time.

They are called Polarity Reversals, There have been about 170 of these reversals during the last 76 million years according to geological evidence,” writes NASA. Likewise, according to NASA, “Geophysicists have noted that the strength of Earth's magnetic field has been decaying — about 5 percent globally over the past century. However, it is not changing in a uniform way; it grows, growing stronger in some places and weaker in others.”

A weaker shield is not considered positive, but scientists still don't know enough to understand what it could mean, said Vaknin.

The archaeology behind the study

The interdisciplinary, interinstitutional study was published today in the prestigious PLOS One science journal. It is based on Vaknin's doctoral thesis and was completed in collaboration with geophysicist Shaar and Tel Aviv University's Prof. Erez Ben-Yosef, Prof. Oded Lipschits and Prof. Yuval Gadot, as well as Dr. Yiftach Shalev of the Israel Antiquities Authority. The City of David's Givati Parking Lot excavation where the building is found is co-directed by Gadot and Shalev.

Gadot explained in a video accompanying a press release that the building under study was an impressive structure from the Kingdom of Judah. According to the article, the archaeologists uncovered a 17 meter by 10 meter (55 feet by 33 feet) segment of “a large structure that had served as an elite or public building.” The bottom story of the structure was filled with up to 2.3 meters (7.5 feet) of debris, including dirt and stones. “Among the debris a substantial amount of ash and charcoal was found, leading the excavators to the conclusion that the structure had been destroyed by an intense conflagration,” they write.

“What most surprised us were pieces of flooring. The floor should be under the destruction layer, but here we're finding it mixed in,” Gadot said, adding that the flooring was of “exceptional quality.”

Co-excavator Yiftach said it was time to bring in the big guns. “It was clear that for this excavation we needed to go beyond the tools that we use in a regular excavation and use all the technology available to us and so we brought in Yoav, who used the techniques involved in paleomagnetism,” he said.

According to the article, Vaknin studied 54 pieces of “exquisitely crafted” floor that was 15 cm (6 inches) thick and had two layers.

“The bottom layer was made of coarse material and pieces of limestone.

The upper layer was made of consolidated well-sifted material and contained chunks of calcite, which probably shone when the floor was polished. Its upper face was perfectly flat and smooth.”

Vaknin conducted his paleomagnetic experiments at the magnetically shielded paleomagnetic laboratory at the Institute of Earth Sciences located at the Hebrew University of Jerusalem’s Givat Ram Campus where Shaar is based.

He writes in the article that in order to estimate the direction of the ancient magnetic field, the scientists averaged the directions of the 38 segments that yielded coordinates.

“Our results show that the acquisition of the magnetic information in the floor segments occurred during the destruction of the structure by fire. From this, in conjunction with the historically-based tight dating, we can conclude that we managed to pinpoint our paleomagnetic results on the time axis to less than a year, which is rare for such an early period,” write the authors.

Givati Parking Lot excavations in the City of David Park in Jerusalem, a site where remnants of the 586 BCE destruction of Jerusalem by the Babylonians were discovered. (Shai Halevi/Israel Antiquities Authority)

Use of archaeomagnetism in Israel

When asked for comment on how common the use of archaeomagnetism is in Israeli excavations, Bar-Ilan Prof. Aren Maeir, the director of the Tell es-Safi/Gath Archaeological Project, wrote, “The method in recent years has been used extensively in Israel... We have used this at Safi as well.”

Archaeologist Aren Maeir (left) supervises at an 830 BCE destruction layer at the Tell es-Safi/Gath Archaeological Project, July 2018. (Amanda Borschel-Dan/Times of Israel)

In fact, it was Shaar and some of his students who helped out at Safi.

“Dating ancient material is never an easy task, never,” said Shaar. He told The Times of Israel that he has been to dozens of excavation sites in recent years since developing a method to “read” pottery and other artifacts such as burnt structures and worked metals to gather more precious data points to chart the development of the geomagnetic field.

Dating ancient material is never an easy task, never “We are sitting in Israel on a gold mine! It’s unbelievable,” said Shaar. “We have immediate access to an infinite number of artifacts we can measure and date and understand the field in the past.”

The geophysicists work in cooperation with archaeologists who provide them with archaeological material that can be dated and compared with other data points.

“Measuring magnetic data from a floor burned thousands of years ago is no trivial matter. We had to characterize the magnetic particles, understand how the magnetic data was coded in the material, and develop measuring techniques enabling us to read this data. Nature hasn’t made life easy for us,” said Shaar.

At the same time, Shaar is cautious about relying on one method to firmly date an artifact or an event. “Fortunately, in this particular study, Yoav was able to decipher nature’s magnetic code and give us important information from several angles: historic, archeological and geomagnetic,” he said.

Please visit the site: <https://www.timesofisrael.com/burnt-remains-of-586-bce-destruction-of-jerusalem-help-map-physics-holy-grail/> [Go there for many pix]

RESEARCHERS UNLOCK SECRETS OF THE PAST WITH NEW INTERNATIONAL CARBON DATING STANDARD

Radiocarbon dating is set to become more accurate than ever after an international team of scientists improved the technique for assessing the age of historical objects.

The team of researchers at the Universities of Sheffield, Belfast, Bristol, Glasgow, Oxford, St Andrews and Historic England, plus international colleagues, used measurements from almost 15,000 samples from objects dating back as far as 60,000 years ago, as part of a seven-year project.

They used the measurements to create new international radiocarbon calibration (IntCal) curves, which are fundamental across the scientific spectrum for accurately dating artifacts and making predictions about the future. Radiocarbon dating is vital to fields such as archaeology and geoscience to date everything from the oldest modern human bones to historic climate patterns.

Archaeologists can use that knowledge to restore historic monuments or study the demise of the Neanderthals, while geoscientists on the Intergovernmental Panel on Climate Change (IPCC), rely upon the curves to find out about what the climate was like in the past to better understand and prepare for future changes.

Professor Paula Reimer, from Queen's University Belfast and head of the IntCal project, said: "Radiocarbon dating has revolutionized the field of archaeology and environmental science. As we improve the calibration curve, we learn more about our history. The IntCal calibration curves are key to helping answer big questions about the environment and our place within it."

The team of researchers have developed three curves dependent upon where the object to be dated is found. The new curves, to be published in Radiocarbon, are IntCal20 for the Northern Hemisphere, SHCal20 for the Southern Hemisphere, and Marine20 for the world's oceans.

Dr. Tim Heaton, from the University of Sheffield and lead author on the Marine20 curve, said: "This is a very exciting time to be working in radiocarbon. Developments in the field have made it possible to truly advance our understanding. I look forward to seeing what new insights into our past these recalculated radiocarbon timescales provide."

The previous radiocarbon calibration curves developed over the past 50 years, were heavily reliant upon measurements taken from chunks of wood covering 10 to 20 years big enough to be tested for radiocarbon.

Advances in radiocarbon testing mean the updated curves instead use tiny samples, such as tree-rings covering just single years, that provide previously impossible precision and detail in the new calibration curves. Additionally, improvements in understanding of the

carbon cycle have meant the curves have now been extended all the way to the limit of the radiocarbon technique 55,000 years ago.

Radiocarbon dating is the most frequently used approach for dating the last 55,000 years and underpins archaeological and environmental science. It was first developed in 1949. It depends upon two isotopes of carbon called stable ^{12}C and radioactive ^{14}C .

While a plant or animal is alive it takes in new carbon, so has the same ratio of these isotopes as the atmosphere at the time. But once an organism dies it stops taking in new carbon, the stable ^{12}C remains but the ^{14}C decays at a known rate. By measuring the ratio of ^{14}C to ^{12}C left in an object the date of its death can be estimated.

If the level of atmospheric ^{14}C were constant, this would be easy. However, it has fluctuated significantly throughout history. In order to date organisms precisely scientists need a reliable historical record of its variation to accurately transform ^{14}C measurements into calendar ages. The new IntCal curves provide this link.

The curves are created based on collecting a huge number of archives which store past radiocarbon but can also be dated using another method. Such archives include tree-rings from up to 14,000 years ago, stalagmites found in caves, corals from the sea and cores drilled from lake and ocean sediments. In total, the new curves were based upon almost 15,000 measurements of radiocarbon taken from objects as old as 60,000 years.

Alex Bayliss, Head of Scientific Dating at Historic England, said:
"Accurate and high-precision radiocarbon dating underpins the public's enjoyment of the historic environment and enables better preservation and protection.

"The new curves have internationally important implications for archaeological methodology, and for practices in conservation and understanding of wooden built heritage."

Darrell Kaufman of the IPCC said: "The IntCal series of curves are critical for providing a perspective on past climate which is essential for our understanding of the climate system, and a baseline for modeling future changes."

Please visit the site:

<https://www.sciencedaily.com/releases/2020/08/200812144122.htm>

OXFORD ARCHAEOLOGISTS WIN ACCESS TO RESTRICTED SATELLITE IMAGES OF ISRAEL AND THE PALESTINIAN TERRITORIES

Satellite images of the earth's surface are familiar. From Google Earth to estate agents' websites, space age technology is used to bring us images of the world in which we live. And there has been regular exciting news from archaeologists about an entire new city or settlement discovered in the desert or on a remote hilltop, lost to generations, found thanks to satellite imaging.

There are pictures of almost every country on Earth, from space. But there has been one key area which it has not been possible accurately to view with satellites, frustrating archaeologists keen to study the region. That area is Israel and the Occupied Palestinian Territories (OPT) - a region packed with the history of ages and civilisation, where feet really did walk in ancient times.

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A long-standing prohibition in the United States, known as the Kyl-Bingaman Amendment, meant that archaeologists studying the region could not use US satellite technology – which was the main source for many years, although Israel itself put good quality images of its territory on its own mapping agency website.

Two Oxford archaeologists, Dr Michael Fradley and Dr Andrea Zerbin, decided to do something about it. And recently, following concerted effort over several years, reform of the prohibition was allowed.

Restrictions over the sale of US high-resolution satellite imagery over the region was reduced on the Federal Register on 21 July. It was a significant victory.

Dr Fradley maintains, 'This ruling opens up many opportunities for research for archaeologists and many other disciplines which use Earth observation, such as for monitoring evidence of climate change and water exploitation. And it is a big win for science...

'A century ago, the Cambridge botanist Hugh Hamshaw Thomas, who served as an RFC/RAF intelligence officer on the Palestine front during the First World War, highlighted the value of aerial photography for scientific study in the Levant in a paper in the journal Nature. But this potential has rarely been achieved. Hopefully, this long-overdue reform will help reverse that trend with regards to more recent satellite imagery'.

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This reform success has been hard-fought. It all started because the Oxford pair came up against the barrier. Their work was part of the Arcadia-funded, Endangered Archaeology of the Middle East and North Africa (EAMENA) project. It uses satellite imagery to identify and monitor archaeological sites across the MENA region.

Three years ago, they found most archaeological sites in the OPT were not visible on the available low-resolution imagery. According to Dr Fradley, ‘It was a major barrier to our work. The imagery available was very low resolution – because of the US restrictions. We decided to find a way around it.’

They did find a way. The Kyl-Bingaman Amendment contained a reform mechanism that meant restrictions would be lowered, if companies outside the US were selling their own satellite imagery at a higher resolution than the level set by the US restrictions. And things had changed. The US was no longer the only supplier; Airbus provided imagery. The archaeologists found the French company had been producing sub-2m resolution of Israel from at least 2012. But nobody in the US had been effectively monitoring the situation. Since that time, several other companies outside the US had also surpassed the 2m level, including the South Korean company Kompsat. But, from an academic perspective, US satellite imagery offered the potential for open-source free access – essential for academic uses.

The Oxford pair tried to argue their case, with little response – although no one in the scientific community argued that the restriction should be retained. But they persevered, publishing an agenda-setting paper on the restrictions in the journal *Space Policy* and working with the Washington-based policy group al-Shabaka. Finally, the US regulator relented, lowering to the restricted level to 0.4m as the archaeologists had argued, a level achieved by the Kompsat K3A satellite.

The decision to lift the prohibition has ‘huge implications’, according to Dr Fradley. ‘We haven’t been able to access some areas in occupied territories and this will make an enormous difference.

‘We will be able to record archaeology of the region on a granular level and have a much more objective view. We will be able to see if there has been damage to sites and, potentially, [if they secure access to retrospective imagery] identify where sites have been lost.’

Dr Fradley explains, ‘Israel has its own mapping of the entire country and a well-developed and well financed antiquities authority...but we haven’t had accurate imagery for the OPT. More data is of more benefit.’

Commenting on the news, Dr Jack Green, Associate Director of the American Centre for Oriental Research, based in Amman, Jordan, says, ‘The release of this more detailed satellite imagery will help provide many archaeologists and cultural heritage professionals with the vital additional tools needed to document and monitor sites and landscapes under their care from continual threats of urban encroachment, agricultural development, looting, vandalism, and other unauthorized activities. This is especially important for monitoring areas which are difficult or impossible to gain access to for security reasons.’

Dr Carol Palmor, Director of the Council for British Research in the Levant, also based in Amman says, ‘This represents an essential step for the protection of heritage in Israel and Palestine, with profound implications for many years to come. Furthermore, it is a brilliant example of the impact of research on policy and international legislation.’

This represents an essential step for the protection of heritage in Israel and Palestine, with profound implications for many years to come. Furthermore, it is a brilliant example of the impact of research on policy and international legislation

This successful reform has been bittersweet. In July last year, Dr Andrea Zerbini passed away of a rare cancer at the age of 34, when it still appeared that the restrictions would not be lifted. The present reform would have delighted him, and the decision is a lasting tribute to the research in Space Policy, in which he was a prime mover.

Please visit the site: <https://www.ox.ac.uk/news/arts-blog/oxford-archaeologists-win-access-restricted-satellite-images-israel-and-palestinian>

OLDEST HUMAN CREMATION IN THE NEAR EAST UNEARTHED, BY LAURA GEGGEL

9,000 years ago, a young adult was cremated in a pit of flowers.

The oldest known person to be intentionally cremated in the Near East took their last breath about 9,000 years ago, and their body went up in flames shortly thereafter, a new study finds.

The body wasn't simply thrown in a fire, however; whoever arranged the funeral pyre did so with care, archaeologists found by sifting through the body's burnt remains. It appears that the deceased was placed in a seated position, with their knees bent to their chest in a kiln-like pit. Then, a fire was ignited next to or under the deceased.

Until now, the earliest known cremation in the Near East dated to the sixth millennium B.C. Meanwhile, the oldest known human cremation in the world — the so-called "Mungo Lady," whose burned remains were found near Lake Mungo in New South Wales, Australia in 1969 — is much older, dating to about 40,000 years ago, according to a 2003 study in the journal *Nature*.

Researchers discovered the extraordinary burial in 2013, while excavating the Neolithic (the last age of the Stone Age) village of Beisamoun, in the Upper Jordan Valley of northern Israel. The burial pit contained 355 bone fragments, many of which were scorched, said study lead researcher Fanny Bocquentin, an archaeo-anthropologist at the French National Center for Scientific Research (CNRS).

The cremated individual was a young adult, but their sex and height remain a mystery (the remaining bones were too damaged to tell, Bocquentin said). Even so, an analysis of the bones revealed that this person had survived a ghastly injury; the researchers found a 0.5-inch-long (1.2 centimeters) flint projectile point embedded in the left shoulder bone — an injury that likely tore the muscle and likely caused "severe pain but not necessarily impaired function," the researchers wrote in the study.

The bone had started to heal, indicating that the individual survived the injury for at least several weeks or months, but then "died of something else, we don't know what," Bocquentin told *Live Science*.

Radiocarbon dating of the fibula (the lower leg bone) revealed that the person lived sometime between 7031 B.C. and 6700 B.C., during the Pre-Pottery Neolithic C culture. That means the deceased lived amongst early farmers who had domesticated certain cereals and animals, but who hadn't yet figured out how to create pottery. (That technology emerged in the South Levant, the southern land east of the Mediterranean, in the sixth millennium B.C., Bocquentin said.)

A kiln-like grave

The U-shaped grave itself is small, just 32 inches in diameter and 24 inches deep (80 by 60 cm). It was lined with reddish mud plaster that these Neolithic people used to make bricks for their houses. So, it appears that the burial pit was designed to function as a kiln, the researchers wrote in the study.

Once the "kiln" was complete, the deceased's body was placed in a seated position in the grave, with their upper body leaning against the southern wall. It's possible that the body was placed on a pallet above the pyre, Bocquentin noted, as the bottom of the pit doesn't show signs of burning, likely because the fire wasn't very hot at its base. The walls of the grave, however, were scorched, which makes sense because the fire would have been hotter higher up, where there was more oxygen to fuel it, the researchers wrote in the study.

After the fire started, it appears that the upper body fell forward and rotated.

As bone burns, its chemical composition changes. To determine how hot the fire was, the researchers used Fourier-transform infrared spectroscopy (FTIR), a technique that directs infrared radiation at a sample — in this case, several bone fragments and a tooth from the grave — to detect unique molecular fingerprints. These fingerprints revealed that the person's body had been heated to temperatures reaching at least 1,300 degrees Fahrenheit (700 degrees Celsius), the researchers found. That's on par with modern cremation incinerators, which are typically preheated to about 1,100 F (593 C) before a body is placed inside, according to HowStuffWorks.

Wrapped in a shroud?

The researchers also found high levels of plants known as sedges, "water-loving rushes that have spongy stems and are commonly used for basketry and matting," the researchers wrote in the study. Perhaps, the cremated individual was wrapped in a shroud of sedges, the team said. This practice has been identified as far back as the Natufian period (13,050 B.C. to 7,550 B.C. in the Levant) and is also seen in other Neolithic burials in the Levant, the researchers wrote.

In addition, the researchers found 776 fragments of animal remains in the cremation pit, which could have been used as fuel for the fire or grave offerings; they also may have been refuse in the village's dirt that just happened to become part of the grave. They identified 84 of the animal remains as belonging to: cattle, goats, gazelles, pigs, birds of prey and fish, the researchers said.

Elżbieta Jaskulska, a bioarchaeologist at the University of Warsaw in Poland, who specializes in cremated remains, and was not involved in the study, praised the researchers for their "comprehensiveness," saying the paper could serve as an example for bioarchaeological analyses of other ancient cremations.

As this discovery is "mostly a case study," more research is needed to illustrate "differences and similarities within the sites, cultures, regions and chronological periods," Jaskulska told Live Science in an email. "That will bring more understanding of what was happening in the past societies, the question at the core of every archaeological study."

Grave changes

So far, the researchers have unearthed 33 other ancient burials — including 18 adults, three youngsters and 12 infants — in Beisamoun dating to before and during the Pre-Pottery Neolithic C culture. There are many types of burials, including single and double graves, primary burials and even secondary burials, five of which contain "secondary" cremations of individuals whose remains were dried first and burnt later. The pyre-pit is the only known burial from the site that holds a corpse that was cremated while it was still "fresh," according to chemical analyses done by the researchers.

The pyre-pit cremation was likely a faster way to process the dead compared with the formerly lengthy burial practices of people in the South Levant.

"Here they are really reducing the time of the funerary customs," Bocquentin said.

Just 200 to 300 years after this particular burial, ancient people living in the South Levant no longer buried the dead inside or near villages, making it a challenge for archaeologists to find their remains. "We have very few graves from the six millenium [B.C.] in the South Levant," Bocquentin noted. Perhaps this happened because the living decided to invest less time in the dead, she said.

The study was done in conjunction with the French Ministry for Europe and Foreign Affairs and the Israel Antiquities Authority. It was published online today (Aug. 12) in the journal PLOS One.

Please visit the site: <https://www.livescience.com/oldest-cremation-near-east.html>
[Go there for pix and caps. Full article at <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0235386>]

FIRST PHASE OF EXTRACTING, RESTORING SECOND KHUFU SHIP COMPLETED, BY MUSTAFA MARIE

Director General of the Executive Affairs for Restoration at the Grand Egyptian Museum and Supervisor of the restoration process of the second Khufu Ship Issa Zeidan announced the completion of about 98 percent of the first phase of the Egyptian-Japanese giant project for the extraction and restoration of the second Khufu Ship in Giza.

This comes in preparation for the final restoration work phase that targets assembling the boat and displaying it in its specialized hall in the Grand Egyptian Museum.

Zeidan explained that about 1,272 wooden pieces have been recovered from the 13-layer pit in which the ship was found. The wooden pieces were covered with Japanese paper for protection during the lifting process; they were registered and their current state was determined in the museum's laboratory.

He added that the first restoration of 1,200 wooden pieces was carried out, and about 1006 pieces were transferred to the stores of the Grand Egyptian Museum.

Zeidan also revealed the start of the construction of a unique building attached to the Grand Egyptian Museum befitting the grandeur of King Khufu. The building was designed by General Supervisor of the museum Atef Moftah to display the second Khufu Ship after its assembly next to the first Khufu Ship, which will be transferred during the upcoming period from its current location inside a special museum in the pyramids' area.

On the history of the discovery of the ships of King Khufu, Zeidan said that on May 26, 1954, Kamal al-Malakh announced the discovery of King Khufu's most unique relics, the two pits of King Khufu's ships, also dubbed the boat of the sun. These were found on the southern side of the Great Pyramid of Cheops (Khufu).

He further clarified that archaeologist Kamal al-Malakh and restorer Ahmed Youssef worked on the discovery, restoration and re-installation of the first ship, which came to light after staying in the ground for nearly 5,000 years, and is currently exhibited in its own museum, which was opened in 1982.

As for the second Khufu Ship project, Issa Zeidan emphasized that the second Khufu Ship's restoration and extraction project is one of the largest restoration projects that highlight the fruitful cooperation between Japan and Egypt. The project is carried out in cooperation with the Ministry of Antiquities, Waseda University of Japan and Higashi Nippon International University and with the support of the International Cooperation Agency (JICA).

He pointed out that in 1987 the Antiquities Authority and the American Geographical Society agreed to implement a project to photograph the contents of the second pit without changing its contents, or its climate and environmental conditions through inserting instruments to detect temperature and humidity in the ship's bore.

Zeidan also clarified that acclaimed engineer Bob Morse, a specialist in drilling technology, designed the device that will be used to puncture the hole without compromising its environment or leaking air into it.

He stressed that the Egyptian-Japanese work team in Egypt has started work on the second Khufu Ship project from 1992 to date.

On the difference between the first and second Khufu Ships, Zeidan revealed that the first ship was in a good state of preservation, while the second ship was in a very bad condition that everyone lost hope in restoring it, until the cooperation between Egypt and Japan bore fruit.

Please visit the site: <https://www.egypttoday.com/Article/4/90572/First-Phase-of-extracting-restoring-Second-Khufu-Ship-completed>

ISRAEL'S MOST ANCIENT 'SOAPERY' **DISCOVERED IN RAHAT**

Ancient soap-making workshop uncovered in southern Israel, where olive oil was turned into soap 1,200 years ago.

Israel's most ancient soap-making workshop (soapery) has been exposed in recent weeks at an excavation site run by the Israel Antiquities Authority and young participants, inside a wealthy home of the Islamic period (approximately 1200 years ago), in the Bedouin city of Rahat.

Over the last six months, hundreds of youth and adults have been employed at the large archaeological excavation managed by the Israel Antiquities Authority, including participants from among the local Bedouin residents, university students and students in pre-military preparatory programs.

The excavation was supervised by Dr. Elena Kogen-Zehavi, with the help of Dr. Yael Abadi-Rice and Avinoam Lehavi. The purpose was to reestablish the connection between the community and the local history. The excavations were carried out in light of new neighborhood developments in Rahat, initiated by the Authority for Development and Settlement of the Bedouin in the Negev.

The production of olive oil soap is mentioned in writings since the 10th century CE and it has been a significant industry in the region from the Middle Ages and until the early 20th century. During the soap-making process, olive oil was used as the base material, mixed with ashes produced by burning salsola soda (saltwort) plants, which contain potash and water.

The mixture was cooked for about seven days, after which the liquid material was transferred to a shallow pool, where the soap hardened for about ten days until it could be cut into bars. These were piled for additional drying, and the final product was ready after an additional period of two months. The site at Rahat displays facilities associated with this industry.

The Antiquities Authority's researchers obtained samples from the finds, with the purpose of identifying the materials used in the production process.

According to Dr. Elena Kogen Zehavi, the IAA excavation director, "This is the first time that a soap workshop as ancient as this has been discovered, allowing us to recreate the traditional production process of the soap industry. For this reason, it is quite unique. We are familiar with important soap-making centers from a much later period – the Ottoman period. These were discovered in Jerusalem, Nablus [Shechem], Jaffa, and Gaza."

According to Svetlana Tallis, IAA Northern Negev District archaeologist, "One of the underground spaces of the wealthy building contained another exciting finding, shedding light on the daily life of the inhabitants – a round limestone gameboard used for a strategy game called the "Windmill."

This game is known to have existed as early as the 2nd and 3rd centuries CE (the Roman period), and it is still being played to this very day.”

Nearby, a second gameboard known as “Hounds and Jackals”, or “Fifty-eight Holes” was also found. This game was first played in Egypt and it spread to other parts of the Mediterranean basin and to Mesopotamia around 2000 BCE. In Israel, it has been discovered in ancient Megiddo and Tel Beth Shan. It was played by two players throwing dice or sticks that determined the number of places to move with each throw. The goal of the game seems to have been a specific point on the board.

According to the mayor of Rahat, Fahiz Abu Saheeben, “The excavation has revealed the Islamic roots of Rahat. We are proud of the excavation and happy that it took place in cooperation with the local community. We enjoy good relations with the Israel Antiquities Authority and the Authority for Development and Settlement of the Bedouin in the Negev and we hope to construct a visitors’ center that tourists and the local community will be able to enjoy.”

**Please visit the site: <https://www.israelnationalnews.com/News/News.aspx/285398>
[Go there for video]**

STRONTIUM ISOTOPES SERVE AS LOCATIONS' 'FINGERPRINTS', BY AMANDA BORSCHEL-DAN

1st complete strontium isotope map of Israel tracks ancient human migration

New study of rock and soil samples taken from entire span of Israel provides first comprehensive database for archaeologists to perform ‘forensics’ on movements of people, animals

A team of Australian Earth scientists have completed the first comprehensive strontium isotope mapping of Israel. Strontium isotopes, found in most soil, eventually make their way to human and animal bones and teeth, where they serve as a “fingerprint” of the locations in which they resided.

The map allows archaeologists to chart migration patterns of ancient humans and animals through a comparison between strontium isotope levels found in bone and tooth remains found in excavations and the new database of securely pinpointed sites throughout Israel.

“The application of the study is for archaeologists to understand how people move through landscapes,” said Dr. Rachel Rudd, a co-author of the new study, “Bioavailable Soil and Rock Strontium Isotope Data from Israel.”

Rudd told The Times of Israel that just as archaeologists in Israel routinely test for radiocarbon-14 when dating artifacts, they should now also test for strontium isotopes “for a further layer of information; another piece of the puzzle.”

Using the new map, archaeologists can “find the overlap between isotopes from teeth or bones and the landscape, and can work out from where they may have come,” she said.

The research is part of the Isotopic Reconstruction of Human Migration database out of Australian National University. The Israeli data was harvested in 2008 by a crew including lead author Prof. Ian Moffet of Flinders University and processed by a large interdisciplinary team in Australia, including Rudd, also of Flinders.

All living organisms carry varying levels of strontium, which is found in soil and water with the breakdown of rocks. Since the element makes its way into both flora and fauna, the metal is absorbed into animals and humans through their diet. Scientists are able to discern the differing levels of the isotopes in bones and teeth, which reflect the regions in which the individuals lived.

The technology is already being used in archaeological excavations in Israel, including the Tell es-Safi/Gath Archaeological Project, headed by Bar-Ilan University Prof. Aren Maeir. He told The Times of Israel that Flinders University’s Moffet and his team have a paper analyzing strontium from human teeth in the upcoming second volume of Tell es-Safi excavation reports.

“This is a great method for provenancing animals, humans, and at times plants, since each region has a typical strontium fingerprint in the local geology, which effects the water/plants, which effects the uptake of strontium (Sr) in organisms. You can then know where an animal/person was at different times of its life, based on Sr on different developments stages of teeth,” wrote Maeir in an email.

According to the Center for Applied Isotope Studies out of the University of Georgia, which was not involved in the new study, “Archeologists use the isotope ratios of strontium to determine residential origins and migration patterns of ancestral humans.”

“Since Sr isotope ratios in soils, rocks, and waters vary widely in nature, and are not appreciatively fractionated by biologic processes, the assumption is that the isotope values for strontium in bone and tooth enamel will reflect those in the portion of the biosphere in which an individual lived. Thus, strontium isotope composition provides links to the land where food was grown or grazed,” explains the website.

Strontium isotope analysis also has practical modern applications and is used in forensics analysis of human tissue to discover the John or Jane Doe’s region of origin, travel history, and even clues into diet.

The new Israel study is based on 60 modern soil samples and 48 rock samples, mostly from road cutting, which were analyzed in Australia and mapped, said Rudd. When the findings of the strontium ratios are compared to securely dated bones taken from archaeological sites, archaeologists can gain a new sense of where these people or animals lived.

Rudd calls the mapping and the data base “absolutely crucial data for working out how far early humans and animals were moving around the landscape in a place that has many of the most important archaeological sites for understanding human evolution.

“Israel has many archaeological sites of great importance for understanding human evolution, and the results of this study will assist in furthering this research,” said Rudd in the Flinders’ press release.

Please visit the site: <https://www.timesofisrael.com/1st-complete-strontium-isotope-map-of-israel-tracks-ancient-human-migration/> [Go there for pix]

CHEMICAL ‘TIME-MACHINE’ TO TIE ISRAEL’S ANCIENT PEOPLE WITH MODERN LAND, BY ROSSELLA TERCATIN

“Israel has many archaeological sites which are really important for understanding human evolution.”

Rocks and soil collected all over Israel will help researchers shed light on the mysteries of its remote past, thanks to a specific chemical element that will act as the equivalent of a time-machine, connecting its ancient inhabitants with the modern land.

Flinders University in Adelaide, Australia, announced Monday that a group of international Earth scientists have completed the mapping of samples from across the country.

“Israel has many archaeological sites which are really important for understanding human evolution,” Flinders University Research Associate Dr Rachel Rudd and a co-author of a paper recently published in the journal Earth System Science Data told The Jerusalem Post via email.

“The results of this study will allow archaeologists to better understand these sites by adding another method of analysis.”

The crucial element that the scientists considered is strontium, which is found in many natural materials in a variety of form called isotopes and makes its way to the body through water and food.

The goal is therefore to be able to compare strontium isotopes found in the ancient remains with those in rocks and soil.

“Strontium isotope mapping has uses in many fields as a geochemical tracer, including archaeology, forensic science, ecology and food sciences,” Rudd pointed out. “In archaeology, we can look at research questions involving landscape movement. The analysis of animal remains may give us an insight into the hunting behavior of the hominin groups occupying these sites – were they hunting locally or further away?”

Therefore, using the dataset from this project, the researchers will be able to determine whether specimens from archaeological sites were local or not.

“Determining the exact origin of humans and animals will always be more difficult, but this data will allow us to learn a lot more about these specimens,” Rudd added.

The results of the research have already been used to analyze remains that have been uncovered at the Tell es-Safi/Gath, a settlement in the Judean foothills overlooking the southern coastal plain of Israel, which is prominently featured in the Bible, including as the city of origin of David’s giant foe Goliath.

“We also hope to apply these methods to other archaeological sites in Israel in the future, to understand human and animal mobility in the landscape,” Rudd concluded.

Please visit the site: <https://www.jpost.com/archaeology/chemical-time-machine-to-tie-israels-ancient-people-with-modern-land-639360> [Go there for caps]

‘GLASS WRECK’ REVEALS TRACES OF EAST-WEST MARITIME TRADE IN SOUTHWESTERN TURKEY

Glassware found during the excavations of the Serçe Port shipwreck are on display at the Bodrum Museum of Underwater Archaeology, Muğla, southwestern Turkey,

The Serçe Port shipwreck, on display at the Bodrum Museum of Underwater Archaeology in southwestern Muğla province, offers a glimpse into the popular 11th-century trade route between the Middle East and Europe. Popularly called the "Glass Wreck," the exhibit hosts hundreds of items reflecting the ship's historical and archaeological importance.

The ship is believed to have set sail from Lebanon's Port of Beirut – recently in the news following a huge blast – in the 11th century and sunk at a depth of 33 meters (108 feet) in Serçe Port, Marmaris, in southwestern Turkey. The vessel and its artifacts are on display in the new hall of the museum at Bodrum Castle, which recently underwent restoration.

The shipwreck hauled from the sea is seen at the Bodrum Museum of Underwater Archaeology, Muğla, southwestern Turkey.

Among the artifacts exhibited along with the ship are gold Islamic and copper Byzantine coins, scales, weights, lead seals, spears, and Byzantine, Bulgarian, Syrian and Sicilian pots, pans and glassworks.

The items have attracted the interest of local and foreign holidaymakers.

In an interview with Anadolu Agency (AA), Tuba Ekmekçi, director of the Bodrum Research Center at the Institute of Nautical Archaeology (INA), said the wreck on display at the museum is an important large shipwreck that has provided a nice collection of Islamic glass artifacts.

Ekmekçi noted that they determined through extensive research the ship set sail from the Port of Beirut, adding: “Unfortunately before it could reach its destination, it sank at the entrance to Serçe Port in 1026. Between 1977 and 1979, archaeological excavations were carried out. Since then, the shipwreck and the artifacts recovered from the wreck have been on display at the Bodrum Castle Underwater Archaeological Museum.”

Pointing out that the wreck offers historical traces of maritime trade between Beirut, Damascus and Europe, Ekmekçi said: “This trade link between the Islamic world and the Christian world was previously unknown, though historians were aware of a trade network linking the East to the West by sea for centuries. With this wreck, the glass trade and its route were revealed. The Port of Beirut was a crucial port and trade center in ancient times. We know as a result of archaeological studies that it was a very active port where many materials from the Middle East and East were loaded and sent to the West. I am sure it is very important today as well. But the horrific blast, unfortunately, has caused serious problems. I wish a speedy recovery for all people in Beirut and Lebanon.”

Please visit the site: <https://www.dailysabah.com/arts/glass-wreck-reveals-traces-of-east-west-maritime-trade-in-southwestern-turkey/news> [Go there for pix]

PANDEMIC BAKERS BRING THE PAST TO LIFE, BY KERIDWEN CORNELIUS

As people sheltering at home take on ambitious kitchen projects, a few experimental archaeologists are reclaiming recipes from ancient societies.

Around 2000 B.C., a baker in the ancient Egyptian city of Thebes captured yeast from the air and kneaded it into a triangle of dough.

The baked bread was then buried in a dedication ceremony beneath the temple of Pharaoh Mentuhotep II on the west bank of the Nile.

There the yeast slept like a microbial mummy for four millennia, until 2019, when Seamus Blackley—a physicist and game designer best known for creating the Xbox—suctioned it up with a syringe and revived it in a sourdough starter.

Blackley, an amateur Egyptologist, thinks about this ancient baker often as he attempts to re-create the bread of 2000 B.C. “I’m trying to learn from you, my friend,” he tweeted, as if speaking across time to the baker. “Your voice will never be silent. ... May you have life, forever.”

This spring, as people around the world sheltered at home to avoid spreading or catching the coronavirus, many home cooks cultivated their baking hobby or learned to make sourdough. Some housebound archaeologists took the trend to the next level by replicating baking methods from Roman Pompeii or Neolithic Turkey.

Blackley, for example, is collaborating with archaeologist Serena Love of Australia-based Everick Heritage consultancy to bake bread using what they believe is 4,000-year-old yeast and ancient techniques in his backyard in California. In March, he successfully baked a loaf in an earthen pit, similar to the way the Egyptians baked in the time of the pyramids. The bread was as dense as cake, with a rich, sour aroma and a comforting sweetness akin to brown sugar. “It’s magic,” Love says, “because he’s actually brought the past alive.”

These achievements sparked a sensation, with news outlets and foodie podcasts chronicling the story of these “raiders of the lost yeast.”

But Blackley and Love’s motivation is not purely culinary curiosity.

These “gastroegyptology” adventures—along with other edible archaeological feats taking place during the pandemic—fall into a subfield known as experimental archaeology. Modernized in the 1960s, this increasingly popular area of research involves re-creating everything from ancient ships to stone tools to beer.

As the culinary experiments suggest, experimental archaeologists are on a quest to fill in the blanks of the archaeological record, to bring the lessons of the past into the present, and to experience what it felt like, smelled like, and tasted like to live in the distant past.

The pandemic has brought on a nostalgia for the past, and many experimental archaeologists and home cooks are bringing lessons from history into the present through

their kitchens. In early May, more than 100 people logged onto Zoom to learn to bake like a first-century Roman. The audience watched as Farrell Monaco, an archaeologist and baking instructor studying the bread of Pompeii at the University of Leicester, formed her dough into a circle and cinched it up with twine. Then, wielding another piece of twine like dental floss, she deftly scored the dough into eight wedges, perfectly re-creating the Roman Empire’s most iconic bread: the panis quadratus.

Monaco is translating her archaeological insights into practical tips for contemporary cooks that are particularly useful during a pandemic.

In many parts of the world, as COVID-19 lockdowns went into effect in March and April, ingredients like yeast and white flour flew off supermarket shelves.

Given the shortage of these supplies, some cooks turned to traditional methods that sustained our ancestors during times of scarcity.

Sourdough making has been on the rise, and bakers and homebrewers are plundering online stores of Viking flour and heirloom grains.

When Monaco saw the run on baking supplies, she started teaching the techniques she had learned from the artworks, writings, and relics of Pompeii. “I was telling people, ‘Stop panicking,’” she says. “You don’t need a sourdough starter. You don’t need yeast. You’re gonna ferment dough, just like our ancestors did.”

At the same time, other experimental archaeologists began cooking up edible investigations. Most of these efforts have been in the works for years, but many projects have gained momentum amid the pandemic’s home-baking craze.

Leslie Warden of Roanoke College in Virginia has commandeered her daughter’s kiddie pool to make malted grain for Egyptian beer. Laura Dietrich, based at the German Archaeological Institute, is grinding einkorn, a wild species of wheat, on a handstone modeled after a Neolithic artifact from Turkey. Bill Schindler, of Washington College in Maryland, is slathering his homemade sourdough with fermented butter made in a manner inspired by Bronze Age Irish cooks.

And Love and Blackley are continuing their attempts to discover how Egypt’s pyramid builders made their staple food.

Love and Blackley’s collaboration began well before the pandemic. In April 2019, a friend of Love’s tagged her in a Twitter thread that intrigued her. Blackley had tweeted that a brewer colleague had given him ancient yeast scraped from an Egyptian bread pot. He said he was using it to bake sourdough and offered to share the antediluvian yeast with anyone who wanted it.

Love was excited about getting ancient yeast for her homebrewing experiments. She also thought the yeast could offer clues to some mysteries about bread making and brewing, which were central to ancient Egyptian culture.

The people who built the Egyptian pyramids were themselves built by bread and beer. Workers were given a daily ration of about 10 loaves of bread and several pints’ worth of thick, soupy beer they slurped with straws. The Egyptians had 117 words for bread and

around 40 words for beer. But they didn't write down a single recipe. "There are so many holes in the archaeological record," Love says.

Love knew that yeast could survive without food for thousands of years in a hibernation-like state called quiescence. Still, she was skeptical. So, she immediately messaged Blackley, whom she had never met. After peppering him with questions, she informed him that he probably had 21st-century yeast that had settled onto the ancient pots.

But they were both motivated to do the job properly. So along with University of Iowa microbiologist Richard Bowman, they developed a plan to extract 4,000-year-old yeast from inside the pores of Egyptian artifacts. Bowman devised a method using a needleless syringe, nutrient-filled liquid, and a cotton ball to gather yeast without destroying the objects, killing the yeast, or contaminating it with modern microorganisms.

The Museum of Fine Arts in Boston granted Love, Blackley, and Bowman permission to access their ancient Egyptian artifacts. In July 2019, Blackley, as the team's in-person emissary, went to the museum to gather samples from the collection's bread pots, beer vessels, and a loaf of bread. Though baking kills yeast, it was possible that live yeast had wafted from the bakery air or the temple's soils and settled into the nooks and crannies of the bread and pots.

The team's intent was to test the yeast's DNA and confirm its age before conducting any experiments. With a DNA analysis, Blackley, Love, and Bowman can start to answer several questions. Most importantly, Love wants to find out if bread and beer yeast were two different species in ancient Egypt or if they were the same species, as they are today. If they were the same species, that might mean brewers were skimming the yeasty foam off their beer and giving it to bakers to stir into sourdough starters. That could indicate they knew the same mysterious entity lay behind both staples.

DNA tests could also tell the scientists about the ingredients and styles of bread and beer. Were there regional variations? Could one identify a yeast strain as characteristic of the brewing center of Hierakonpolis, for example, and then track that beer (and perhaps bread) through trade routes?

With these questions in mind, Blackley obtained several samples with the museum's permission. But he also pocketed a sample from the bread loaf for his own home use. Blackley brought his yeast sample home and sterilized everything in his kitchen (including the flour) to prevent contamination with modern microbes. Then the experimentation began.

The Egyptians left behind numerous clues—breadcrumbs, if you will—about baking and brewing in their artwork, writings, and pottery.

Paintings in a Fifth Dynasty tomb at the Saqqara necropolis depict part of the process of baking, but they skip essential steps. So, when archaeologists attempted to bake bread based on these images back in the 1990s, the results were "less than delightful": sour, brick-heavy, burnt loaves that stuck to the pots.

Clearly, the ancient Egyptians possessed baking knowledge they didn't document. The only way to find out what that might have been is through continued experimental archaeology.

So, starting in July 2019, Blackley began extreme baking. To make sourdough bread, bakers need to ensure the yeast is alive, active, and in balance with the ambient bacteria. They create a moist environment made of water and flour, and continually feed the yeast flour. When the yeasts digest the sugars, they release carbon dioxide, which makes the bread rise.

Blackley and Love knew the Egyptians baked with barley and two ancestors of wheat: einkorn and emmer. So he decided to feed the yeast those grains.

When Blackley gave the yeast wheat, it sat there like a lump. When he fed it emmer, “it took off like a rocket,” Love says. That was their first clue that this yeast might have been alive and munching on emmer when Mentuhotep II was pharaoh.

Emmer is a notoriously heavy grain that produces ultra-dense breads.

Blackley couldn’t believe the pyramid builders were choking down 10-plus loaves of rock-hard bread a day. So, he experimented with methods the Egyptians might have used to make their loaves fluffier.

He had good luck with an “autolyse,” a technique of resting the sourdough starter for about half an hour.

Love and Blackley researched ancient texts and found that the ancient Egyptians sometimes spiced their bread with roasted coriander.

Blackley further hypothesized that the Egyptians seasoned their baking pots with oil to prevent the bread from sticking.

Love did some digging and told him they might have used flaxseed oil or fat from geese, ducks, goats, sheep, beef, or pork. Every fat Blackley tried worked like a charm.

Amr Shahat, a Ph.D. candidate in archaeobotany and archaeology at the University of California, Los Angeles, notes that the Egyptians likely seasoned their pots with oil immediately after creating these ceramics. Based on wheat chaff found on ancient bread, he believes they may have also coated bread dough with bran to prevent it from sticking.

Blackley and Love’s combination of archaeological evidence, chemical analysis, and practical skills is typical of experimental archaeology.

“The fascinating thing for me as an archaeologist,” Love says, “is that [Blackley] is not an archaeologist. He’s a baker. So he’s approaching this completely differently, and he’s coming up with answers to problems that only a baker would know.”

Experimental archaeologists believe that minute attention to detail is crucial on several levels. For example, when Monaco re-creates Roman breads, she must meticulously replicate ingredients to answer questions about the centrality of panis quadratus to Roman life and society. But she also wants to understand what it was like for women and slaves to make and eat this staple food.

“I want to understand the sensory aspects that went into it—the smells, the tastes, the backache, and the shaking arms that come from hand milling,” says Monaco, who grinds her flour by hand. “When I have an ache in my lower back, it connects me to the daily

doldrums of women hunched over bread and slaves having to stand at a table, kneading and kneading and forming the dough.”

Love has similar motivations. “Experimental archaeology gives us that sensory input that is difficult to get from other studies,” she says.

To re-create the sensory experiences of the pyramid builders, Love and Blackley can’t just replicate ancient ingredients; they have to bake like an Egyptian.

Prior to the pandemic, Blackley had been working with a 21st-century oven. But the pyramid builders took an earthier approach. Love and Blackley discussed archaeological excavations of bakeries, as well as the Saqqara images, which storyboard a method for baking bread underground.

In March, after his home state of California had issued shelter-in-place orders, Blackley succeeded in replicating a similar technique. He blazed two seasoned clay pots in a fire, poured the dough into one of the pots and placed the other on top. He lowered it into a hole filled with orange-hot embers, then covered it with more embers and baked it.

During the pandemic, Blackley created a test bakery in his backyard, including an outdoor earth oven inspired by Egyptian methods. Seamus Blackley

While the archaeological record provided a starting point, Blackley had to work out the details through trial and error. For example, he discovered it’s necessary to place coals beneath the bread pots as well as on top of them, or the setup will collapse.

These experiments can fill in the blanks of the historical record.

They also allow scientists to re-create the sensations ancient Egyptian bakers must have felt as they churned out tens of thousands of loaves a day: the smoke from the fires stinging their eyes, the soot sticking to their sweaty arms, the clay pots burning their calloused fingers, and the sweet taste of the coriander-spiced bread.

“It gets you more in touch with the humanity,” Love says. “You realize that these people in the past were just people like you and I. And something as simple as baking bread that has been done for thousands and thousands of years isn’t too different from how we do it today.”

COVID-19 has delayed the scientists’ yeast-DNA studies. If the analysis confirms the yeast’s age, the collaborators want to return these microorganisms to Egypt—in recognition that they are artifacts belonging to that country—and then request formal permission from Egyptian authorities before continuing their research. But while they wait, Love and Blackley will continue their experiments with more authentic replica clay pots and historically accurate fuels such as acacia trees.

Meanwhile, other experimental archaeologists are pursuing their culinary adventures. Bowman brewed beers with yeast Blackley collected from the bread loaf and from a beer vessel, and the two brews’ distinctive flavors suggest that ancient Egyptian bread and beer yeast may have been different. Schindler is detoxifying potatoes for French fries using methods inspired by Indigenous Peruvians. And Monaco is ironing out plans for building a Pompeian kitchen on her property.

“I would prefer to work in a re-created bakery setting where you can smell the donkey manure and the wood fire at the same time,” Monaco says. “I don’t have that at my disposal yet. But I’m working on it.”

Please visit the site: <https://www.sapiens.org/archaeology/ancient-egyptian-bread/>

RECREATE THE ANCIENT EGYPTIAN RECIPES PAINTED ON TOMB WALLS, BY JESS ENG

Make bread fit for a pharaoh and a sweet treat out of tiger nuts.

The ancient Egyptians left writing everywhere, with hieroglyphs carved painstakingly onto stone steles and miraculously preserved in papyrus.

Though historians are able to study ancient texts on subjects from trade to funeral rites, one category is largely missing from the record: recipes. Without any textual directions or menus, historians have looked elsewhere to unlock the secrets of a 5,000-year-old culinary culture. As it turns out, paintings on tomb walls can provide a rare glimpse into one of the oldest cuisines in the world.

Around 3100 BC, ancient Egyptians started to systematize their hieroglyphs, mummification techniques, and art, all of which influenced the construction of tombs. The most decorated tombs of the time, especially those adorned with food scenes, belonged to royalty.

Workers painted scenes on tomb walls to commemorate the deceased's accomplishments and to ensure that important ceremonies, from food to burial rituals, would endure in the Field of Reeds, the Egyptian afterlife. Some tomb paintings even included images depicting how workers prepared food.

Historians agree that tiger nuts (hab al-'aziz), edible tubers found at the end of the Cyperus grass, were the primary ingredient in what could be considered the oldest-known Egyptian recipe, which dates from the 15th-century BC. A tomb painting interred with the vizier Rekhmire details how to make cone-shaped loaves of ground tiger nuts and honey.

The scene depicts figures grinding tiger nuts with long pestles, and shaping the tuber-honey mixture with both hands into tall and pointy cones.

These images of tiger nut cones were meant to please the sun god Amun on Rekhmire's behalf. But tiger nuts were not just used for special occasions. Egyptians also added tiger nuts to medicine and perfume, and ate them prepared in several ways. Some devoured tiger nuts raw, but others preferred it flavored, boiled in beer, or roasted atop a fire.

As popular as tiger nuts were, bread and beer formed the true bedrock of ancient Egyptian cuisine. Bakers usually made bread with emmer wheat and barley, two of the oldest cultivated grains. Bread was so important, in fact, that it had an outsized influence on ancient Egyptian writing. Historians have recorded 14 distinct hieroglyphs for bread.

To learn more about the process of baking ancient bread, researchers looked again to tomb paintings. One of the most vivid bread baking scenes comes from the Fifth Dynasty tomb of Ty in Saqqara. One painting shows beer and bread production in tandem, with

scenes of cooks making bappir, or beer bread, and the use of bedja, or ceramic bread molds for baking. The scene shows workers cooking bread outdoors through a process called stack heating, which involves baking bread dough inside two preheated bedja bowls clamped together. Additional tomb paintings convey many more steps of the baking process, such as workers kneading dough with both hands or mixing bread with their feet.

Another baking scene, from Ramses III's tomb, suggests a possible recipe for emmer wheat bread that was sprinkled with grape juice to leaven it and boiled before baking. Drawn in motion, the workers smash grapes with their feet, shape bread into spirals, and bake the bread in a vertical tanour oven.

These images tell one story about ancient Egyptian cuisine. However, it's important to note that many did not have the same access to this food culture. The wealthy dead could command elaborate tomb paintings, specialty food items, and even food mummies of many varieties.

According to Egyptian food historian Mennat-Allah El Dorry, food remains from the construction of the Giza pyramids show evidence of this divide: the wealthy ate larger cuts of meat and a varied diet, while simple workmen ate poorer cuts of meat and simpler foods. But besides this scant evidence, not much is known about class disparities in ancient Egyptian foodways.

Even though Egypt's tomb paintings miraculously endured for thousands of years, more recent events have imperiled them. The vibrant paintings within Ramses III's tomb nearly vanished due to early-19th century floods. Since the floods, historians have tirelessly worked to restore, reconstruct, and upload photographs of the paintings to the internet for future research. For some tasty research of your own, try your hand at these recipes for tiger nut cones and emmer wheat bread, inspired by ancient Egypt's tomb paintings.

Tiger nuts are the main ingredient of these sweet cones. JESS ENG

Rekhmire's Tiger Nut Cones

Servings: 10 small cones

Prep Time: 20 minutes

Cook Time (plus cooling): 30 minutes

Ingredients

1 cup of tiger nuts, raw (tiger nuts can be purchased online or at many health food stores.)

¼ cup of honey

¼ cup of olive oil

½ cup dates, chopped (optional)

Measure out one cup of tiger nuts. Pour ½ cup of hot water over the nuts and let soak for 20 minutes. Then, drain off the water and use a food processor to grind the nuts into a powder.

Add the tiger nuts, honey, oil, and dates all at once to a pan. Mix constantly on medium heat for two minutes. Then, turn the heat to a low simmer, so the honey doesn't burn. Continue mixing for the next five minutes.

Turn off the heat and pour the tiger nut mix onto a plate. Let it cool for 20 minutes. Form 10 one-inch-diameter balls with your hands. Shape the balls into cones, and stand them straight up.

These emmer wheat spirals are boiled, then baked. JESS ENG

Ramses III's Emmer Wheat Bread

Servings: Six small loaves

Prep Time: 1 hour and 15 minutes

Cook Time: 15 minutes

Ingredients

2 ½ cups emmer flour (you can purchase emmer wheat flour online from sites such as Bluebird Grain Farms or Camas Country Mill)

2 tablespoons honey

1/2 teaspoon instant yeast

1 cup warm grape juice

½ cup chopped dates (optional)

2 quarts water for boiling

⅓ cup of honey

Combine the emmer flour, honey, yeast, and warm grape juice in a medium bowl. Mix the ingredients and knead into a ball. Set aside the bowl, and let the dough rise for at least one hour in a warm spot.

During this time, preheat the oven to 425° F. Start boiling the water.

Once it boils, add ⅓ cup of honey.

After an hour, split the dough into six equal pieces and roll each one into a ball. (Add the chopped dates, if desired.) Roll each ball of dough into a long tube, and wrap until it forms a spiral.

Gently place one bread spiral at a time into the boiling water, using a long spoon. Let the dough boil in the water for at most two minutes.

Take the dough out, and put it on a baking sheet lined with parchment paper. Repeat with the remaining spirals.

Once all six spirals have been boiled, place the baking sheet in the oven for 14 to 16 minutes. Serve the bread warm, or at room temperature.

Please visit the site: <https://www.atlasobscura.com/articles/ancient-egyptian-recipes>
[Go there for pix & scroll down for recipes]

MYSTERIOUS CARVED ROCK CHAMBERS FOUND INSIDE SACRED MOUNTAIN OF ABYDOS, BY NEVINE EL-AREF

Some openings lead to one chamber, while others lead to groups of two, three and five chambers, thought to be of ancient religious significance

The Egyptian archaeological survey team led by Mohammed Abd Al-Badea, which has been documenting evidence of human activity from prehistoric times through modern periods over an eight-kilometre long area in the desert west of Abydos, has located an extensive series of mysterious openings cut high in a cliff inside the sacred valley south of the royal cemetery of Umm Al-Qaab.

Mostafa Waziri, secretary general of the Supreme Council of Antiquities, said that examination showed that these openings are entrances to carved out chambers, which probably have sacred religious importance.

Some openings lead to one chamber, while others lead to groups of two, three and five chambers. The groups are interconnected by narrow doorways cut through the bedrock wall. The chambers are rarely more than 1.20 metres high and are undecorated, but most have cut-rock features such as shallow niches, benches, rows of circular depressions or troughs cut in the floor, and many small holes in the walls just below the ceiling.

Beside most of the opening, Waziri said, are ropes or hand holds.

Some of the chambers are enlargements of natural tunnels in the bedrock created by water flowing over thousands of years. The cliff chambers are cut above deep vertical well-like shafts that follow natural water tunnels down into the bedrock, but these are now blocked by debris.

There is no evidence of burials inside any of the chambers, and they do not appear to have been tombs. Material evidence for the function of the complex is scant. A single graffiti in one of the chambers gives the names of one Khuusu-n-Hor, his mother Amenirdis, and grandmother Nes-Hor. These names, as well as the pottery found in and around the chambers, suggests that the complex probably dates to the Ptolemaic period, 332-30 BCE. The only carved decoration consists of two small but unusual figures cut in bas relief on the side of one entry point.

Matthew Adams of the Institute of Fine Arts of New York University and co-director of the North Abydos Expedition, who is collaborating with the survey mission, suggests that the chambers' location inside the sacred valley of Abydos and their hard-to-reach position high on a cliff means that they may have had great religious significance.

The exploration of the area is at a preliminary stage, and much additional research and on-the-ground work will be needed.

Please visit the site:

<http://english.ahram.org.eg/NewsContent/9/40/374570/Heritage/Ancient-Egypt/Mysterious-carved-rock-chambers-found-inside-sacre.aspx>

ANCIENT EGYPT: MUMMIFIED ANIMALS **'DIGITALLY UNWRAPPED' IN 3D SCANS,** **BY NEIL PRIOR**

Three mummified animals from ancient Egypt have been digitally unwrapped and dissected by researchers using high-resolution 3D scans.

The snake, bird and cat, from the Egypt Centre's collection at Swansea University, are at least 2,000 years old.

Ancient texts suggest they were offerings to the souls of the departed, but little was known of their fate.

Researchers said the details revealed by the scans were "extraordinary".

Using micro CT scanners, which generate 3D images with 100 times the resolution of medical CT scans, the animals' remains were analysed in previously unseen detail, giving an insight into how they were killed and the ritual behind it.

And the seven-year project, a collaboration between the Egypt Centre and Swansea's College of Engineering, came about by chance.

Richard Johnston, professor of material science, said: "The project started purely because the engineering department used to be right opposite the Egypt Centre, and over coffee I mentioned our X-ray scanner might reveal what's hidden inside their animal mummies, and so we took it from there.

"Up until then we'd been using the technology to scan jet engine parts, composites, or insects, but what we found when we started looking at the mummified animals was extraordinary."

Dr Carolyn Graves-Brown, of the Egypt Centre, said the collaboration between engineers, archaeologists, biologists, and Egyptologists showed "the value of researchers from different subjects working together".

The team discovered that:

unerupted teeth hidden within the jaw bone suggested the cat was a kitten of less than five months old. Separation of its vertebrae indicated it had possibly been strangled

Virtual bone measurements suggested the bird most closely resembled a Eurasian kestrel

Analysis of bone fractures on the snake - a juvenile Egyptian Cobra - showed it was killed by a whipping action against the ground or a wall

The findings are in keeping with what the Egypt Centre already believed about the ritual mummification of animals.

The ancient Egyptians mummified animals as well as humans, including cats, ibis, hawks, snakes, crocodiles and dogs.

Sometimes they were buried with their owner, or as a food supply for the afterlife, but the most common animal mummies were offerings, bought by visitors to temples to present to the gods.

They were bred or captured by keepers and then killed and embalmed by temple priests; it is believed that as many as 70 million animal mummies were created in this way.

Prof Johnston said while finding an animal inside might not have been a surprise, the level of detail they were able to obtain certainly was.

"The snake mummy had been X-rayed before, but that only creates a 2D image which doesn't tell you too much about the finer structure.

Conventional medical CT scanning provides a 3D image, but the resolution is too poor to make out much more," he said.

"However, with the micro CT software we can create a virtual reality image of the scan as large as a house, if you like; I can actually walk around inside the body of the cat and make microscopic measurements to examine in minute detail."

The micro CT works by taking thousands of individual X-rays from all angles while the mummy rotates 360 degrees.

A computer then merges them to create a 3D image which can be rotated and viewed from any angle.

It differs from a medical scanner in that, rather than the X-ray source and camera revolving around the object, the object spins on a platform between the source and camera.

Prof Johnston said this makes it impractical for medical use on live humans, but the technology still has many other untapped applications.

"X-ray dose from micro CT is typically too high for human use, and the scan times much longer," he said.

"But it has limitless potential for materials in science, engineering, biology, even biomimicry.

"We scan structures from nature that have evolved over millions of years to be efficient or strong, like bamboo, and then reproduce the micro-scale shape for engineering design through 3D printing."

The full research is published today in the journal Scientific Reports.

Please visit the site: <https://www.bbc.com/news/stories-53841256>

A CALENDAR IN STONE: HITTITE YAZILIKAYA, BY EBERHARD ZANGGER AND RITA GAUTSCHY

A great deal is known about the Hittite culture that ruled over central Asia Minor from around 1600 to 1190 BCE, only to suddenly collapse and be forgotten for over 3,000 years. The curiosity of the educated classes was instantly aroused when, in 1834 CE, a European scholar first saw the massive architectural remains of the Hittite temples in the former capital Hattuša, about 150 km east of Ankara in central Anatolia. Excavations commenced in 1906 and became so incredibly productive and insightful that they still continue today.

As many as 33,000 cuneiform documents and text fragments have been retrieved from the former palace. The 6.8-km-long fortification wall protected as many as 30 temples.

The Hittites proudly reported that they lived in the “Land of Thousand Gods,” presumably to emphasize how divinely blessed they were.

However, with wealth comes responsibility, and the Hittite Great King, as the gods’ chief representative on earth, was expected to participate in all the major festivals to honor them. Nurturing and pleasing the multitude of divinities also occupied a large proportion of the elites’ time throughout the year. There were no less than 165 religious festivals across the country. A keen observer visiting the land of Hatti was thus quite likely to see a royal entourage forming a procession in a ceremonial venue in which a statue of a deity, sheeted with gold, was retrieved from a temple and carried across open land to one or more sacred places. But remembering when to hold those festivals was a challenge.

There is a wealth of Bronze Age documents, most dealing with prayers and festival liturgies, as well as many studies of Hittite religion, including sacred springs, grottos and caves, rocks and mountains. So far, however, little emphasis has been placed on identifying the Hittites’ relation to celestial deities, even though their highest-ranking goddess was the Sun Goddess of Arinna, and the Great King of Hatti even used to refer to himself as “My Sun.”

Probably the best depiction of the Hittite pantheon is preserved just outside the city walls of Hattuša in the rock sanctuary of Yazılıkaya, one of the most fascinating archaeological sites in the world and a World Heritage site.

For almost two centuries, scholars have been puzzled by the procession of over 90 deities and mythical figures carved into the vertical faces of the natural limestone outcrop. Its artistic style is completely distinct from the examples familiar from ancient Egypt and Mesopotamia. Without doubt, this place was of utmost importance in Hittite religion; but what exactly were priests and the royal family celebrating at this spot? The archaeologists in charge of excavations at the site have long argued that the highest echelons of Hittite society celebrated the beginning of the New Year at this sanctuary.

I (Zangger) first saw Yazılıkaya in the spring of 2014 during a vacation to visit archaeological sites in Turkey. The local hostel where I spent the night had sold me the “Hattusha Guide” written by the German prehistorian Jürgen Seeher, who was in charge

of the excavations from 1994 to 2006 on behalf of the German Archaeological Institute. Seeher states on page 157 of the guide that a particularly large relief of the Hittite Great King Tuthalija IV lies in the shade throughout the year, except for a few days around the summer solstice, when it is illuminated by natural sunbeams.

Absent-mindedly I made a note in the margin: “calendar?”. Little did I know that this spontaneous thought would keep me occupied for the next five years.

The rock sanctuary consists primarily of two chambers, for the most part natural, designated Chamber A and B. Chamber A has always been an open space, with dozens of reliefs carved into the limestone walls at eye level. Chamber B, on the other hand, contains a massive vertical face pointing almost due north. It looked so technical – the smooth face had even been extended with ashlar masonry in Hittite times – that I thought the rooms may indeed have had a technical function in addition to their religious and symbolic meaning. An astronomical application appeared to be a good place to start.

Upon returning to Zurich, I came into contact with Rita Gautschy, an archaeologist and archaeoastronomer at the University of Basel. We decided to jointly pursue an investigation of the sanctuary. Little by little we worked towards an interpretation of the groups of figures and the deities themselves, until we eventually understood how the whole system may have been used. In our view, it is a tool to operate a calendar based on celestial events. To make sure that their festivals fell in the right season, the Hittite priests had to keep track of the beginning of each year and month. This is what we think Yazılıkaya was used for – and could still be used for today, since the system works in perpetuity.

We distinguished four groups among the 63 preserved reliefs of deities in Chamber A, beginning with 12 identical male gods on the west wall at the entrance. These, in our view, were used to count the 12 lunar months of a year – an idea that had already been brought forward in 1973 by the ancient historian Friedrich Cornelius. Next, to the right, is a group of 30 deities, which we interpret as keeping track of the days of a lunar month (alternating between 29 and 30 days). Since a lunar year comprises 354 days (12 times 29.5), a leap month had to be inserted approximately every three years in order to keep the lunar calendar synchronized with the seasons.

We think that days and months were counted and marked from right to left, following the path of the moon across the sky. The Hittite priests most likely used wood or stone columns to indicate the current day and month. A carefully shaped sill, still well preserved, could have accommodated these markers.

The eastern wall nowadays shows 17 female deities, but originally there were at least nineteen. One of the two today missing figures is gone, with only a hieroglyph on the wall with its name indicating that it used to be there. The other missing figure was found in the neighborhood in 1945, and is now displayed in a nearby museum. If the group indeed consisted of 19 reliefs, it could have been used to mark a 19-year solar cycle. Such a 19-year solar cycle is a perfect tool to align solar and lunar calendars.

The symbolic role and possible technical function of the five deities in the main scene is not yet explained – we are planning to take up this task in due course. Chamber B, too, requires more scholarly scrutiny. Like Chamber A, it contains a group of 12 identical

gods, which we interpret to indicate the lunar months. With the chamber pointing almost due north, the sharp natural rock edges could have been used as a star clock – a system that had been in use in Egypt for over a thousand years by the time Chamber B was created.

This new interpretation of Yazılıkaya serves as a starting point for a better understanding of Hittite religion. Celestial deities played a paramount role in the Hittite religion that acted as an amalgam of different local Anatolian beliefs and rites on one hand, and of concepts of stargazing that were for the most part adopted from principles first recognized in Mesopotamia.

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Please visit the site: <http://www.asor.org/onetoday/2020/05/calendar-in-stone> [Go there for pix, maps, and nicer format]



MYSTERIOUS MARKINGS MAY HOLD CLUES TO ORIGIN OF WRITING - PALEOANTHROPOLOGIST DISCOVERS SET OF GEOMETRIC SIGNS USED AROUND THE WORLD 40,000 YEARS AGO

Paleoanthropologist and rock art scholar Genevieve von Petzinger decided in 2007 to undertake the study of geometric signs found in caves and other sites, dating back as far as 40,000 years ago during the Stone Age.

Although many people know of the familiar petroglyphs of animals, little was known about the symbols alongside them, even though there are far more of them.

Von Petzinger, after travelling all over the world, may record a group of symbols that appear in sites all over the planet. Her findings suggest a common early communication system dating back much further than the first written languages of Ancient Sumer 3,000 years ago.

“The funny thing is that at most sites the geometric signs far outnumber the animal and human images,” said Genevieve von Petzinger.

“But when I started on this back in 2007, there wasn’t even a definitive list of how many different shapes there was; nor was there a strong sense of whether the same ones appeared across space or time.”

The paleoanthropologist set out to compile a database of all the known geometric signs at rock art sites in Ice Age Europe. She found that there was vague information on some of the locations and that some hadn’t been studied in half a century or more.

She and her husband, Dillon, decided to target the lesser-studied sites across France, Spain, Portugal, and Sciliy. They found a treasure trove of new geometric signs.

“We found new undocumented geometric signs at 75 percent of the sites we visited,” she explained. The couple ventured deep into cave systems and found symbols on walls a mile into the earth in some cases.

Later, she traveled to other sites, including in North America. Armed with a growing database of symbols, the researchers started to see some stunning similarities.

“Barring a handful out outliers, there are only 32 geometric signs. Only 32 signs across a 30,000-year time span and the entire continent of Europe. That is a very small number,” she explained.

“Now if these were random doodles or decorations, we would expect to see a lot more variation, but instead what we find are the same signs repeating across both space and time.”

The researchers found that 65 percent of the signs stayed in use over the course of thousands of years. Some signs appeared to be locally used without wide distribution, while some were used across the world, all the way to Indonesia and Australia. They seem to have agreed-upon culturally-recognized meanings.

“It’s starting to seem increasingly likely that this invention actually traces back to a common point of origin in Africa,” said Von Petzinger.

The geometric shapes aren’t like a written representation of a spoken language but are stylized abstract representations of things people saw in the world around them.

“If we’re talking about geometric shapes, with specific culturally-recognized, agreed-upon meanings, then we could very well be looking at one of the oldest systems of graphic communication in the world,” said Von Petzinger.

These early representations may be the first inspirations for what later developed into abstracted written language. She thinks of them as similar to emojis today.

“If you think about it, these [geometric signs] are like the great, great, great grandparents of emojis; simple little characters with huge amounts of information embedded into them,” she said.

“But you need to be part of the culture group to be able to decipher it. You have to know the code.”

Now that the researchers have found the common symbols, they are working translate what they mean. Objects like a 16,000-year-old necklace from a burial site in France may serve as a helpful decoder.

You can find out more in the book “The First Signs: Unlocking the Mysteries of the World’s Oldest Symbols,” by Genevieve von Petzinger.

It’s fascinating to know that ancient geometric symbols appear around the world dating back 40,000 years, though some experts point out that ancient humans created symbolic markings as far back as 500,000 years ago.

Please visit the site: https://archaeology-world.com/mysterious-markings-may-hold-clues-to-origin-of-writing/?utm_source=pushengage&utm_medium=push_notification&utm_campaign=pushengage&fbclid=IwAR296EK-2AmLVPG_JXINz-tsXNtzA6IDkwOGfU5XI8W3WpayCYd05oJqi30 [Go there for pics and video]

THE LOST LANGUAGES DISCOVERED IN ONE OF THE WORLD’S OLDEST CONTINUOUSLY RUN LIBRARIES, BY BRIGIT KATZ

Centuries-old texts were erased, and then written over, by monks at Saint Catherine’s Monastery in Egypt.

Saint Catherine’s Monastery, a sacred Christian site nestled in the shadow of Mount Sinai, is home to one of the world’s oldest continuously used libraries. Thousands of manuscripts and books are kept there—some of which contain hidden treasures.

Now, as Jeff Farrell reports for the Independent, a team of researchers is using new technology to uncover texts that were erased and written over by the monks who lived and worked at the monastery.

Many of these original texts were written in languages well known to researchers—Latin, Greek, Arabic—but others were inscribed in long-lost languages that are rarely seen in the historical record.

Manuscripts with multiple layers of writing are known as palimpsests, and there are about 130 of them at St. Catherine’s Monastery, according to the website of the Early Manuscript Electronic Library, which has been leading the initiative to uncover the original texts.

As Richard Gray explains in the Atlantic, with the rise of Islam in the 7th century, Christian sites in the Sinai Desert began to disappear, and Saint Catherine’s found itself in relative isolation.

Monks turned to reusing older parchments when supplies at the monastery ran scarce.

To uncover the palimpsests’ secret texts, researchers photographed thousands of pages multiple times, illuminating each page with different-colored lights. They also photographed the pages with light shining onto them from behind, or from an oblique angle, which helped “highlight tiny bumps and depressions in the surface,” Gray writes.

They then fed the information into a computer algorithm, which is able to distinguish the more recent texts from the originals.

Since 2011, researchers have photographed 74 palimpsests, which boast 6,800 pages between them. And the team’s results have been quite astonishing. Among the newly revealed texts, which date from the 4th to the 12th century, are 108 pages of previously unknown Greek poems and the oldest-known recipe attributed to the Greek physician Hippocrates.

But perhaps the most intriguing finds are the manuscripts written in obscure languages that fell out of use many centuries ago. Two of the erased texts, for instance, were inked

in Caucasian Albanian, a language spoken by Christians in what is now Azerbaijan. According to Sarah Laskow of Atlas Obscura, Caucasian Albanian only exists today in a few stone inscriptions. Michael Phelps, director of the Early Manuscripts Electronic Library, tells Gray of the Atlantic that the discovery of Caucasian Albanian writings at Saint Catherine’s library has helped scholars increase their knowledge of the language’s vocabulary, giving them words for things like “net” and “fish.”

Other hidden texts were written in a defunct dialect known as Christian Palestinian Aramaic, a mix of Syriac and Greek, which was discontinued in the 13th century only to be rediscovered by scholars in the 18th century. “This was an entire community of people who had a literature, art, and spirituality,” Phelps tells Gray. “Almost all of that has been lost, yet their cultural DNA exists in our culture today. These palimpsest texts are giving them a voice again and letting us learn about how they contributed to who we are today.”

The Sinai Palimpsests Project, as the team’s initiative is known, has taken on new urgency in recent years, as the Islamic State’s presence in the Sinai Peninsula has made Saint Catherine’s monastery even harder to reach. Phelps and his fellow researchers are making images of the palimpsests available online, so scholars can explore the secret writings that have recently been brought to light.

Brigit Katz is a freelance writer based in Toronto. Her work has appeared in a number of publications, including NYmag.com, Flavorwire and Tina Brown Media's Women in the World.

Please visit the site: <https://getpocket.com/explore/item/lost-languages-discovered-in-one-of-the-world-s-oldest-continuously-run-libraries>

