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Πληροφοριακό Δελτίο της Ελληνικής Αρχαιομετρικής Εταιρείας

- Αύγουστος 2019 -

**What you leave behind is not what is engraved in stone
monuments, but what is woven into the lives of others.**

(Pericles)

Newsletter of the Hellenic Society of Archaeometry

- August 2019 -

Nr. 221

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ΣΥΝΕΔΡΙΑ - CONFERENCES/WORKSHOPS

IRUG14 CONFERENCE, MAY 27-29, 2020, CULTURAL HERITAGE AGENCY OF THE NETHERLANDS, AMERSFOORT, 1ST ANNOUNCEMENT AND CALL FOR PAPERS

Dear Colleagues,

The Infrared and Raman Users Group (IRUG) is pleased to announce that the fourteenth IRUG Conference (IRUG14) will be held at the Cultural Heritage Agency of the Netherlands, Amersfoort, The Netherlands, May 27-29, 2020. The conference will include oral and poster presentations addressing all aspects of the application of Infrared and Raman spectroscopy for the study, documentation and protection of the world's cultural heritage.

Important dates:

Abstract Submission (500 words): October 15, 2019 – November 30, 2019

Conference: May 27-29, 2020

Registration: Full €75, Student €150

Further information for abstract submission and online registration procedures, social events, accommodation and transportation is forthcoming and will be published on the IRUG website (www.irug.org).

Please address inquiries to: Suzan de Groot, IRUG14@cultureelerfgoed.nl

Looking forward to your abstract submission and to seeing you in May 2020.

On behalf of the organizing committee and the IRUG Board of Directors,

Suzan de Groot
Conservation Scientist
Cultural Heritage Agency of the Netherlands

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3RD INTERNATIONAL RADIOCARBON IN THE ENVIRONMENT CONFERENCE (RIE III), GLIWICE, POLAND, 6-10 JULY, 2020

The 3rd International Radiocarbon in the Environment Conference (RIE III) will take place in the city of Gliwice, Poland, from Monday 6th to Friday 10th of July 2020.

On behalf of the Organizing Committee and the Gliwice Radiocarbon Laboratory team, we would like to invite you to participate in the Conference.

The RIE III website (c14env.polsl.pl) is now open. All relevant information (deadlines, registration, abstract submission, GDPR info*, etc.) will be updated in October 2019.

RIE III Organizing Committee

Andrzej Z. Rakowski (Conference Chairperson),
Sławomira Pawełczyk,
Jacek Pawlyta,
Konrad Tudyka,
Barbara Sensuła,
Danuta J. Michczyńska,
Grzegorz Kazanowski

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MA-XRF 2019, MA-XRF SCANNING IN CONSERVATION, ART AND ARCHAEOLOGY, CATANIA, OCTOBER 15-16, 2019, CALL FOR ABSTRACTS

The MA-XRF 2019 **Call for Abstracts** is open. Dead line for the abstract submission is **July 31, 2019**.

The abstract submission will be managed through the Easy-Chair conference system at the link:

<https://easychair.org/my/conference?conf=maxrf2019>

The submission procedure is fully detailed below.

The meeting will be based on **ORAL** contributions that are included in the scientific program after a review process performed by the Scientific Committee of the workshop. **Poster session** will be programmed at the meeting only if strictly necessary.

Please visit the [MA-XRF 2019 website](#) for updated information.

Important Dates:

Deadline for the Abstract submission: July 31, 2019
Notification of Abstract Acceptance: August 20, 2019
Registration deadline: September 1, 2019
Final program: September 15, 2019

Please note that the abstract submission is NOT the **registration form**. The presenting author of an accepted abstract must register and complete the full payment prior to the deadline of September 1, 2019. Please note that registration is required in order to be included in the scientific program, to have the abstract in the “Book of Abstracts” of the workshop, and to be invited to submit a full paper for the publication in a **special issue of X-ray Spectrometry**. Registration to the workshop can be performed at the link: [MA-XRF 2019 workshop](#). The registration will be managed by the Shougun Travel agency.

Abstract submission:

To submit your abstract for an **ORAL** contribution to the MA-XRF 2019 workshop, please follow the instructions below.

All abstracts must be submitted in English. All abstracts will be forwarded to the Scientific Committee for review. The accepted abstract from registered presenting authors will be published in the “Book of Abstracts” of the workshop and will be invited to submit a paper for the publication in a special issue of X-ray Spectrometry.

Abstract submission is managed through the Easy-Chair conference system. To submit your abstract use to the web address at the URL:

<https://easychair.org/my/conference?conf=maxrf2019>

If you do not have already an account, choose “sign up for an account” and follow the procedure to obtain an account, using the e-mail you will have received as confirmation of the creation of the account. Define an user ID and a password to access to the system of submission of abstracts.

Once you are logged to the site, to submit an abstract choose “New Submission”. Complete the information related to every author of the paper, specifying at least one Corresponding Author. If the abstract has more than 3 authors, use the “Click here to add more authors” option. Enter the Title and the Abstract in plain text in the reported form. This is only to help the system and the database, but the ABSTRACT MUST BE SUBMITTED AS PDF format according to this [TEMPLATE](#).

Please notice that abstract length must be limited to one A4 page as indicated in the template. Enter at least 3 keywords, one per line.

UPLOAD THE FILE WITH YOUR ABSTRACT as .pdf format and submit your abstract clicking the “Submit” button.

Once you have submitted one or more papers, you can access to your submission(s) through either the “overview” or “my submissions” menu. You can edit or add corrections or upload a new version of your abstract(s) before the abstract deadline.

Confirmation of receipt and notification of decision:

You will receive email confirmation that your abstract has been received, indicating the allocated abstract number. Please refer to this abstract number in all further correspondence regarding the abstract. Only the submitter will receive all information concerning the abstract and will be responsible for informing the other Authors of the status of the abstract. After the review by the Scientific Committee, authors will be notified about results by August 20, 2019. If an abstract is accepted, the presenting author must register and pay the registration fee by September 1, 2019.

MA-XRF 2019 Special Issue of X-ray Spectrometry:

Participants are invited to submit manuscripts based on their contributions for publication in a special issue of *X-ray Spectrometry*. Please note that all papers will be handled and reviewed as regular submissions to the journal. As such, submitted manuscripts will be subjected to the selection process of this journal, including a peer review procedure. Therefore, acceptance for presentation at the meeting is not a guarantee for publication in the journal. All manuscripts must meet the standards of the journal: they will need to show clear analytical advances on the use of MA-XRF (even in combination with other methods) in the Cultural Heritage field and they must match the scope of the journal. Accepted papers will be published individually in regular issues as soon as they are accepted. The deadline for submission of manuscripts will be published in the website of the workshop.

Contacts:

Participants are encouraged to visit the website of the meeting ([MA-XRF 2019 website](#)) or to contact the organizers (caliri@lns.infn.it) for updated information.

Koen Janssens

Paolo Romano

(On behalf of the Scientific Committee)

**INTERNATIONAL CONFERENCE “SILK IN
ANCIENT GREECE AND ITS RESONANCE”,
SWEDISH INSTITUTE AT ATHENS,
SEPTEMBER 19-21, 2019**

Dear Colleagues,

We are happy to announce the program for the international conference “Silk in Ancient Greece and its Resonance”, which takes place at the Swedish Institute at Athens, September 19-21, 2019.

Best wishes,

Jenny Wallensten, Stella Spantidaki, Peder Flemestad

PROGRAM

September 19

19.15-20.00 Key-note: Berit Hildebrandt: *The Provenance, Production and Manufacture of Silk in Ancient Greece: A Reassessment*
Reception at the Swedish Institute

September 20

9.00-09.30 Registration and coffee

Session 1: A Literary Thread

09.30-10.00 Peder Flemestad, *Silk in the Second Sophistic*

10.00-10.30 Ines Bogensperger, *The Evidence of Silk in Papyrus Texts from Egypt*

10.30-11.00 Mary Harlow, *Spinning Tales of Silk: The Use and Misuse of Silk in Late Antique Authors*

11.00-11.30 Coffee

Session 2: A Historical Thread I

11.30-12.00 Julia Galliker, *Silk in the Byzantine World: Transmission and Technology*

12.00-12.30 Maria Sardi: *The Culture of Silk in the Mamluks (13th-16th c. A.D.)*

12.30-13.00 Hedvig Landenius Enegren: *Silk in Cyprus Yesterday and Today: A Retrospective Exposé*

Session 2: A Historical Thread II

15.00-15.30 Amica Sundström, *Silk Imitation from the Migration Period (400-550 AD) in Sweden*

15.30-16.00 Petra Lindscheid, *Early Silk North of the Alps: Silk Finds in Roman and Early Medieval Germany*

16.00-16.30 Marianne Vedeler, *Attitudes to Silk in the Viking age*

September 21

Session 3: A Material Thread

- 10.00-10.30 Eva Panagiotakopulu, *Wild Silk from the Aegean: An Archaeoentomological perspective*
- 10.30-11.00 Christophe Moulherat, Serge Berthier, Bernd Schollhorn, Camille Aracheloff, *From Cocoon to Textile: Structure and Colour*
- 11.00-11.30 Christina Margariti, *The Effects of Artificial Degradation on Silk Fibres*
- 11:30-12:00 Coffee

Session 4: Tying Up the Threads

- 12.00-12:30 Amica Sundström, *The Reconstruction of a Roman Silk Textile*
- 12.30-13.00 Kalliope Sarri, *Experiment and Experience: Hands-on Approaches to the Equipment and Technology of Ancient Textiles*
- 13.00-13.30 Maria Venizelea, *Silk Stories*
- 13.30 Concluding remarks

Organized by: The Swedish Institute at Athens, ARTEX, Lund University, Pireos Bank

**INART 2020: 4TH INTERNATIONAL
CONFERENCE ON INNOVATION IN ART
RESEARCH AND TECHNOLOGY,
14-17 APR 2020, PARIS, FRANCE**

Dear Colleagues,

You are cordially invited to participate in the 4th International Conference on Innovation in Art Research and Technology (inArt 2020) to be held in Paris, on April 14-17, 2020.

Chemists, physicists, geologists, art historians, restorers, archaeologists, conservation scientists, etc. are welcome to create a wide community and a common environment for a fruitful discussion. Previously InArt conferences took place in Evora - Portugal in 2013, in Ghent - Belgium in 2016 and in Parma - Italy in 2018.

The Conference scope is to create a bridge of communication between interdisciplinary units in the field of archaeometry. It took several years for the scientific and art historical knowledge to be brought together and establish a new era on approaching preservation of cultural heritage. Nowadays, the contribution of natural sciences to characterize and document artistic materials is well known. Generally, these applied sciences, especially physics and chemistry, contribute to a deeper understanding of cultural heritage artefacts and shed light on different aspects related to the origin of the work of art or its chronology.

Important dates:

- Abstract Submission (600 words): September 2 - November 15, 2019.
- Notification of abstract acceptance: January 20, 2020.
- Registration: November 01, 2019 - February 29, 2020.
- Conference: April 14-17, 2020.

Further information for abstract submission, online registration procedures, social events, accommodation and transportation is forthcoming and will be published on the conference website: <https://inart2020.sciencesconf.org/>

Looking forward seeing you in April 2020 in Paris,

Conference chair
Ludovic Bellot-Gurlet
Delphine Neff

Contact: inart2020@sciencconf.org

2019 NKF-SYMPOSIUM: ANALYSIS AND IMAGING TECHNIQUES IN THE CONSERVATION OF ART, CULTURAL AND NATURAL HERITAGE, OCTOBER 31ST - NOVEMBER 1ST 2019, COPENHAGEN

Nordic Association of Conservators (IIC - Nordic Group) the Danish Committee invites you to the 2019 NKF-Symposium: ANALYSIS AND IMAGING TECHNIQUES IN THE CONSERVATION OF ART, CULTURAL AND NATURAL HERITAGE

A two-day educational symposium in Copenhagen ? Denmark

Date: October 31st - November 1st 2019

Nordic Association of Conservators ? Denmark is pleased to announce this 2019 educational symposium on analysis and imaging techniques in the conservation of art, cultural and natural heritage, arranged in collaboration with the National Museum of Denmark and the scientific journal of conservation MoK.

The program for this 2019 symposium will cover a wide range of methods and applications of imaging techniques and material-based analysing techniques. The aim is to provide insight into the rapidly growing technology within state-of-the-art of visual analysis, including several types of 3D imaging, MFT as well as the development within material-based analysis methods. The main topics of the research presentations will be:

- 3D imaging and photogrammetry
- 3D modelling and documentation
- Digital Technologies in Heritage Conservation
- Archaeological material analysis
- Micro fading technique, X-ray and other analysis

The organising committee are honoured to present our two keynote speakers:

Dr. Alex Ball, head of Imaging and Analysis, the Natural History Museum UK

Prof. Karin Margarita Frei, research professor in Archaeometry, The National Museum DK

When participating in the symposium, you are also invited to join a specially arranged tour of relevant conservation research laboratories or the Copenhagen Technical University section of Image Analysis & Computer Graphics. Please visit our website for

more details, programme and registration for the symposium: www.nkf-dk.dk/symposium

2ND SINO-HELLENIC INTERNATIONAL CONFERENCE ON ENVIRONMENT AND CULTURE, 1ST PRELIMINARY ANNOUNCEMENT – CALL OF PRESENTATIONS, RHODES 2020

The 1st Conference in Kaifeng was organized by the Collaborative Innovation Center on Yellow River Civilization & Key Research Institute of Yellow River Civilization and Sustainable Development and the University of the Aegean with Prof. Liritzis.

Programme of 1st Conference

Co-Organizers: **University of the Aegean** (*Research Center of Yellow River Civilizations; Lab. of Archaeometry; Lab. of Environmental Archaeology & Preventive Conservation*), **Henan University** (*Research Center of Hellenic Civilization; Collaborative Innovation Center for Yellow River Civilization; Key Research Institute of Yellow River Civilization & Sustainable Development; School of Environment & Planning; International Research Center for Ancient Civilizations*)

Endorsed by: Center for Comparative Studies of World Civilizations of Chinese Academy of Social Sciences; Institute of Geology & Geophysics Chinese Academy of Sciences; European Academy of Sciences & Arts (Saltzburg)

AIM

With the aim of deepening Chinese Academics' understanding to Western Civilization, at the same time, cultivating the interests of Chinese civilization in Western Academics, reducing mutual misunderstandings and prejudices, and promoting mutual trust and consensus, in 2016, University of the Aegean and Henan University achieved Memorandum of Understanding with the provisions to promote and facilitate the interaction, exchanges, and cooperation between the Chinese and Greek academics.

Then the Sino-Hellenic Academic Project (SHAP*) was initiated by Prof I.Liritzis (www.huaxiahellas.com). In September 2018, Henan University established the Research Centre for Yellow River Civilizations (RCYRC) to in order to promote the education and research of Chinese Civilization in Greece and Europe. The Centre will be an organization of international calibre dedicated towards organizing Sinitic and Hellenic studies, publishing papers and books, organizing conferences, conference proceedings, talks, lectures, discussion panels, workshops, student exchanges, expert exchanges and so on. In this Centre, the Chinese students and academics will have opportunities in learning Chinese, studying Chinese history and archaeology, philosophy, arts, and culture, carrying on interdisciplinary innovation research.

Along this bilateral initiative the RCYRC with the respective Research Center for Hellenic Civilization (RCHC) in China provide a vehicle and a bridge for facilitating

comparative cultural & environmental studies along the two Silk Roads: the continental one and the southern coastal one.

In June 2018 on the occasion of the inauguration of the RCHC in Kaifeng (Henan University) the 1st International Sino-Hellenic Conference on Environment & Culture was established.

This is a Series of international conferences initially hosted by Kaifeng and Rhodes in alternative turns.

The 2nd SHIC on Environment & Culture will take place in Rhodes in October 2020.

The 2nd SHIC will focus on any topic relating environment and cultures for Greece and China, including the cultural-trade axis of Greece, Europe, North Eastern Africa, Near – Middle East, to Eastern Asia and China from 3rd c. BC (Han Dynasty, Alexander the Great).

In Depth investigations & Comparative Studies, from Prehistory to Roman & Byzantine Empires and respective Chinese Dynasties (Tang, Ming) are welcome.

Sessions

- *Cultural Management, Innovation Technologies & Sustainability*
- *Enviro-cultural reports from Ancient Euro-Asian literature sources*
- *Enviro-Cultural Issues in ancient Greece & China*
- *Disaster Archaeology*
- *Silk Road: Operational sequences of artifacts & diffusion of ideas*
- *Geoarchaeological Issues*
- *Sacred Landscapes & religious aspects*
- *Archaeological Sciences-Archaeometry*
- *3D Reconstructions*
- *Remote Sensing applications*
- *Predictive Modeling of Archaeological Sites*
- *Archaeological Parks*
- *Geoarchaeological Parks*
- *Miscellaneous*

***It is planned to publish selective presentations as Book indexed in Scopus.**

Information: Prof. Ioannis Liritzis, University of the Aegean, Research Center for Yellow River Cultures, Rhodes, Greece (liritzis@rhodes.aegean.gr) [coordinator]

Dr. Asimina Vafiadou (vafiadou@rhodes.aegean.gr) [administrative matters]

Dr. Pantelis Volonakis (p.volonakis@rhodes.aegean.gr)

Maria Bratitsi (mbratitsi@rhodes.aegean.gr) [Local issues]

Alex Westra (alexanderwestra@hotmail.com) [Chinese issues]

LOC (provisional)

Prof. Ioannis Liritzis (Archaeometry, co-Coordinator of SHAP)

Prof. Katerina Frantzi (Head of DMS)

Prof. Manolis Stefanakis (Archaeology)
Dr. Pantelis Volonakis (IT in Cultural Heritage)
Dr. Asimina Vafiadou (Archaeometry)

THE VENUE

CONFERENCE FEES (provisional, subject to change): 300 Euros, includes: conference material, abstract book, accommodation and meals, welcome buffet, museum entrance, local transport in Rhodes.

The official language of the conference is English. Translation and interpreting services will not be available.

Reaching Rhodes: a) Through Charter flights, b) From Athens regular flights to Rhodes (make early reservation).

Rhodes Airport to the City: By local bus frequently, by taxi. On a predefined date and time, a shuttle bus arranged by Conference take participants straight to the Hotel.

Conference place: In the University or Hotel Conference Center (TBA)

**The Sino-Hellenic Academic Project (SHAP) is a collaboration between the University of the Aegean, Greece, and Henan University, China, which seeks to promote further research about ancient Hellenic and Chinese Civilizations, and their One Belt One Road ancient Silk Road that bridges EuroAsian continents, cultures and palaeoenvironments, interactions and diffusion of ideas & craftsmanship and exchange of goods, through a series of comparative and parallel projects. It is a project which aims to bring Greek and Chinese academics closer together through joint efforts, such as conferences, publications, workshops, and so on. It is a valuable effort that both universities have established centres in each other's campuses: The Research Centre for Hellenic Civilisation (RCHC) at Henan University and the Research Centre for Yellow River Civilization (RCYRC) at the University of the Aegean. The Sino-Hellenic Academic Project's mission promote and encourage research in the domain of Sino-Hellenic studies. The opportunity for studying the Greek and Chinese civilizations side-by-side is unique. Experts from both fields and from both countries are gathered here to discuss and create methods and understanding of both civilizations respectively. The Initiator of the Project is Ioannis Liritzis, Professor of Archaeometry-Physical Sciences of the University of the Aegean, Dept. of Mediterranean Studies & Visiting Distinguished Professor at the University of Henan (www.liritzis.eu), who established the collaboration also through an official Memorandum of Understanding between the two Universities. Professor Miao Changhong, Professor of Geography is the Chinese counterpart and co-initiator with Prof. Liritzis of the MOU and the two research centers. Current Acting Director of the RCHC is Dr. Chao Chen, currently working on Ancient Greek law and he is interested into exploring ancient Greek agriculture. For the RCHC in Rhodes acting director is Prof. I. Liritzis.*

Intention to participate. Fill In the table below and send it to archlab@aegean.gr

1. NAME	
2. INSTITUTION (Dept, Lab, Center)	

3. TITLE OF PRESENTATION	
4. E-MAIL	
5. URL (personal/Institutional)	
6. Accompanied	
7. Single	

ΑΝΑΚΟΙΝΩΣΕΙΣ - ANNOUNCEMENTS
INFRARED AND RAMAN SPECTROSCOPY
SCHOOL ON CULTURAL HERITAGE (VIII
EDITION)

Infrared and Raman Spectroscopy School on Cultural Heritage (VIII edition) will be held at Centro Conservazione e Restauro La Venaria Reale; near Turin (Italy) in the next November. The school, with the technical support of Bruker Italia, will be focused on the molecular spectroscopies and their complementarity. There will be theoretical lessons and practical sessions in particular on the use of different instruments and on the spectral interpretation

The lessons will be in Italian.

For more information and for the full program, please contact labos_formazione@centrorestaurovenaria.it or anna.piccirillo@centrorestaurovenaria.it or click on <https://www.centrorestaurovenaria.it/news/scuola-di-spettroscopia-infrarossa-e-raman-viii-edizione>

Anna Piccirillo
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ΝΕΕΣ ΕΚΔΟΣΕΙΣ – NEW PUBLICATIONS

MAGAN – THE LAND OF COPPER **PREHISTORIC METALLURGY OF OMAN BY** **CLAUDIO GIARDINO**

Paperback; 210x297mm; xviii+182 pages; 150 figures, 14 tables (colour throughout). (Print RRP £40.00). 537 2019 The Archaeological Heritage of Oman 2. Available both in printed and e-versions. Printed ISBN 9781789691788. Epublication ISBN 9781789691795.

The development of a prehistoric civilization in the Sultanate of Oman was strongly connected with the exploitation and the use of copper.

The Oman Peninsula has several rich copper ore deposits that have been exploited since prehistoric times. The earliest evidence of metallurgical activities in Oman dates back to the end of the Neolithic period in the 4th millennium BC. Thanks to the availability of this precious raw material, Oman became one of the main copper sources for the entire Middle East during the Bronze Age. The cuneiform texts of Mesopotamia referred to Oman as the Land of Magan, a region where the precious copper was found in fabulous abundance.

This volume describes the geography and environments of Oman, its rich copper ore deposits and the ancient mining and smelting techniques, and it also includes an overview of the physical properties of the different metals exploited in antiquity and of the analytical techniques used in archaeometallurgy. Moreover, the author presents for the first time a comprehensive and detailed typology of the metal objects discovered at sites in Oman dating to the millennia from the Neolithic up to the Early Iron Age, emphasizing the development of advanced alloying techniques in order to obtain artefacts with specific properties and appearance.

About the Author

CLAUDIO GIARDINO is Associate Professor of Prehistory and Protohistory at the University of Salento (Lecce, Italy), where he also teaches Prehistoric Archaeometallurgy at the Post-graduate School of Archaeology. He has participated in archaeological projects in many regions of Europe and Asia working on several aspects of archaeometallurgy. He has conducted extensive research on the beginning and early developments of copper-based technologies at several sites in the Sultanate of Oman, from the Neolithic period (Ras Al-Hamra and Wadi Shab) up to the Bronze and the Iron Ages (Ras Al-Hadd, Ras Al-Jinz, Al-Safah and Daba). He is the author of numerous scientific publications on prehistory and ancient metallurgy, including a handbook on the use of metals in the ancient world, books on mining and metallurgical spheres in the West Mediterranean, and studies on the early metallurgy of Southeastern Arabia.

Please visit the site:

<http://www.archaeopress.com/ArchaeopressShop/Public/displayProductDetail.asp?id={12577A6F-33BB-40B7-B993-6955A71C5BCA}> [Go there for pricing]

EΙΔΗΣΕΙΣ - NEWS RELEASE

ARCHAEOLOGY SHOWS PHILISTINES, ENEMY OF ISRAELITES, CAME FROM EUROPE, BY MAAYAN JAFFE-HOFFMAN

"We found infants that were too young to travel... so they were born on site. And their DNA revealed [that] their parents' heritage was not from the local population."

New evidence has revealed that the ancient people most known for their biblical conflict with the Israelites were immigrants to the region in the 12th century BCE.

"For 30 years, we excavated at Ashkelon, uncovering Canaanites, early Philistines and later Philistines – and now we can begin to understand the story that these bones tell," said Daniel M. Master, director of the Leon Levy Expedition to Ashkelon, who headed the excavations.

The team used state-of-the-art DNA technologies on ancient bone samples unearthed during the excavation from 1985-2016. Analyzing for the first time genome-wide data retrieved from people who lived in Ashkelon during the Bronze and Iron ages (around 3,600 to 2,800 years ago), the team found that a substantial proportion of their ancestry was derived from a European population.

This European-derived ancestry was introduced into Ashkelon around the time of the Philistines' estimated arrival in the 12th century BCE.

The findings of the study were published Wednesday in Science Advances.

According to the Book of Joshua, the land of the Philistines was in the southwestern Levant comprising the five city-states of Gaza, Ashkelon, Ashdod, Ekron and Gath, from Wadi Gaza in the south to the Yarkon River in the north. It was from this designation that the whole of the country was later called Palestine by the Greeks.

The Israelites' conflict with the Philistines is well attested to in the Bible. Samson slays 1,000 Philistines in Judges 15, and David battles Philistine Goliath in 1 Samuel 17, among other examples.

Dr. Adam A. Aja, assistant curator of collections at the Harvard Semitic Museum and one of the Ashkelon Philistine cemetery archaeologists, said that people today often want to know, "who are we, where did we come from?"

"When we found the infants – infants that were too young to travel... these infants couldn't march or sail to get to the land around Ashkelon, so they were born on site. And their DNA revealed [that] their parents' heritage was not from the local population," Aja explained, referring to the new genetic input from the direction of Southern Europe that was found in bone samples taken from infants buried under the floors of Philistine homes, as was the custom during that period.

“All the work of previous scholarship was pointing in that direction,” said Aja. “The DNA answered that definitively for us... The DNA gave us the opportunity to let these people speak for themselves.”

MICHAEL FELDMAN of the Max Planck Institute for the Science of Human History, leading author of the study, explained that the genetic distinction is due to European-related gene flow that is known to have been introduced in Ashkelon during either the end of the Bronze Age or the beginning of the Iron Age.

“This timing is in accord with estimates of the Philistines’ arrival to the coast of the Levant, based on archaeological and textual records,” he said.

“Not only do we have radio-carbon dating that demonstrates the antiquity of the samples, but we also have stratigraphic evidence,” Masters said. “These samples come from carefully-excavated contexts, connected to artifacts that can be precisely dated.”

The Leon Levy Expedition has been working in the area under license from the Antiquities Authority. In 2016, archaeologists uncovered the first Philistine cemetery. From those graves, researchers successfully recovered genomic data from the remains of 10 individuals who lived in Ashkelon during the Bronze and Iron ages. This data allowed the team to compare the DNA of the Bronze and Iron Age people of Ashkelon to determine how they were related. The researchers found that individuals across all time periods derived most of their ancestry from the local Levantine gene pool, but that individuals who lived in early Iron Age Ashkelon had a European-derived ancestral component that was not present in their Bronze Age predecessors.

The researchers also found that the European-related component could no longer be traced in later Iron Age individuals from Ashkelon.

In other words, within two centuries or less, the genetic footprint introduced during the early Iron Age is no longer detectable and seems to be diluted by the local Levantine gene pool, which researchers say suggests intensive admixture between local and foreign populations. Yet, there was continuity in their ethnicity.

“The Philistines stayed Philistines,” explained Masters. “Later people who called themselves Philistines looked very much like the people around them. Their ethnicity did not change even though, as we look at their genome, we see a lot [more] of Levantine influence than we did before.

“It is an interesting way of looking at how genetics and ethnicity operate in different ways under different principles,” Masters concluded.

Aja said that additional work still needs to be done.

“We need more genetic samples from this region to pinpoint more precisely where this population is from,” he said. However, he noted that the latest findings help complete the picture more than ever before.

Aja said that archaeology is almost akin to having a jigsaw puzzle with most of the pieces missing, and the picture itself missing – “and we are trying to make the joins that work. When we found the cemetery and could get DNA evidence from this, it was as if someone handed us a picture.

“And now, we can see that the puzzle we are putting together actually matches what we thought it was going to be,” he said.

Please visit the site: <https://www.jpost.com/Middle-East/Archaeology-shows-Philistines-came-to-Israel-from-across-the-Mediterranean-594509>

BIBLICAL ERA PURPLE DYE INDUSTRY DISCOVERED IN HAIFA - RESEARCHERS BELIEVE THE DYE CAME FROM SEA SNAILS, BY AARON REICH

Archeological findings have uncovered the first ever biblical era purple dye workshop at the Tel Shikmona archeological site. The site, which is south of Haifa, dates back to the Iron Age (11th to sixth century BCE), and was first excavated in the 1960s at the behest of the Haifa Museum. The findings, however, had been kept in storehouses for various reasons. Now, almost 50 years later, Prof. Ayelet Gilboa and PhD candidate Golan Shavi of the University of Haifa have been able to begin studying the findings, and made a shocking discovery.

Tel Shikmona, despite being well documented throughout history, often confused scholars as to why it was established. The shore was too rocky to serve as a harbor, and the land around it was not especially suitable for agriculture. The most notable clues up until this point were the abundance of Phoenician pottery, and large amounts of purple coloring preserved in ceramic vats.

Now, however, an analysis of the findings confirmed that the dye came from sea snails.

Findings of purple coloring from this period are exceptionally rare, the researchers stated, and were only found in small amounts in other places. Not only did Tel Shikmona contain an unprecedentedly large amount – indicating production of the dye – but it also contained looms and spindles – indicating manufacturing of textiles as well.

Purple dye, made from the Murex snails, were the most expensive in the ancient world. Wearing purple was a sign of incredibly high status due to the difficulty in manufacturing it. In fact, the exact process of making purple coloring is still not understood by modern scholars.

This sheds light on the mystery of Tel Shikmona. It wasn't a trading settlement, but a purple dye manufacturing center.

“To date, no center for the production of purple has been found in Iron Age Phoenicia,” the researchers were quoted by the Jewish Press as saying. “We know that there were production sites in Tyre and Sidon and other sites in Lebanon, and thousands of Murex shells have been found there, but... there is still no evidence of the production sites themselves and no direct evidence of the dye.”

This is somewhat related to another conclusion Gilboa and Shavi made based on the findings. Tel Shikmona has traditionally been considered part of the Kingdom of Israel, as most of the Carmel was, until the Assyrian conquest. However, it now seems more fitting to consider it part of the Phoenician world, as they were the ones that held the closely guarded secret of purple dye.

The researchers also believe this dye was used for Tekhelet which was used in the clothing of the High Priest, the tapestries in the Tabernacle, and the tassels.

If these assumptions are correct, then Tel Shikmona just became one of the most unique and important historical sites in the region.

Some of the findings from the site are on display at Haifa's National Maritime Museum

Please visit the site: <https://www.jpost.com/Israel-News/Biblical-era-purple-dye-industry-discovered-in-Haifa-594266> [Go there for pix]

ANCIENT ROMAN SHIPWRECK DISCOVERED UNDISTURBED IN MEDITERRANEAN, BY SAMUEL OSBORNE

Vessel thought to be first well-preserved discovery of its kind in history of Cyprus

An ancient Roman-era shipwreck has been discovered at the bottom of the Mediterranean Sea off the eastern coast of Cyprus.

Divers found it was still loaded with transport amphorae – large clay jars typically used for holding wine and other liquids.

It is thought to be the first well-preserved discovery of its kind in the island nation's history.

Cyprus' Antiquities Department said the ship was most probably from Syria and ancient Cilicia on modern-day Turkey's southern coast.

Underwater archaeologists were working to examine the ship, the department added.

The wreck was found by a pair of volunteer divers with the University of Cyprus' archaeological research unit.

The Antiquities Department said study of the vessel was "expected to shed new light on the breadth and the scale of seaborne trade between Cyprus and the rest of the Roman provinces of the eastern Mediterranean".

A number of ancient vessels have been found off the island's coast including one dating back the Greek era in the middle of the 4th century BC which is thought to be one of the region's best preserved.

Archeologists working on that wreck said they had gained insights into the evolution of ancient boat-building in the region.

Please visit the site: <https://www.independent.co.uk/news/world/europe/roman-shipwreck-discovered-cyprus-mediterranean-sea-a8978496.html> [Go there for brief video]

EGYPTIAN-BRITISH ARCHAEOLOGISTS CONCLUDE SEARCH FOR QUEEN NEFERTITI TOMB, BY AL-MASRY AL-YOUM

A team of Egyptian and British archaeologists have concluded their three-day search in the Valley of the Kings in Luxor, which started on Sunday, for the burial chamber of Queen Nefertiti.

According to a theory by English Egyptologist Nicholas Reeves, Nefertiti was buried in one of the rear chambers of the tomb of King Tutankhamun.

The search, led by the former Egyptian Antiquities Minister Mamdouh Damati, included a careful radar survey to explore the space behind the tomb of King Tutankhamun.

Researchers from the Center for Sound Vibration and Smart Structures at the Faculty of Engineering, Ain Shams University, and a team from the English Terravision Center took part in the search as well.

The search process, which started in October 2015, is scheduled to continue until the end of 2019.

The results of the latest radar survey conducted inside and around the cemetery, carried out by an Egyptian-Italian team led by Professor Franco Porcelli, a professor of engineering at the Faculty of Applied Sciences at the University of Turin, Italy, showed spaces behind the walls of the tomb of King Tutankhamun, but those results did not confirm whether the spaces behind the tomb walls are natural or man-made spaces, said Egyptian archaeologist Francis Amin.

The results of previous radar surveys have found evidence of the existence of spaces and organic material behind the walls of the cemetery, said Amin, adding that he believes a chemistry professor will be needed to take part in the analysis of the radar survey results.

The theory of the existence of the tomb of Queen Nefertiti behind the walls of the cemetery of King Tut are historical assumptions that may be true, especially because there are other historical assumptions that say that Queen Nefertiti established a cemetery of her own that was not used for her burial.

Please visit the site: <https://www.egyptindependent.com/egyptian-british-archaeologists-conclude-search-for-queen-nefertiti-tomb/>

MYSTERY OVER TURKISH ROCK CARVINGS MIGHT FINALLY BE SOLVED - REPORT

Researchers have said mysterious carvings at an ancient sanctuary in Turkey which have baffled archaeologists for years may actually depict a calendar, the New York Post reported on Wednesday.

The intricate carvings on Yazlıkaya, a 3,200-year-old building that is thought to have played an important religious role in the capital city of the ancient Hittite Empire, have been a source of enduring mystery for years.

So much so that conspiracy theorists have posited that the ruins in today's northern Anatolian province of Çorum are the work of aliens who came to Earth to mine gold but had to leave when the Antarctic glaciers melted, the New York Post said.

However, a new theory suggests, the relief carvings at the site in the old city of Hattusa, may have functioned as a calendar that was way ahead of its time.

“It's not only a striking idea, it's reasonable and possible,” the New York Post quoted researcher Juan Antonio Belmonte at the Institute of Astrophysics of the Canary Islands as saying.

Some scientists say that despite years of studies, some key aspects of the carvings have been overlooked, the newspaper said. The researchers argue that some faded deity carvings would make one of the depictions add up to the number of days in a lunar month.

According to Eberhard Zangger, president of Luwian Studies, an international non-profit foundation and his colleague Rita Gautschi from the University of Basel, one carving containing 12 deities depicts the months in a year and another containing 30 depicts the days in a month.

The researchers think that ancient people would have marked underneath the first of the 30 deities at the start of a month and then worked backward to keep track of time, the New York Post said.

The theory has received criticism, however, from others arguing that the number of deities alone corresponding to a calendar is not enough conclusive evidence to confirm the hypothesis.

Please visit the site: <https://ahvalnews.com/archaeology/mystery-over-turkish-rock-carvings-might-finally-be-solved-report>

ARCHAEOLOGISTS CLAIM TO HAVE FOUND THE CHURCH OF THE APOSTLES BY SEA OF GALILEE, BY RUTH SCHUSTER

A bishop trekking around the lake in 725 saw and described the Church of the Apostles — exactly where this one has been found, archaeologists say.

Archaeologists believe they have likely found the Church of the Apostles, which Christian tradition says had been built over the home of Jesus' disciples Peter and Andrew in the village of Bethsaida by the Sea of Galilee.

The archaeologists, from the Kinneret Academic College and Nyack College of New York, said the Jewish village of Bethsaida on which the Roman city of Julias had been built was much larger than had been thought, they announced Thursday.

What can be said for certain is that the excavators of Beit Habek, aka el-Araj, found the hallmarks of a large Byzantine-era church. The most distinctive indicator is gilded glass tesserae (mosaic tiles), Prof. R. Steven Notley of the private Christian college in New York tells Haaretz. "Those are for wall mosaics and only appear in churches," he says.

So far, only the southern rooms of the church have been dug up. But the bird's-eye view of the structure also supports the theory that this place was a church because of the west-east axis and the division into a central nave with two aisles, explains Prof. Mordechai Aviam from Kinneret Academic College.

The archaeologists also found marble fragments from the chancel screen that would have separated the congregation from the priest at the altar. The stone screen had been decorated with a floral wreath.

Other discoveries included mosaic flooring, roof tiles characteristic of big buildings and a fragment of a chalk carving featuring a cross.

Finding a Byzantine-period church is one thing, but why do the archaeologists, whose work is supported by the Israel Antiquities Authority, think it's the Church of the Apostles, no less?

"It's the historical tradition we possess, and there is no good reason to question it," Notley tells Haaretz. Namely, in the year 725, a Bavarian bishop named Willibald was touring the Holy Land and wrote about walking from Capernaum to Kursi, and on the way seeing the church of Peter and his brother Andrew, Aviam explains.

"No other churches have been found between those two towns," Aviam clarifies. And the el-Araj church seems to be from the appropriate period.

The ruins have not been scientifically dated yet, but the church seems to have been built in the fifth century, nearly 500 years after the apostles would have lived, and to have been abandoned in the late seventh century or eighth century.

Notley qualifies that the identification of the church will remain theoretical until proof can be found, such as an inscription. “It would be normal to find an inscription in a church of the Byzantine period, describing in whose memory it was built, for instance,” he says.

Another discovery in this fourth excavation season is a Crusader “beehive” lamp, composed of two separately turned parts. At the other end of the cultural rainbow is a discovery made in 2017: The relief of a lioness carved on a basalt rock, which the archaeologists think graced a synagogue that also stood there in the early Byzantine period.

el-Araj as Bethsaida

The case of el-Araj as the long-lost city of Bethsaida, home to Peter, Andrew and Philip (John 1:44; 12:21) and elevated into the Roman city of Julias by the local Jewish governor Philip Herod (son of the great vassal king Herod), has long been touted by Notley and Aviam.

Their theory competes with the nearby site of e-Tell as Bethsaida, which is argued by Prof. Rami Arav of the Hebrew Union College.

Notley notes that because no church had been found in the relevant area (until now), what has happened is that people tended to “correct” pilgrimage records, drawing the pilgrimage testimonies about Bethsaida to Capernaum. The argument was made that an 8-sided structure in Capernaum was the church mentioned that was built over the house of Peter, he explains.

“Now we have a church right where the pilgrims say was a church. The early testimonies about the church over Peter’s house described it as a basilica. Would a Byzantine describe an eight-sided structure as a basilica? This is a question that needs to be addressed more fully,” Notley tells Haaretz.

The settlement at el-Araj dates at the very least to the Second Temple period, when it was a Jewish fishing village. Among other things, the archaeologists have found lead fishing weights.

Some had argued that the site at el-Araj had merely been a Roman army camp, based on the 2017 discovery of Roman baths there. Not so, says

Notley: In the Second Temple period, the early Jewish village which became a Roman polis had spread over a very large area, most of which remains to be excavated. The city survived into the Roman period. In the first century, the Jewish tetrarch Herod Philip decided to build a proper Roman polis based on the Jewish village. He named his new city Julias.

“The first historical witnesses to the site of Bethsaida are all Roman,” says Notley. “We assume it was part of Hasmonean expansion into the Galilee.”

Now you see Bethsaida, now you don’t

The historian Josephus mentions Bethsaida once in his writings, precisely when describing its urbanization, says Notley. He adds that there are two other known examples of Jewish villages being transformed into Roman hubs: Sepphoris (Tzipori) and Antipatris (Tel Afek, built during the first century B.C.E. by Herod the Great, who named it in honor of his father, Antipater). Pliny, writing in the first century, also mentioned Julias.

And then something strange happened. The city of Bethsaida-cum-Julias suddenly disappeared from the historical and archaeological record at the end of the third century.

Eusebius, the bishop of Caesarea who lived and wrote prolifically in the 4th century, including the Onomasticon ("On the Place-Names in the Holy Scripture"), does not provide any details about Bethsaida or the church indicating he does not personally know Bethsaida. Rabbinic testimonies about Bethsaida also go silent after the third century C.E.

Then, in the fifth century, a Byzantine settlement with a monastery and the church, now found, were built on the spot, and suddenly the literary sources began anew.

Aviam points out that the level of the Sea of Galilee (aka Lake Kinneret) fluctuates a lot. It is entirely possible that for roughly 150 to 200 years, the town was abandoned because the lake level rose and the ground became waterlogged.

The church and the town would be abandoned again, in the 8th century; following a period of later Crusader occupation, it would then disappear from sight until archaeological investigation ensued. There is not yet sign of damage in the church, from the well known earthquake of 749 CE that devastated the Jordan Valley. Aviam even points out that we don't know if the church was abandoned before or after that quake).

He adds that, possibly, silting from the nearby Jordan River mouth ruined the local fishing. By the way, scanning technology indicates that more houses lie beneath the silt.

It's likely the church was abandoned with the rise of the Umayyad caliphate and Islamic presence in the land, from the late seventh or early eighth century, which is when Bishop Willibald toured the land and described the great church. But he didn't mention whether or not the church was still being used.

Please visit the site: <https://www.haaretz.com/archaeology/.premium.MAGAZINE-archaeologists-claim-to-have-found-the-church-of-the-apostles-by-sea-of-galilee-1.7538758> [Go there for pix]

RESEARCHERS SHED NEW LIGHT ON HARBOR TECHNOLOGIES OF ANCIENT ROME

Portus, the maritime harbor of Rome at the height of the Roman Empire, was a port complex composed of basins and canals connecting the commercial harbor to the city via the Tiber River. Now, an international team of archaeologists and geologists has applied marine geology techniques at the archaeological site to uncover harbor technologies of the first centuries CE.

A 16th-century fresco in the Vatican Palace shows an idealized reconstruction of Portus' architectural and engineering features.

Portus was established in the middle of the first century CE and for well over 400 years was Rome's gateway to the Mediterranean.

It was centered around a large hexagonal basin, which can still be found today near Rome's Fiumicino airport.

The port played a key role in funneling imports to the citizens of Rome from across the region and beyond.

“Dating ancient harbor sediments is a major challenge, given ports are not only subjected to weather events throughout history, but the lasting effects of human activity,” said Dr. Agathe Lisé-Pronovost, an archaeology research fellow and a marine geologist at La Trobe University.

In order to overcome the problems of dating harbor deposits, Dr. Lisé-Pronovost and colleagues used a range of high-resolution sediment analyses including piston coring, X-ray scanning, radiocarbon dating.

These methods allowed precise identification of major reworked events, including dredged and hyperpycnal deposits.

“Ancient harbors can accumulate sediments more rapidly than natural environments, which is the case of Portus built in a river delta and where sediment accumulated at a rate of about one meter per century,” Dr. Lisé-Pronovost said.

“Applying these methods allowed us to date and precisely reconstruct the sequence of events of the historical port, including dredging to maintain enough draught and canal gate use.”

“The findings suggest that the Romans were proactively managing their river systems from earlier than previously thought — as early as the 2nd century CE.”

The team's paper was published in the March 2019 issue of the journal *Quaternary International*: <https://www.sciencedirect.com/science/article/pii/S1040618217313976>

Please visit the site: <http://www.sci-news.com/archaeology/portus-harbor-technologies-07402.html>

EARLIEST MODERN HUMAN FOUND OUTSIDE AFRICA, BY PAUL RINCON

Researchers have found the earliest example of our species (modern humans) outside Africa.

A skull unearthed in Greece has been dated to 210,000 years ago, at a time when Europe was occupied by the Neanderthals.

The sensational discovery adds to evidence of an earlier migration of people from Africa that left no trace in the DNA of people alive today.

The findings are published in the journal Nature.

"It's about five times older than any other evidence of modern humans in Europe. And obviously it's older even than Misliya from Israel (a 150,000-year-old early modern human fossil). The shape of the back of the skull is very modern looking and it's potentially the oldest fossil that shows this modern look to the back of the skull," Prof Chris Stringer, from London's Natural History Museum, told BBC News.

The earliest proposed *Homo sapiens*, a 300,000-year-old skull from Jebel Irhoud in Morocco, does not show this rounded, high back.

The latest evidence was uncovered at the site of Apidima Cave in Greece in the 1970s. Two skulls were found; one was very distorted and the other incomplete, however, and it took computed tomography scanning and uranium-series dating to unravel their secrets.

The more complete skull appears to be a Neanderthal. But the other shows clear characteristics, such as a rounded back to the skull, diagnostic of modern humans.

What's more, the Neanderthal skull was younger.

"Now our scenario was that there was an early modern group in Greece by 210,000 years ago, perhaps related to comparable populations in the Levant, but it was subsequently replaced by a Neanderthal population (represented by Apidima 2) by about 170,000 years ago," said Prof Stringer.

People living outside Africa today trace their ancestry to a migration that left the continent 60,000 years ago.

As these modern humans expanded across Eurasia, they largely replaced other species they encountered, such as the Neanderthals and Denisovans.

But this wasn't the first migration of modern humans (*Homo sapiens*) from Africa.

Homo sapiens fossils from Skhul and Qafzeh in Israel were dated in the 1990s to between 90,000 and 125,000 years ago.

These were viewed as anomalies - a brief foray outside our African homeland that came to very little.

However, in recent years, we've come to understand that our species ranged outside Africa even earlier and further than we'd previously believed.

In the last few years, palaeontologists have discovered modern human fossils from Daoxian and Zhirendong in China dating to between 80,000 and 120,000 years ago.

DNA studies have turned up signs of early interbreeding between African humans and Neanderthals. Evidence from German Neanderthals shows that mixing occurred between 219,000 and 460,000 years ago, although it's not clear if *Homo sapiens* was involved, or another early African group.

"The movement of the people into Europe, that was actually was a warm stage - Marine Isotope Stage 7 - when it did warm up. So that may have been a reason why the population was able to expand into Europe at that time," said Prof Stringer.

"Soon afterwards, we get a much colder stage starting. Possibly, climate change was a reason why the group died out and Neanderthals re-established themselves."

On the affinities of the Apidima 1 skull, Prof Stringer says: "It's obviously only on the parts preserved. We have to be careful, it is only on the back of the skull, the front might have been more primitive, who knows. But going on what we've got it can be diagnosed as a modern human going on the parts preserved.

"If we're right about it, there must be some more evidence of this population and ones like it, still to be discovered."

Please visit the site: <https://www.bbc.com/news/science-environment-48913307>

9,000-YEAR-OLD CITY JUST UNEARTHED NEAR JERUSALEM IS A ‘GAME CHANGER’ FOR ARCHAEOLOGISTS

An archeologist excavation project in Motza near Jerusalem has uncovered an extensive 9,000-year-old settlement called “a game-changer.” The site was saved when builders surveyed it before their planned construction of a highway, according to the Australian Broadcasting Corporation.

The Neolithic settlement predates Britain’s Stonehenge monument, during which time “more and more” human populations transitioned from continuous migration to more permanent communities.

Co-director of the Motza excavations, Jacob Vardi, claimed the knowledge gathered from this discovery gives archaeologists their “Big Bang” moment regarding this particular stage of human history.

“It’s a game-changer, a site that will drastically shift what we know about the Neolithic era,” said Vardi. The research team estimated a population between 2,000 and 3,000 people once lived in the settlement — “an order of magnitude that parallels a present-day city,” the team said.

Spanning dozens of acres, the town sits about three miles northwest of the center of Jerusalem. According to The Times Of Israel, most experts thought the area was uninhabited during this particular prehistoric period — until just recently.

“So far, it was believed that the Judea area was empty and that sites of that size existed only on the other bank of the Jordan river, or in the Northern Levant,” a joint statement by Vardi and archaeologist Hamoudi Khalaily read.

“Instead of an uninhabited area from that period, we have found a complex site, where varied economic means of subsistence existed, and all these only several dozens of centimeters below the surface.”

For Lauren Davis, an archaeologist with the Israel Antiquities Authority, the site is a wealth of contextual data — and one that will reap priceless rewards yet unknown.

“This is most probably the largest excavation of this time period in the Middle East, which will allow the research to advance leaps and bounds ahead of where we are today, just by the amount of material that we are able to save and preserve from this site,” she said.

In terms of the actual remnants and excavated artifacts produced by the dig, the team exposed sizable buildings, alleys, burial plots, and evidence of fairly sophisticated urban planning. The team also found storage sheds that held miraculously well-preserved lentil seeds and legumes.

“This finding is evidence of intensive practice of agriculture,” the Israel Antiquities Authority said.

Thousands of arrowheads, a collection of flint tools, axes, sickle blades, and knives were discovered at Motza, as well. Alongside evidence of domesticated animals, the uncovered artifacts indicated a people in transition — teetering between hunter-gatherer and agricultural lifestyles.

“Animal bones found on the site show that the settlement’s residents became increasingly specialized in sheep-keeping, while the use of hunting for survival gradually decreased,” the organization said.

The ancient people of Motza also kept domesticated goats, which researchers theorized were traded with people in Turkey, Jordan, and around the Red Sea. Signs of cow and pig farming were found, too, while the animal remains showed these people hunted gazelle, deer, wolves, and foxes.

The unexpectedly large buildings uncovered in this dig included areas for rituals, with some even containing plaster floors. The alleyways between structures denoted an advanced level of city design for the time, which was another welcome surprise for the excavation team.

As might be expected in the discovery of an ancient community’s settlement, evidence of human burials — replete with offerings postulated to accompany the dead into the afterlife — were found, as well. Some of these goods, like obsidian beads, came from Turkey, while others, like some seashells, came from the Red Sea many miles away.

“Based on the data that we have and from the fauna, we have a pretty good notion that the people at the site were farmers and they were specialists in what they did,” said Vardi, adding that it was clear why this area was so desirable.

The Motza site — which is about 30 to 40 hectares big, or one-tenth of a square mile — is near a large spring of freshwater, with a few smaller ones scattered about nearby.

As it stands, the excavation project is far from finished. The team plans on publishing numerous research papers and articles for the public on its website, while some of the priceless artifacts are installed in yet-to-be identified museums.

In other words, at some point, you’ll hopefully be able to see the 9,000-year-old things you’ve just read about for yourself.

Please visit the site: <https://www.archaeology-world.com/a-game-changer-vast-developed-9000-year-old-settlement-found-near-jerusalem/?fbclid=IwAR3gNFtMmkvuAd8QfmiPSFVbLlodjPUM0nbKgJUZHDWg6xuLvtEihXBUFNg>

SCIENTIST BELIEVES SHE’S FOUND THE RECIPE FOR ANCIENT ROMAN CONCRETE USED 2,000 YEARS AGO, BY J-P MAURO

The concrete of ancient Rome was stronger, longer lasting, and more environmentally friendly than the mix we use today.

Scientists have long puzzled over the elusive recipe for ancient Roman concrete, which has withstood the test of time better than any of the concrete that’s been poured in the 20th century. Now, [Time reports that Maria Jackson from the University of Utah](#) claims to have unravelled the mystery, and furthermore believes that the ancient Roman process could influence modern-day construction.

Jackson’s findings, published in [American Mineralogist](#), claim the unbreakable strength of ancient Roman concrete is due to a rare chemical reaction that takes place when the mineral aluminium tobermorite is exposed to sea water. The reaction strengthens the mortar and prevents cracks from forming or widening.

The longer the concrete is submerged in sea water, the stronger it becomes, as a mineral mixture of silica oxides and lime grows between the volcanic rock aggregate, which in turns hardens all the components into a single, unyielding piece. [Jackson explained how this is different](#) from our current concrete to Time:

“Contrary to the principles of modern cement-based concrete, the Romans created a rock-like concrete that thrives in open chemical exchange with seawater.” She said, adding, “It’s a very rare occurrence in the Earth.”

This may explain the ancient observation of the Roman scientist Pliny the Elder, who wrote in 79 AD that the concrete, “as soon as it comes into contact with the waves of the sea and is submerged, becomes a single stone mass, impregnable to the waves and every day stronger.”

The Pantheon in Rome, still in use over 2,000 years after it was built, is a testament to the strength of ancient Roman concrete. Once a Roman temple, it has been in continuous use throughout history, and since the 7th century has been used as a church dedicated to “St. Mary and the Martyrs.”

Jackson notes that the Roman process was actually much more eco-friendly than our modern method, which is known to produce carbon dioxide. She believes that the old ways of concrete production could teach us a lot, but she notes that the ancient Romans had a greater access to volcanic ash, a primary ingredient, than most countries do today.

Jackson said she is currently experimenting with several substances that could act as a substitute for volcanic ash in the concoction, which would also require lime, sea water, and aluminium tobermorite. She has also proposed that the construction of a planned tidal lagoon in the United Kingdom utilize the ancient Roman concrete in place of steel.

She said that the ancient concrete would be ideal for the tidal lagoon, as the concrete would strengthen with the tide, rather than deteriorating over time. However, she did note that it would take about 120 years to know if the recipe will stand the test of time as well as that of the Romans.

Either way, she believes the ancient concrete would last at least twice as long as our modern concrete.

Please visit the site: <https://aleteia.org/2019/07/16/scientist-believes-shes-found-the-recipe-for-ancient-roman-concrete-used-2000-years-ago/?fbclid=IwAR3WibwpKLI9jFiAKRP4MMwy7szSJpfA0vLtoVxEzKIWpHv6HXbl0K3bt3I>

ALL THINGS ASSYRIAN - ANCIENT BABYLONIAN ASTRONOMERS WERE WAY AHEAD OF THEIR TIME, BY K. N. SMITH

According to a newly translated cuneiform tablet, ancient Babylonian astronomers were the first to use surprisingly modern methods to track the path of Jupiter.

The purpose of four ancient Babylonian tablets at the British Museum has long been a historical mystery, but now it turns out that they describe a method that uses figures on a graph to calculate the motion of Jupiter. It's a technique that historians previously thought no one came up with until medieval Europe, and it's a staple of modern astronomy, physics and math.

Tracking Jupiter's Motion

Because they're so far away, the position of the stars doesn't change much from our point of view, even as Earth moves around the sun.

Planets, however, are much closer, so changes in relative position are more apparent. That's why, throughout the year, the visible planets seem to move against the background of the stars.

According to the method described in four of the tablets, Babylonian astronomers plotted a 60-day portion of Jupiter's wandering path across the sky on a graph, with time plotted on one axis and velocity

-- how many degrees Jupiter's path shifted each day -- on the other.

The figure on the resulting graph described looks like a trapezoid, and the area of that trapezoid is the total distance Jupiter travels in 60 days.

None of the four tablets actually show the trapezoid graph, but their text describes it in detail, from the method of plotting to the length of each of the trapezoid's sides. It's a bit like a geometry textbook with the actual figures missing, but the method described would be familiar to any 21st century physicist.

"Anyone who studies physics or math is familiar with graphs of velocity against time, and they're familiar with integral calculus, where you compute areas under curves -- you compute areas under figures -- and if you do that with velocity against time, you get distance traveled by the body," says astronomical historian Mathieu Ossendrijver. "In modern physics, it's really unthinkable not to have this method of having integral calculus. It's just so central to modern physics and modern math."

Ancient Mystery Solved

It has taken 150 years for modern scholars to realize that these four tablets were actually about astronomy. It took a fifth tablet, which Ossendrijver calls "tablet A," to solve the mystery. Tablet A describes a set of arithmetic calculations to chart Jupiter's movement, but it uses the same numbers and produces the same results as the trapezoid method discussed in the other four tablets.

Ossendrijver realized that the tablets were describing the same calculation, done in two different ways.

"If you think of this in modern terms, and if you plot this in the modern way, then you get a trapezoid, and you get exactly the trapezoid that's talked about on the other tablets, so this is how I was able to crack these other tablets," he said.

The ancient Greeks also used geometry to compute the movement of stars and planets, but in a much more concrete way; for instance, if a Greek astronomer wanted to plot the orbit of a planet, he drew a circle.

Using figures on graphs is much more abstract thinking.

"We've got a figure that is defined in abstract mathematical space. On the one axis you have time, on the other axis you have velocity, and that's really new," said Ossendrijver. He published his work Thursday in the journal *Science*.

Unanswered Questions Remain

Jupiter's path would have been quite important to Babylonian astronomers. Ancient Babylonia revered dozens of major and minor gods, but by 350 BCE, the supreme god of them all was Marduk, whose temple stood in the city of Babylon, and Jupiter was Marduk's sacred star.

One big question remains: Was this method common in Babylonian astronomy, or were these tablets the work of a few forward-thinking geniuses? There are about 4,000 to 5,000 other astronomical texts among the Babylonian tablets at the British Museum, and so far none of them have mentioned using geometry or graphs to do astronomical computation, but many other tablets still haven't been translated.

In fact, modern researchers don't even know exactly where the tablets came from. They were shipped en masse to the British Museum from Iraq during the late 1800s, at a time when archaeology was mostly about treasure hunting rather than science. No one at the time bothered to record whether the tablets had been found in the ruins of a temple, a government building or a Babylonian scholar's private library. It's impossible to know who used these astronomical calculations, or for what purpose.

When Babylonian culture faded away around 100 AD, some of its astronomical knowledge survived among the scholars of Greece, but the trapezoid method was lost. Astronomers had to wait over a thousand years for scholars in medieval Europe to independently devise the same method again.

Please visit the site: <http://www.aina.org/ata/20190720135324.htm>

MARBLE PYRAMID ISLAND UNCOVERED, REVEALING ORIGINS OF ANCIENT GREECE, BY ASSIL GIACHEIA

Archaeologists have found the earliest monumental complex of buildings ever unearthed anywhere in the Greek World

It is evidence of a rich cultural and monumental landscape dating earlier than the Minoan period on a remote and uninhabited pyramid-shaped islet.

The islet of Daskalio, is located just off the coast of the island of Keros, which is one of the Cyclades islands in the Aegean Sea, and was once part of Keros before sea-levels rose.

The sculptures and secrets uncovered in the ongoing excavations could unlock the door to thousands of years of history (Badisches Landesmuseum, Karlsruhe, Germany)

The long-buried structure, dating back at least 4,600 years, was constructed of marble transported from nearby Aegean islands on tiny wooden ships.

“It is by far the largest prehistoric marine transport operation that has ever come to light anywhere in the world,” said Dr. Julian Whitewright, a leading maritime archaeologist at the University of Southampton, told the Independent.

“It demonstrates quite clearly just how important, and integral to their culture, seafaring was to these early Bronze Age Aegean people.”

The huge quantity of white marble, up to 10,000 tonnes, was shipped from Naxos, an island some six-and-a-half miles away. Archaeologists estimate that it would have required over 3,500 trips with 24 sailors rowing solidly for five hours in open water.

It was part of a worldwide explosion of monumental building – the ruined pyramid of Dhaskalio is roughly the same age as Stonehenge, the lost city of Eridu in Iraq, and the earliest pyramids in Egypt.

The pyramid structure seems to have occurred independently to the Greeks and Egyptians, and a little later the Aztecs, as the ideal shape for monumental building.

The artistic genius of a 5,600-year-old ancient culture: this 1.5m-tall marble statue is the largest known example of Cycladic sculpture (National Archaeological Museum of Athens)

It is believed that the pyramid-islet was a religious site that attracted pilgrims, as small sculptures which may have been left as offerings have been found by archaeologists. Elsewhere on the island, innumerable knives and tools have been found.

Michael Boyd of Cambridge University's McDonald Institute for Archaeological Research, who is a co-director of the investigation, told the Independent: "Our investigation has been transforming our understanding of early Bronze Age Cycladic culture and suggests that these very early Greeks were organisationally, technically and politically much more advanced than previously thought."

Daskalio has been the subject of intense archaeological investigations since 2015 when an undisturbed site was located.

The research is being carried out by a multinational team, supported by the Greek government and the British School in Athens. The large-scale project is being funded by several international institutes.

Please visit the site: <https://greece.greekreporter.com/2019/07/13/marble-pyramid-island-uncovered-revealing-origins-of-ancient-greece/>

A CASE FOR RELIGION IN THE PREHISTORIC MEDITERRANEAN, BY TALA JARJOUR

Until recently, archaeologists thought that settled civilization evolved as a result of agriculture. Once tied to land, humans eventually developed technologies for building clustered structures that were meant to withstand the elements and last some duration of time. Social life, according to this theory, was a subsequent development.

A relatively recent discovery, however, has put that narrative into question, proposing instead different scenarios for why human groups erected structures that they used collectively. The discovery is Gobekli Tepe, an estimated 12,000-year-old site buried under shallow land on a hilltop in the Anatolia region of Turkey.

This discovery makes a case for social life, or sophisticated collective interaction, as an earlier instigator of human settlement. Findings in Gobekli Tepe suggest that ceremonious gathering, ritual, or some other form of assembly may have existed before people cultivated seeds.

The site was excavated by the Turkey-based German Archaeological Institute in the mid-1990s. Gobekli Tepe contains large stone pillars of different sizes. The most striking are T-shaped pillars that are thought to mimic the human form.

Some of these megaliths measure as high as 20 feet, and most have exquisite carvings and reliefs, mostly of animals. The beauty and state of preservation of these forms are simply stunning. Archaeologists think that the site was deliberately buried, probably not long after it was constructed, but they do not know why.

It is estimated that a mere 5-10 percent of the site has been unearthed so far, according to archaeological predictions and radar technology. Archaeologists also estimate that around 250 pillars are still underground, compared to the 43 that have been uncovered. The site sits 6 miles from Urfa, a city in southeast Turkey.

Urfa has strong significance in the religious history of the region. For Judaism, Christianity and Islam, important events took place there. So the modern city has many holy sites today, some bearing witness to other ancient religions as well.

With no evidence of human settlements in the prehistoric era of Gobekli Tepe, speculation has been mounting as to who created the structure and why. Theories vary widely. One scenario is that the site was built by a group of technologically advanced people that either were killed by hunter-gatherers or left the area soon after they constructed the site.

Another assumption proposes a cataclysm that caused the extinction of a developed civilization that had lived close to the site along with many other civilizations to whom it had imparted agricultural and other skills before all was destroyed.

Without evidence of agriculture or residential settlements around the site (there is evidence nearby of animal consumption by humans), archaeologists can only speculate that it was built by hunter-gatherers who used it for some kind of ritual.

One of the most widely circulated explanations of this unique site is that it was a place of worship, a temple of sorts. Without evidence of agriculture or residential settlements around the site (there is evidence nearby of animal consumption by humans), archaeologists can only speculate that it was built by hunter-gatherers who used it for some kind of ritual. Burial rites and ancestor worship bear reference to nearby sites, but none date as early as this one.

What most theories seem to agree upon is that the structure was used as a place of assembly. This proposition is based on a number of features, such as the circular formations in which the columns are arranged, and the animal figurines on their surfaces. The carefully carved shapes have naturalistic and sacrificial overtones in our understanding of ritual, or what in many contemporary cultures is considered religion.

I visited the site in 2014, and found it covered by sheds that made a full view difficult but shaded the digging site from direct sunlight. The pillars appeared to be uniquely decorated, with elaborate or minimalist carvings of patterned shapes and animals, ranging from insects to large animals. My favorite was what I thought was a frog. But there were more serious animals as well, such as lions and bulls, references to which abound in ancient Mesopotamian mythology and religions. Turkish President Recep Tayyip Erdogan declared last year that 2019 is the year of Gobekli Tepe. Hopefully the scaffolding has been reduced for visitors to enjoy a better view.

Historians tend to go by material evidence, which they select and examine carefully before they construct historical narratives — retrospectively — based on possible scenarios. If agriculture was indeed the initial instigator behind the formation of human societies, as has long been thought, then a discovery such as Gobekli Tepe introduces alternative scenarios for why and when human groups became attached to land or built sophisticated things on it.

If indeed assembly was the purpose, then humankind has valued being together more than we think. What is more, if groups of people got together for purposes of worship, then they have valued being close to the powers they feared or adored, also more than we think.

Whatever those ancestors were doing 12,000 years ago in the environs of Urfa, a different thought preoccupied me as I wandered around the pillars. I was trying to imagine the kind of acoustics this place might have had. To this anthropologist of music and religion, the central question was what types of sounds, or song, may have reverberated on these exquisitely carved surfaces.

• Tala Jarjour is author of “Sense and Sadness: Syriac Chant in Aleppo.” She is a visiting research fellow at King’s College London, and an associate fellow at Pierson College, Yale.

Please visit the site: <http://www.arabnews.com/node/1528386>

DAIRY FARMING - THE ANCIENT HISTORY OF PRODUCING MILK - 8,000 YEARS OF DRINKING MILK, BY K. KRIS HIRST

Milk-producing mammals were an important part of early agriculture in the world. Goats were among our earliest domesticated animals, first adapted in western Asia from wild forms about 10,000 to 11,000 years ago. Cattle were domesticated in the eastern Sahara by no later than 9,000 years ago. We surmise that at least one primary reason for this process was to make a source of meat easier to get than by hunting. But domestic animals also are good for milk and milk products like cheese and yogurt (part of what V.G. Childe and Andrew Sherratt once called the Secondary Products Revolution). So—when did dairying first start and how do we know that?

The earliest evidence to date for the processing of milk fats comes from the Early Neolithic of the seventh millennium BC in northwestern Anatolia; the sixth millennium BC in eastern Europe; the fifth millennium BC in Africa; and the fourth millennium BC in Britain and Northern Europe (Funnel Beaker culture).

Dairying Evidence

Evidence for dairying—that is to say, milking dairy herds and transforming them into dairy products such as butter, yogurt, and cheese—is only known because of the combined techniques of stable isotope analysis and lipid research. Until that process was identified in the early 21st century (by Richard P. Evershed and colleagues), ceramic strainers (perforated pottery vessels) were considered the only potential method of recognizing the processing of dairy products.

Lipid Analysis

Lipids are molecules which are insoluble in water, including fats, oils, and waxes: butter, vegetable oil, and cholesterol are all lipids. They are present in dairy products (cheese, milk, yogurt) and archaeologists like them because, under the right circumstances, lipid molecules can be absorbed into ceramic pottery fabric and preserved for thousands of years. Further, lipid molecules which are from milk fats from goats, horses, cattle, and sheep can be easily distinguished from other adipose fats such as that produced by animal carcass processing or cooking.

Ancient lipid molecules have the best chance of surviving for hundreds or thousands of years if the vessel was used repeatedly for producing cheese, butter or yogurt; if the vessels are preserved near the production site and can be associated with the processing; and if the soils in the vicinity of the site where the sherds are found are relatively free-draining and acidic or neutral pH rather than alkaline.

Researchers extract lipids from the fabric of the pots using organic solvents, and then that material is analyzed using a combination of gas chromatography and mass spectrometry; stable isotope analysis provides the origin of the fats.

Dairying and Lactase Persistence

Of course, not every person on the earth can digest milk or milk products. A recent study (Leonardi et al 2012) described genetic data concerning the continuation of lactose tolerance in adulthood. The molecular analysis of genetic variants in modern people suggests that the adaptation and evolution of the ability of adults to consume fresh milk occurred rapidly in Europe during the transition to agriculturalist lifestyles, as a byproduct of the adaptation to dairying. But the inability of adults to consume fresh milk may also have been a spur to inventing other methods for using milk proteins: cheese making, for example, reduces the amount of lactose acid in dairy.

Cheese-Making

Producing cheese from milk was clearly a useful invention: cheese may be stored for a longer period than raw milk, and it was definitely more digestible for the earliest farmers. While archaeologists have found perforated vessels on early Neolithic archaeological sites and interpreted them as cheese strainers, direct evidence of this use was first reported in 2012 (Salque et al).

Making cheese involves adding an enzyme (typically rennet) to milk to coagulate it and create curds. The remaining liquid, called whey, needs to drip away from the curds: modern cheesemakers use a combination of a plastic sieve and a muslin cloth of some sort as a filter to perform this action. The earliest perforated pottery sieves known to date are from Linearbandkeramik sites in interior central Europe, between 5200 and 4800 cal BC.

Salque and colleagues used gas chromatography and mass spectrometry to analyze organic residues from fifty sieve fragments found on a handful of LBK sites on the Vistula River in the Kuyavia region of Poland. Perforated pots tested positive for high concentrations of dairy residues when compared to cooking pots. Bowl-form vessels also included dairy fats and may have been used with the sieves to collect the whey.

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HUMANS INTERBRED WITH FOUR EXTINCT HOMININ SPECIES, RESEARCH FINDS

As anatomically modern *Homo sapiens* migrated out of Africa and around the rest of the world, they met and interbred with at least four different hominin species, according to new research from the University of Adelaide, Australia. Strikingly, of these hominins, only Neanderthals and Denisovans are currently known; the others remain unnamed and have only been detected as traces of DNA surviving in different modern populations.

“Each of us carry within ourselves the genetic traces of these past mixing events,” said [Dr. João Teixeira](#), co-author of a [paper](#) published in the *Proceedings of the National Academy of Sciences*.

“These archaic groups were widespread and genetically diverse, and they survive in each of us. Their story is an integral part of how we came to be.”

“For example, all present-day populations show about 2% of Neanderthal ancestry which means that Neanderthal mixing with the ancestors of modern humans occurred soon after they left Africa, probably around 50,000 to 55,000 years ago somewhere in the Middle East.”

But as the ancestors of modern humans traveled further east they met and mixed with at least four other groups of archaic humans.

“Island Southeast Asia was already a crowded place when what we call modern humans first reached the region just before 50,000 years ago,” Dr. Teixeira said.

“At least three other archaic human groups appear to have occupied the area, and the ancestors of modern humans mixed with them before the archaic humans became extinct.”

In their new research, Dr. Teixeira and his colleague, [Professor Alan Cooper](#), analyzed genetic, archaeological and fossil evidence as well as additional information from reconstructed migration routes and fossil vegetation records.

The scientists found there was a mixing event in the vicinity of southern Asia between anatomically modern humans and a group they named Extinct Hominin 1 (EH1).

Other interbreeding occurred with Denisovans in Island Southeast Asia and the Philippines, and with another group — named Extinct Hominin 2 (EH2) — in Flores, Indonesia.

We knew the story out of Africa wasn’t a simple one, but it seems to be far more complex than we have contemplated,” Dr. Teixeira said.

“The Island Southeast Asia region was clearly occupied by several archaic human groups, probably living in relative isolation from each other for hundreds of thousands of years before the ancestors of modern humans arrived.”

“The timing also makes it look like the arrival of modern humans was followed quickly by the demise of the archaic human groups in each area.”

*João C. Teixeira & Alan Cooper. Using hominin introgression to trace modern human dispersals. *PNAS*, published online July 12, 2019; doi: 10.1073/pnas.1904824116

Please visit the site: http://www.sci-news.com/othersciences/anthropology/humans-hominin-introgression-07438.html?fbclid=IwAR1QxlgL15-1lew2A1LNLvnd420o915vQtcBYOpbozonZtxeQNvwwGwwKvk#.XT_fm0K4yVg.facebook [Go there for pix]

ARCHAEOLOGISTS DOCUMENT THE OLDEST KNOWN FORERUNNERS OF FRESCO PAINTINGS IN THE MEDITERRANEAN REGION, BY EBERHARD KARLS

Researchers from the Universities of Beirut and Tübingen have analyzed 4000-year-old murals in a Bronze Age palace in Lebanon.

Archaeologists from the American University of Beirut and the University of Tübingen have documented the oldest large-area wall paintings from the Ancient Near East. The first parts of the paintings were discovered in 2005 in the ruins of a Bronze Age palace in southern Lebanon, on the Mediterranean coast south of Sidon. In the following years, the paintings on large wall surfaces were uncovered and preserved; the researchers have now published their results in a book.

Professor Jens Kamlah of the Institute of Biblical Archaeology at the University of Tübingen describes how, in this early stage of fresco painting, the colors were applied to the walls – some time around 1900 B.C.E. This is the earliest known evidence of a preliminary form of the fresco technique in the entire Mediterranean region. The project was headed by Kamlah and the Lebanese archaeologist Professor Hélène Sader. They were supported by the German Archaeological Institute as a cooperation partner, under the scientific director, Dr. Dr. Margarete van Ess.

The German-Lebanese team of archaeologists discovered the palace in 2001 at the Tell el-Burak site south of Sidon, and had fully excavated it by 2011. The paintings were found on the walls inside the largest room, which measured seven by 14 meters. The researchers say the palace was built around 1900 B.C.E. and was in use for some 200 years.

The paintings show a geometric frieze as well as a hunting scene, a procession, and a “tree of life.” Comparable motifs are known from the Ancient Near Eastern and Egyptian iconography, says Julia Bertsch from the University of Tübingen, a member of the team who has been investigating the paintings. She says the technique may be seen as a preliminary stage of the fresco because the preliminary drawings were applied to the still-damp plaster. By contrast, in the fully developed fresco technique, the paintings in their entirety are applied to the fresh plaster.

As the plaster dries, the paints combine permanently with the substrate. “It was previously assumed that this technique was developed several centuries later in Minoan-Aegean palace paintings. These finds from Tell el-Burak show us that, at the very least, important steps in the development of the technique were made in the Near East,” says Bertsch.

An analysis of the paints showed that one of the colors used was Egyptian blue. This hardly ever occurs naturally, but it was produced and used in ancient Egypt from the

third millennium B.C.E. “This shows that there were close ties between today’s southern Lebanon and the Egyptian Empire at that time,” Kamlah says. “The paintings could have been created by Egyptian artists. In any case, they testify to an early form of cultural exchange and knowledge transfer in the Eastern Mediterranean.”

Complex architecture and static problems

The palace walls are partly preserved to their original height of about 3.5 meters. “This is particularly remarkable because they are made of air-dried clay bricks that are around 4,000 years old,” Kamlah explains. This complete preservation was a stroke of luck and only possible because the room was completely filled with sand, gravel and clay from floor to ceiling around 1800 B.C.E.

The doors were blocked up with clay bricks. “The palace stood on a 17-meter-high artificial mound directly on the beach. The wing on the sea side was originally located on a lower terrace than the other rooms. We assume that this led to static problems. The walls on the lower level, which included the room with the murals, were deformed by the pressure of the higher terrace. The lower rooms were filled in to stabilize,” Kamlah says. As a result, the paintings were extensively preserved, but are very fragile. “They had to be uncovered by specially trained experts – in small sections and very carefully.

Gradually, the researchers were able to see the big picture: a geometric frieze divides the long side of the room into an upper and a lower register. It is made of diamonds and is framed by two bands of alternating colors. In the upper register, a hunting scene is visible in which two hunting dogs drive a herd of gazelles towards a hunter who has already shot one of the animals. In the lower register, three striding men and other people are visible in a procession scene. A third scene is arranged three-dimensionally in a corner of a room with a rising floor. The painting shows a tree on a hill in which a blue animal has placed its front hooves and eats. The animal’s head is not preserved.

The painting also covers parts of the floor, and in the corner of the room the tree’s branches stretch out on both walls. “The motif corresponds to Ancient Near Eastern representations of the “tree of life,” which represents the fertility of the divinely created order,” Kamlah explains. All three motifs correspond to Ancient Near Eastern and Egyptian iconography, which idealized kings, rulers and members of the elite.

The almost 4,000-year-old wall paintings testify to an era of artistic richness in the south of present-day Lebanon in the Middle Bronze Age (approx. 2000-1550 B.C.E.). “Until now, very little was known about the people of that time. The German-Lebanese excavations show that there must have been an economically and culturally flourishing city-kingdom in Sidon. Since we have found no signs of major upheavals in the population, we can assume that these people were ancestors of the Phoenicians who later inhabited the area,” Kamlah concludes.

Please visit the site: <https://www.heritagedaily.com/2019/07/archaeologists-document-the-oldest-known-forerunners-of-fresco-paintings-in-the-mediterranean-region/124330?fbclid=IwAR2stgXxc3h9Obc4SSHNO2G67Tu5CfZ-GlhGGo30vxBPUNjFs83l5ksYCjE> [Go there for pix]

MOVE OVER, DNA: ANCIENT PROTEINS ARE STARTING TO REVEAL HUMANITY'S HISTORY, BY MATTHEW WARREN

Proteins dating back more than one million years have been extracted from some fossils, and could help to answer some difficult questions about archaic humans.

Some time in the past 160,000 years or so, the remains of an ancient human ended up in a cave high on the Tibetan Plateau in China. Perhaps the individual died there, or parts were taken there by its kin or an animal scavenger. In just a few years, the flesh disappeared and the bones started to deteriorate. Then millennia dripped by. Glaciers retreated and then returned and retreated again, and all that was left behind was a bit of jawbone with some teeth. The bone gradually became coated in a mineral crust, and the DNA from this ancient ancestor was lost to time and weather. But some signal from the past persisted.

Deep in the hominin's teeth, proteins lingered, degraded but still identifiable. When scientists analysed them earlier this year, they detected collagen, a structural support protein found in bone and other tissues. And in its chemical signature was a single amino-acid variant that isn't present in the collagen of modern humans or Neanderthals — instead, it flagged the jawbone as belonging to a member of the mysterious hominin group called Denisovans¹. The discovery of a Denisovan in China was a major landmark. It was the first individual found outside Denisova Cave in Siberia, where all other remains of its kind had previously been identified. And the site's location on the Tibetan Plateau — more than 3,000 metres above sea level — suggested that Denisovans had been able to live in very cold, low-oxygen environments.

But the finding also marked another milestone: it was the first time that an ancient hominin had been identified using only proteins.

It is one of the most striking discoveries yet for the fledgling field of palaeoproteomics, in which scientists analyse ancient proteins to answer questions about the history and evolution of humans and other animals. Proteins, which stick around in fossils for much longer than DNA does, could allow scientists to explore whole new eras of prehistory and use molecular tools to examine bones from a much broader part of the world than is currently possible, according to the field's proponents.

Previously, scientists had recovered proteins from 1.8-million-year-old animal teeth and a 3.8-million-year-old eggshell. Now, they hope that palaeoproteomics could be used to provide insights about other ancient hominin fossils that have lost all traces of DNA — from *Homo erectus*, which roamed parts of the world from about 1.9 million to 140,000 years ago, to *Homo floresiensis*, the diminutive 'hobbit' species that lived in Indonesia as recently as 60,000 years ago. By looking at variations in these proteins, scientists hope to answer long-standing questions about the evolution of ancient human groups, such as which lineages were direct ancestors of *Homo sapiens*. "I think that you can basically unlock the whole of the human tree," says Matthew Collins, a bioarchaeologist at the

University of Copenhagen who has been at the forefront of the field since the 1980s, when it consisted of just a handful of researchers.

A coming of age

Despite the excitement, some argue that researchers could struggle to paint a definitive picture of human history from the information that researchers can get out of proteins, which is limited compared with that obtainable from DNA. And many worry that palaeoproteomics in general might be susceptible to spurious results, stemming from issues such as contamination. “You see very good research, and then you see people that publish things that are just very strange, because they don’t think critically about the methods,” says Philipp Stockhammer, an archaeologist at the Ludwig Maximilian University of Munich in Germany.

Over the past two decades, DNA retrieved from ancient fossils has transformed scientists’ understanding of human evolution. Analysis of the similarities and differences in the DNA of different hominin groups has allowed researchers to map out the tangled family tree in a way that was previously not possible. And genetic material has led to some major finds, such as the discovery of Denisovans in the first place.

But glaring gaps remain in that picture. DNA has been sequenced from just three groups of hominin: Neanderthals, Denisovans and *Homo sapiens*, mostly from specimens that are less than 100,000 years old (a notable exception is a pair of 430,000-year-old early Neanderthals from Spain²). Go a few hundred thousand years further back, and things get much murkier. This was a time period when a lot of exciting things were happening, says Frido Welker, a molecular anthropologist at the University of Copenhagen. It’s when Denisovans and Neanderthals branched off from the lineage that would become modern humans, for example. But it remains a hazy part of human history. Researchers don’t know, for instance, whether the ancient hominin *Homo heidelbergensis*, which lived around 700,000–200,000 years ago, was an ancestor of both *H. sapiens* and Neanderthals or part of only the Neanderthal branch, as some have suggested. “A lot of that happens beyond the reach of ancient DNA,” says Welker.

Go back one million years or more, and things get even less clear. *H. erectus*, for example, first emerged in Africa around 1.9 million years ago, but without DNA evidence, it remains uncertain exactly how it is related to later hominins, including *H. sapiens*.

Ancient DNA has also left geographical blind spots. DNA degrades faster in warm environments, so although a 100,000-year-old specimen found in a cold Siberian cave might still harbour genetic material, a fossil that has spent that long in the heat of Africa or southeast Asia generally will not. As a result, little is known about the genetics of even relatively recent hominins from these regions, such as *H. floresiensis*.

Now researchers are hoping that protein analysis might begin to fill in some of those blanks. The idea is not new: as early as the 1950s, researchers had reported finding amino acids in fossils. But for a long time, the technology needed to sequence ancient proteins just didn’t exist. “For most of my career, I honestly, genuinely believed that we would not be able to recover ancient protein sequences,” says Collins.

That changed in the 2000s, after researchers realized that mass spectrometry — a technique used to study modern proteins — could also be applied to ancient proteins. Mass spectrometry essentially involves breaking down proteins into their constituent peptides (short chains of amino acids) and analysing their masses to deduce their chemical make-up.

Researchers have used this method to sift through hundreds of bone fragments to identify the types of animal they came from. In this specific approach, called zooarchaeology by mass spectrometry or ZooMS, researchers analyse one kind of collagen. The mass of collagen's components differs in various groups and species, providing a characteristic fingerprint that allows researchers to identify the bone's source.

ZooMS was used in a 2016 paper³ to identify one hominin bone among thousands of fragments from Denisova Cave — a bone that DNA analysis would later show belonged to a hybrid individual, nicknamed Denny, with a Neanderthal mother and a Denisovan father. Even with that result alone, ancient protein analysis had already substantially expanded our view of human evolution, says population geneticist Pontus Skoglund at the Francis Crick Institute in London. Katerina Douka, an archaeologist at the Max Planck Institute for the Science of Human History in Jena, Germany, is now using the technique to search through 40,000 unidentified bone fragments from Asia in the hope of uncovering more ancient hominins.

But ZooMS paints a picture only in broad brushstrokes. Once a bone is identified as belonging to a hominin, for example, other techniques are needed to delve deeper. So others have turned to shotgun proteomics, which aims to identify all the protein sequences in a sample — its proteome. The composition of the proteome depends on the kind of tissue being examined, but will often include various forms of collagen. This method spits out thousands of signals, which makes it much more informative than ZooMS, says Douka, but also trickier to interpret. By matching these signals to known sequences in databases, researchers can identify the exact sequences of collagen or other proteins in their sample.

Scientists can then compare this newly determined protein sequence to the same protein from other hominin groups, looking for similarities and differences in individual amino acids that will help to place the hominin on the family tree. This is similar to how ancient-DNA researchers look at single-letter variations in genetic sequences.

Filling in the gaps

Although researchers had used protein analysis alongside ancient DNA sequencing before⁴, the Tibetan Denisovan was the first ancient hominin for which proteins alone were analysed — and others could soon follow (see 'Getting fossils to speak'). A look at the protein sequences from *H. heidelbergensis*, for example, could clarify its relationship to *H. sapiens* and Neanderthals.

Debates have swirled for a decade and a half over the nature of *H. floresiensis*, remains of which were discovered on the Indonesian island of Flores in 2003. Its relationship to other hominins is unclear, with suggestions that it could be a dwarf descendant of *H. erectus*, or perhaps even that it evolved from the *Australopithecus* genus that is more

distantly related to modern humans. This group lived more than 2 million years ago, and counts the famous Lucy skeleton among its members.

Proteomics could put that mystery to bed, says Collins. “I am utterly convinced that we have *Homo floresiensis* protein around, and it will be sequenceable, and it will tell us where that fits in the family tree,” he says. The same could be true of another small hominin, *Homo luzonensis*. Its bones and teeth were discovered in a cave on the island of Luzon in the Philippines several years ago, and reported on earlier this year⁵. Similarly to *H. floresiensis*, these samples have yielded no DNA. Armand Salvador Mijares, an archaeologist at the University of the Philippines in Quezon City, says that he is planning to send Welker an animal tooth from the cave where *H. luzonensis* was found, to test the viability of analysing proteins in ancient tropical materials.

As researchers prepare to do more proteomic analysis on ancient hominins, work on other animals is already revealing much about their evolutionary relationships in the deep past.

In a recent analysis, for example, Enrico Cappellini, a palaeoproteomics specialist at the University of Copenhagen, and his colleagues used proteomics to work out where the extinct rhinoceros *Stephanorhinus* fits on the rhino family tree. As reported in a preprint that has not yet been peer reviewed⁶, the team was able to extract proteins in remains from Dmanisi, Georgia, that were nearly 1.8 million years old. The pattern of amino-acid substitutions suggests that the animal was closely related to the extinct woolly rhinoceros (*Coelodonta antiquitatis*).

Whereas the proteins of the Tibetan Denisovan came from dentine, the bony tissue inside teeth, these *Stephanorhinus* proteins were locked away in the enamel that covers the tooth. This could be particularly useful for finding very old proteins, suggests Cappellini. Enamel is the hardest material in the vertebrate body and acts as what Cappellini calls a closed system, preventing amino acids from leaching out. The 1.8-million-year-old date “doesn’t represent a limit”, he says.

In fact, others have gone further back. Researchers have reported extracting collagen sequences from a 3.4-million-year-old camel found in the Arctic⁷. And in a 2016 paper, Beatrice Demarchi, a biomolecular archaeologist at the University of Turin, Italy, and her colleagues extracted and sequenced proteins from a 3.8-million-year-old ostrich eggshell⁸. This shell wasn’t preserved in a cold polar region: it came from a site in Tanzania, where the average annual air temperature is around 18 °C, says Demarchi. “You would not expect stuff to survive in such a hot environment,” she says. Hominin proteins might be recoverable from the same places, she adds: “We’ve got to try, don’t we?”

Teething pains

There are still hurdles to overcome before ancient proteins can bring the branches of the human evolutionary tree into focus. So far, researchers have been able to deduce the sequences of ancient hominin proteins fairly easily, because they already have DNA from Neanderthals, Denisovans and *H. sapiens*. This allows them to predict the protein sequences that are likely to appear in their mass-spectrometry signals. “You can identify fragments you expect to be there from known genome sequences, from either ancient

organisms or present-day people, and look for them,” says Svante Pääbo, a palaeogeneticist at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany.

But as scientists look further back in time, they will need to work out the sequence of those amino acids without a map. That’s an ongoing challenge for ancient proteomics, because proteins are degraded into small fragments, and samples are often contaminated with modern proteins, Pääbo says.

Collins is confident that it can be done. He points to a 2015 paper² in which he, Welker and others mapped out the phylogenetic tree for South America’s native ungulates, a varied group of peculiar-looking mammals that went extinct around 12,000 years ago. With no DNA available from ungulate fossils, the team had to sequence collagen proteins from scratch to compare them with those of other animals. They found that two extinct native ungulates, *Toxodon* and *Macrauchenia*, were closely related to a group that includes horses and rhinos — and not, as some researchers had thought, the group Afrotheria, which includes elephants and manatees.

Other limitations are more fundamental. Ancient teeth and bones contain a small number of proteins, so there are relatively few chunks of information that can be used to identify a specimen. Analysis of the Tibetan Denisovan, for example, revealed sequences from eight different kinds of collagen protein, totalling slightly more than 2,000 amino acids. Just one of these amino acids differed from Neanderthal and modern human sequences, identifying the sample as Denisovan. That means that even if a researcher were able to sequence the proteins from a *H. erectus* specimen, for instance, there simply might not be enough information in the amino-acid sequences to say anything definitive about its relationship to modern or archaic humans. By comparison, a single ancient genome contains in the order of three million variants compared with any other genome, says Skoglund, and so is much more informative regarding evolution.

And because proteins often perform crucial functions — forming the structure of bone, say — they don’t always change much as species evolve. Proteins that are specific to enamel, for instance, are exactly the same in Denisovans, *H. sapiens* and Neanderthals, so can’t be used to distinguish between these groups. Welker says, however, that these proteins do vary in other great apes, and could be more informative when it comes to older hominin groups.

Still, researchers know very little about how protein sequences vary in populations of ancient humans. Scientists have sequenced only a single Denisovan genome, for example, which means that to identify the Tibetan Denisovan, the team compared the protein sequences to just one other member of that group. It could be that other Denisovans had different variants. “Many geneticists are quite sceptical of the methodology, but I think it’s because they have come a long way in understanding genomic variation in ancient populations,” says Douka.

Learning from the past

There are other challenges, too. Some researchers are concerned that the broader buzz around palaeoproteomics could result in the field falling into the same traps as the ancient-DNA field did 20 years ago. Many apparently exciting results from the 1990s

and early 2000s — the discovery of DNA from dinosaurs or insects trapped in amber, for example — later turned out to be false because they were products of contamination or other methodological errors. “I wouldn’t be surprised if this happens to the proteomics world,” says Douka.

Those leading the way in the field are aware of these problems, and many researchers are making concerted efforts to create a robust science. Among them is Jessica Hendy, an archaeologist at the University of York, UK, who is pioneering the use of proteins to study the diet of early humans. In a 2018 paper, Hendy and her colleagues identified proteins in 8,000-year-old ceramics from Çatalhöyük in modern-day Turkey, which revealed that the ancient inhabitants ate various plants and animals, and even processed milk into whey¹⁰.

“This technique is so interesting and so fascinating and is really getting a lot of attention, especially right now,” Hendy says. “We really need to be moving carefully,” she adds. Together with Welker, Hendy is lead author on a paper outlining best practices for the field, from avoiding contamination to sharing data in public repositories¹¹.

Hendy adds that there needs to be more basic research into how proteins survive and degrade over long timescales. This kind of research might not make headlines, she says, but can give researchers much more confidence in their results. She points to Demarchi’s work as an example: Demarchi found that the proteins in her 3.8-million-year-old eggshell had bound to the surface of the mineral crystals in the shell, essentially freezing them in place. “What’s cool about that is that it’s actually explaining why the proteins are surviving, which makes the finding so much more robust,” says Hendy.

Even though there are still issues to sort out, progress in the field shows no signs of slowing. And whereas human evolution might get the most attention, scientists are using ancient proteomics in all kinds of ways, from studying markers of disease in the tartar of ancient teeth¹², to investigating which animal skins were used to create medieval parchments¹³.

Demarchi says she is excited by it all. And when it comes to working out the family trees of long-extinct organisms, she says, proteomics has the potential to make waves. “I don’t think I’ll see the end of it in my lifetime,” she says. “It’s going to be really quite big”.

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Please visit the site: https://www.nature.com/articles/d41586-019-01986-x?fbclid=IwAR1k_vELfOjCa2rbPMJJ_iE6WAwWEAcQkMYWw7I5rivzPJnYgnBoFuHGSG8 [Go there for pix]

GOLIATH'S BIRTHPLACE MORE GIANT THAN BELIEVED, NEW EXCAVATIONS SHOW, BY SONIA EPSTEIN

Previous excavations at the site, known as Tell es-Safi, uncovered ruins dating to the 9th and 10th centuries BCE.

Archaeologists have discovered remains more ancient and impressive than those previously discovered at the Philistine city of Gath, where the giant Philistine warrior Goliath was born and once lived.

Previous excavations at the site, known as Tell es-Safi, uncovered ruins dating to the 9th and 10th centuries BCE, but the new discovery suggests that the city of Gath was at its height in the 11th century BCE, during Goliath's time.

Goliath was the Philistine whom David of Bethlehem, the eventual second king of Israel and Judah, famously defeated in single combat (1 Samuel: 17.) Together with Gaza, Ashkelon, Ashdod and Ekron, Gath was one of the five Philistine cities until its fall in c. 830 BCE at the hands of the Aramean king Hazael.

While archaeologists have known for decades that Tell es-Safi contained the ruins of Goliath's birthplace, the recent discovery beneath a pre-existing site reveals that his native city was a place of even greater architectural grandeur than the Gath of a century later.

For Prof. Aren Maeir of Bar-Ilan University's archaeology department, who directed the discovery at Tell es-Safi, the findings offer a way to make sense of the biblical accounts of massive giants like Goliath when no archaeological evidence exists to verify them.

"There are no skeletons of people who are taller than NBA centers," Maeir said. He suggested instead that the mythical stories of the Bible reflect how a society allegorizes the accomplishments of its ancestors, as seen through the massive structures they left behind.

"Gath was the largest city in the land of that time, and seems to have had very, very impressive architecture," Maeir said. "The Philistines were the dominant culture in the region, both politically and militarily and probably culturally."

The memory of this dominance, he said, accompanied by the presence of the society's physical remains, inspired the tradition that the inhabitants of Gath were giants, a theme that appears in other biblical tales as well.

"When people see remains of very impressive architecture and say, 'Wow! How could someone have built that?' one of the explanations they sometimes offer is, 'This must have been done by giants of the past,'" he said.

Maeir, who has been studying the Tell es-Safi site for 23 years, found impressive remains from many cultures but from the city of Gath in particular.

“One of the nice things about excavations at this site – and archaeology in general – is that every time you excavate, there are surprises,” Maeir said. “Up until now, we thought that Gath was the largest of the Philistine cities in the 10th and the 9th centuries [BCE], and the find that we have now may indicate that it was also the largest in the 11th century [BCE]. There are things that you thought you knew, but new discoveries tell you, ‘There’s something new here.’”

Please visit the site: <https://www.jpost.com/Israel-News/Goliaths-birthplace-believed-to-be-unearthed-below-ancient-Philistine-city-596766> [Go there for pix]
