

EBERHARD KARLS  
UNIVERSITÄT  
TÜBINGEN



CLOSING SYMPOSIUM  
ERC STARTING GRANT PROJECT „PAGE“  
PALEOANTHROPOLOGY AT THE GATES OF EUROPE

1<sup>ST</sup> — 4<sup>TH</sup> DECEMBER 2016  
ALTE AULA, TÜBINGEN



# THE UNIVERSITY OF TÜBINGEN



Eberhard Karls Universität Tübingen is one of Europe's oldest universities. Several hundred years of history in the sciences and humanities have been written here.

The University's history began in 1477, when Count Eberhard "the Bearded" of Württemberg founded the University. In Tübingen's historical center there is hardly a building or a square that is not linked to a renowned scholar. Tübingen notables include Hegel, Hölderlin and Schelling, Mörike and Uhland, Johannes Kepler and Wilhelm Schickard.

Tübingen today remains a place of research and teaching. In addition to the nearly 84,000 inhabitants, there are some 28,500 German and international students. Some 450 professors and more than 4000 other academic staff teach at the University's seven faculties.

The latest chapter of the University's history is marked by its success in the German federal and state governments' Excellence Initiative. One Graduate School, one Excellence Cluster and the University's Institutional Strategy were successful in the major funding program – also making Tübingen one of Germany's eleven universities in the top "Excellent" class. Tübingen is also home to six collaborative research centers, is involved in five transregional collaborative research centers, and hosts five research training groups – all sponsored by the German Research Foundation. The University specializes in a number of innovative fields of research: Neuroscience, Clinical Imaging, Translational Immunology and Cancer Research, Microbiology and Infection Research, Molecular Biology of Plants, Environmental and Geoscience, Astro- and Elementary Particle Physics, Quantum Physics and Nanotechnology, Archaeology and Anthropology, Language and Cognition, Education and the Media. The excellence of our research helps create optimal conditions for students from all over the world. Research-oriented learning is a particular strength of Tübingen study programs, thanks to the close links between research and teaching.

Teaching at the University of Tübingen reflects the broad, interdisciplinary spectrum of its research. More than 280 courses are on offer. The University is open to the international exchange of academics and students.

The University has partnerships with more than 150 educational institutions in 45 countries, particularly in North America, Asia and Latin America, as well as with all the countries in Europe. Some 12.8 percent of students in Tübingen come from abroad, and many of the University's German students pursue part of their studies in another country.

"International since 1477" – the perfect way to summarize the University of Tübingen.

# PAGE PROJECT

Despite long study, European paleoanthropology continues to produce unexpected and surprising findings. Such discoveries have radically changed our ideas about human presence in Europe. The short chronology of Europe, once the dominant view of the human settlement of the continent, is challenged by evidence indicating colonization at over one million years ago. Nevertheless, the identity of the earliest colonizers, their place of origin, their adaptations enabling their dispersal and their relationship to later hominins remain unresolved. The post 500 ka European paleoanthropological record is more abundant, but still difficult to interpret: the number of species present and their relationship to each other and to African/Asian contemporaries is not well understood. Finally, the arrival of modern humans, *Homo sapiens*, in Europe and the potential interactions with *Homo neanderthalensis* remain topics of debate. In this discussion crucial information that would decisively help resolve these problems is lacking. Such evidence would come from the gateway through which both archaic and early modern people likely entered Europe, the Balkan peninsula. This region lies directly on the most likely route of dispersal between Africa, W. Asia and Europe, and is one of the three major European refugia for fauna, flora and likely also human populations during glacial periods. Paleoanthropological research in the area, however, has generally been sparse.

PaGE (Paleoanthropology at the Gates of Europe) is an European Research Council (ERC) Starting Grant project, awarded to Prof. K. Harvati in 2011. Its goal is to help close this last research gap in European paleoanthropology and test our hypotheses about dispersals, refugia and systematics of European hominins. Over the course of the last five years (2012-2016), PaGE has conducted long-term field exploration, focusing on in situ recovery, in Greece, in collaboration with a number of institutions and partners in Greece: the Ephoreia of Paleoanthropology and Speleology of Southern Greece, the National and Kapodistrian University of Athens, the Aristotle University of Thessaloniki and the American School of Classical Studies at Athens. PaGE has also focused on the (re-) interpretation of the known fossil record from Greece and the Balkans, and on promoting collaboration and networking among research teams working in South-Eastern Europe. The closing PaGE conference brings together multiple collaborating scientists from all the projects undertaken under PaGE and showcases the results and achievements of this landmark project.



# ORGANIZATION COMMITTEE

**Prof. Dr. Katerina Harvati**

Principal Investigator

**Dr. Vangelis Turloukis**

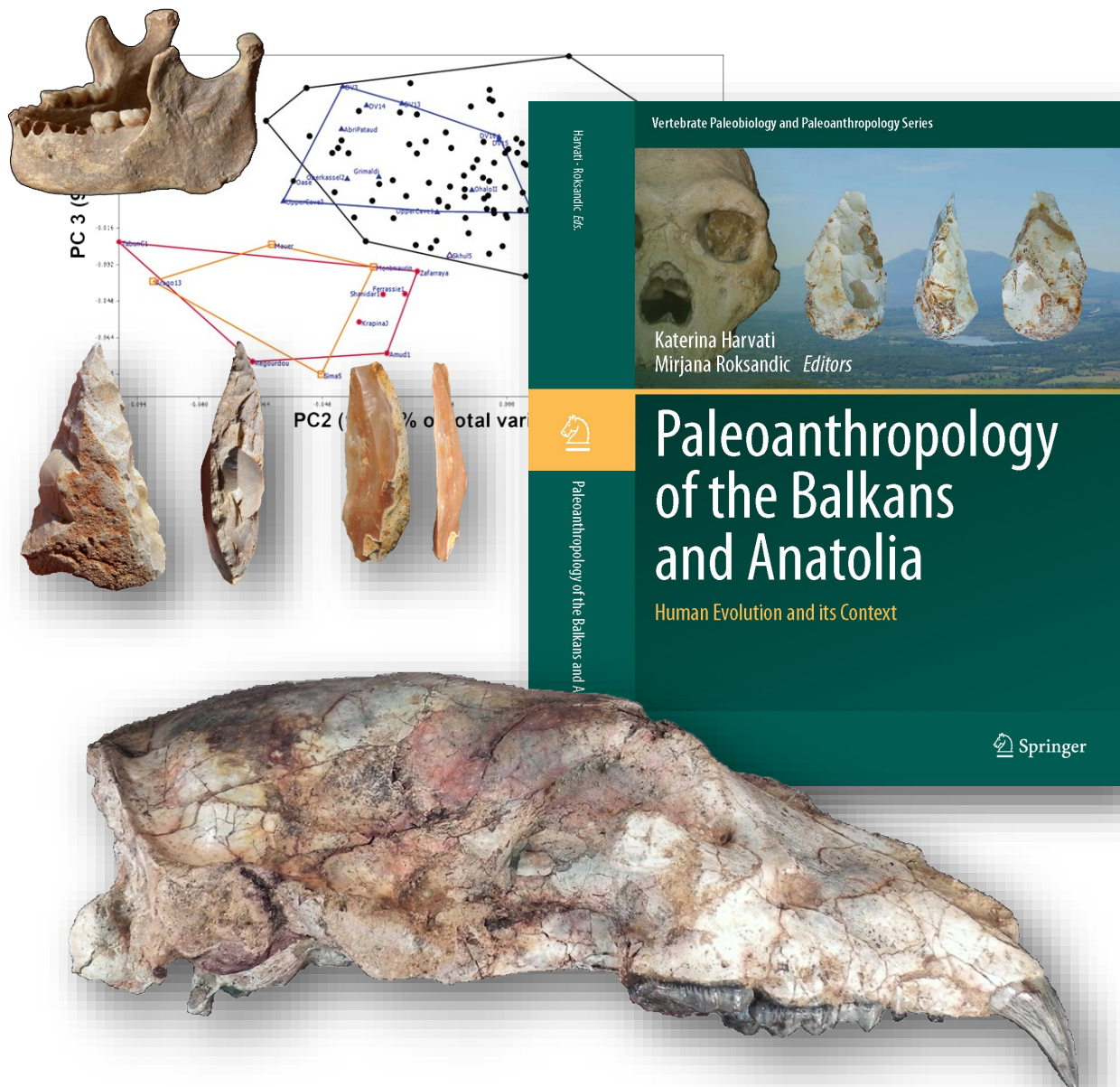
Scientific Coordinator

**Karin Kießling**

Organization Team

**Melania Ioannidou**

Organization Team





# PROGRAM

## THURSDAY, 1<sup>ST</sup> DECEMBER 2016

19:00 Welcome reception at INA (Rümelinstraße 23)

## FRIDAY, 2<sup>ND</sup> DECEMBER 2016

9:00 Welcome address from the Faculty of Science

9:30 PaGE: A retrospective

**Katerina Harvati**

## MIDDLE PALEOLITHIC AND THE NEANDERTHAL LINEAGE

*Session chaired by Vangelis Tourloukis*

10:00 **Reyes-Centeno et al.**

Inner ear form of the Middle Pleistocene cranium from Petralona Cave (Chalkidiki, Greece)

10:20 **Bauer et al.**

Geometric morphometric analysis and internal structure measurements of the Neanderthal lower fourth premolars from Kalamakia, Greece

10:40 **Garefalakis et al.**

Late Pleistocene Neanderthal occupation of Western Mani: the evidence from the Middle Paleolithic assemblages of Mavri Spilia

**11:00 – 11:30 Coffee Break**

11:30 **Kourtessi-Philippakis**

The Middle Kalamas Archeology Project; Thesprotia, Greece: 2011-2015

11:50 **Pappas and Pomonis**

Lithic raw materials in the Middle Kalamas basin, Thesprotia, NW Greece: A petrological approach

12:10 **Thompson et al.**

In search of Pleistocene remains at the Gates of Europe: results from the PaGE Project's directed surface survey of Pleistocene sediments in the basin of Megalopolis

**12:30 – 13:00 Discussion**

**13:00 – 14:00 Lunch (catered)**

# PROGRAM

FRIDAY, 2<sup>ND</sup> DECEMBER 2016

LOWER PALEOLITHIC: MARATHOUSA 1, MEGALOPOLIS

*Session chaired by Katerina Harvati*

- 14:00 **Panagopoulou et al.**  
Marathousa 1: Overview of the excavation and preliminary results
- 14:20 **Karkanis et al.**  
Sedimentology and micromorphology of the Lower Paleolithic lakeshore site Marathousa 1, Megalopolis basin, Greece
- 14:40 **Blackwell et al.**  
Tripling the pleasure: ESR dating of ungulate teeth and molluscs from Marathousa 1, Greece
- 15:00 **Muttoni et al.**  
Magnetostratigraphy of the Pleistocene continental sediments of the Megalopolis Basin, Greece: constraints on the age of the Marathousa 1 archaeological levels
- 15:20 **Jacobs and Li**  
Luminescence dating of sediment samples from Marathousa 1, Greece
- 15:40 **Tourloukis et al.**  
The cultural material from the Lower Paleolithic site of Marathousa 1, Megalopolis, Greece: preliminary results
- 16:00 – 16:30 Coffee Break**
- 16:30 **Konidaris et al.**  
The *Elephas antiquus* skeleton and other large mammals from Marathousa 1 site (Megalopolis basin, Greece): preliminary results on taxonomy, biochronology, paleoecology, and taphonomy
- 16:50 **Doukas et al.**  
The small mammal fauna from the Paleolithic site Marathousa 1 (Greece)
- 17:10 **Field and van Berge-Henegouwen**  
A plant microfossil investigation of organic sediments from Marathousa 1, Megalopolis basin, Greece

# PROGRAM

FRIDAY, 2<sup>ND</sup> DECEMBER 2016

LOWER PALEOLITHIC: MARATHOUSA 1, MEGALOPOLIS

*Session chaired by Katerina Harvati*

17:30 **Ntinou**

Preliminary study of the wood remains from the open-air Lower Paleolithic site Marathousa 1

17:50 **Tsartsidou et al.**

The invisible record of the Marathousa 1 sediments: phytoliths and diatoms

18:10 – 18:30 **Discussion**

20:30 **Dinner at Restaurant Museum (Wilhemstraße 3)**

SATURDAY, 3<sup>RD</sup> DECEMBER 2016

MIOCENE TO PLEISTOCENE. PALEONTOLOGY, PALEOENVIRONMENT AND SITE FORMATION

*Session chaired by George Konidaris*

9:30 **Ioannidou et al.**

A new three-dimensional analysis of the *Ouranopithecus macedoniensis* cranium (Late Miocene, Macedonia, Greece)

9:50 **Konidaris et al.**

A new Early Pleistocene locality with vertebrates from Mygdonia basin (Macedonia, Greece): Tsiotra Vryssi

10:10 **Koufos et al.**

Revisiting *Ursus etruscus* from Greece, with description of new material from the Early Pleistocene locality Tsiotra Vryssi (Mygdonia Basin)

10:30 **Kostopoulos et al.**

Updating Apollonia-1 fossil mammal assemblage through the contribution of PaGE Project; the far SE Epivillafranchian

10:50 **Athanassiou**

Pleistocene vertebrates from the Kyparissia lignite mine, Megalopolis, S. Greece

11:10 – 11:40 **Coffee Break**

# PROGRAM

SATURDAY, 3<sup>RD</sup> DECEMBER 2016

MIOCENE TO PLEISTOCENE. PALEONTOLOGY, PALEOENVIRONMENT AND  
SITE FORMATION

*Session chaired by George Konidaris*

11:40 **Athanassiou et al.**

*Hippopotamus* (Artiodactyla, Mammalia) and other vertebrate remains from the Kyparissia-T  
site, Megalopolis, S. Greece

12:00 **Michailidis et al.**

The ornithological remains from Tsiotra Vryssi (Early Pleistocene, Mygdonia basin, Macedonia, Greece)  
and Marathousa 1 (Middle Pleistocene, Megalopolis basin, Arcadia, Greece) under the auspices of the  
ERC project PaGE

12:20 **Giusti et al.**

Beyond maps: Patterns of site formation processes at Marathousa 1 (Megalopolis basin) and Tsiotra  
Vryssi (Mygdonia Basin)

**12:40 – 14:00 Round table discussion and concluding remarks**

**14:00 – 15:00 Lunch (catered)**

**19:00 Closing reception (Katerina Harvati residence, Engelfriedshalde 27)**





# ABSTRACTS

## ***Hippopotamus* (Artiodactyla, Mammalia) and other vertebrate remains from the Kyparíssia-T site, Megalópolis, S. Greece**

**Athanassios Athanassiou<sup>1</sup>, Vangelis Turloukis<sup>2</sup>, Nicholas Thompson<sup>3</sup>,**

**Aristeidis Lychounas<sup>4</sup>, Eleni Panagopoulou<sup>1</sup>, Katerina Harvati<sup>2</sup>**

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The Middle Pleistocene lacustrine basin of Megalopolis (Peloponnese, Greece) has produced many fossil sites since 1902, when the first palaeontological excavations were carried out there (BÜRCHNER 1903, MELENTIS 1961). The discovery of new sites was facilitated by the more recent development of open-cast lignite mines in the area. During a palaeoanthropological survey, conducted in 2012 by a joint team of the Ephorate of Palaeoanthropology-Speleology of Greece and the University of Tübingen in the frame of the ERC project PaGE, a new site –dubbed Kyparíssia-T– was tracked down at the SW margin of the Kyparíssia mine. A section collapse revealed the presence of fossil bones in three closely situated, but distinct levels. The middle level was by far the richest, and yielded mainly *Hippopotamus* vertebrae, costae, and autopodial bones, which may belong to the same individual; however, there is no direct taphonomic indication of an anatomical association. Other finds from the same site include cervid carpal and tarsal bones, turtle shell fragments, and avian bone fragments. The metrical characters of the hippo and deer are consistent with their attribution to *Hippopotamus antiquus* and *Dama* sp. respectively.

# ABSTRACTS



The fossils were found in organic-rich sediments, stratigraphically adjacent to a lignite seam, indicating that they were deposited during a warm and humid (i.e. interglacial) period (VAN VUGT *et al.* 2000), in a richly vegetated environment.

## References

- BÜRCHNER L. (1903): Wichtige Funde fossiler Knochen in Arkadien. *Berichte des Naturwissenschaftlichen Vereines zu Regensburg*, 9: 119-123.
- MELENTIS J.K. (1961): Die Dentition der pleistozänen Proboscidier des Beckens von Megalopolis im Peloponnes (Griechenland). *Annales Géologiques des Pays Helléniques*, 12: 153-262.
- VAN VUGT N., DE BRUIJN H., VAN KOLFSCHOTEN T., LANGEREIS C.G. (2000): Magneto- and cyclostratigraphy and mammal-fauna's of the Pleistocene lacustrine Megalopolis Basin, Peloponnesos, Greece. *Geologica Ultrajectina*, 189: 69-92.



# ABSTRACTS

## **Pleistocene vertebrates from the Kyparíssia lignite mine, Megalópolis, S. Greece**

**Athanassios Athanassiou<sup>1</sup>**

<sup>1</sup>*Ministry of Culture, Ephorate of Palaeoanthropology–Speleology, Ardittou 34B, 11636 Athens, Greece*

Well known for its richness in fossil mammals —particularly megaherbivores— since the beginning of the 20<sup>th</sup> century (BÜRCHNER 1903, MELENTIS 1961, SICKENBERG 1976), the Middle Pleistocene lacustrine basin of Megalopolis (Peloponnese, Greece) continues to yield new material, due to the operation of lignite mines in it. During the recent years the mining activities in northernmost mine of Kyparíssia have brought to light numerous vertebrate fossils, recovered during salvage field expeditions. Most available specimens are surface finds, as the constant operation of the mine did not allow for a proper excavation in it. A number of stratified specimens indicates the presence of at least two fossiliferous horizons, which are stratigraphically closely situated. The fossils are generally widely dispersed, not in dense concentrations, but they are much more abundant along the western margin of the palaeolake. In a find-spot, which surfaced after a landslide event, two fossil assemblages are interpreted as the partial skeletons of an elephant and a hippopotamus, respectively. The recovered fauna comprises Chelonii, Aves, *Elephas (Palaeoloxodon) antiquus*, *Sus* sp., *Hippopotamus antiquus*, *Capreolus* sp., *Dama* sp., *Cervus* cf. *elaphus*, *Megaloceros* sp., Bovini indet., Rhinocerotidae indet., *Equus* sp., *Crocuta* sp., *Vulpes* sp. and *Castor* sp. The faunal assemblage is dominated by elephants, deer and hippopotamuses, indicating a temperate, woodland/forest environment, with continuous presence of a water body. The fossiliferous clayey sediments, rich in organic material (including wood and tree fruits), also indicate a low-energy, lacustrine, richly vegetated depositional environment, during a warm and humid (i.e. interglacial) period (VAN VUGT *et al.* 2000).

# ABSTRACTS



## References

- BÜRCHNER L. (1903): Wichtige Funde fossiler Knochen in Arkadien. *Berichte des Naturwissenschaftlichen Vereines zu Regensburg*, 9: 119-123.
- MELENTIS J.K. (1961): Die Dentition der pleistozänen Proboscider des Beckens von Megalopolis im Peloponnes (Griechenland). *Annales Géologiques des Pays Helléniques*, 12: 153-262.
- SICKENBERG O. (1976): Eine Säugetierfauna des tieferen Bihariums aus dem Becken von Megalopolis (Peloponnes, Griechenland). *Annales Géologiques des Pays Helléniques*, 27: 25-73.
- VAN VUGT N., DE BRUIJN H., VAN KOLFSCHOTEN T., LANGEREIS C.G. (2000): Magneto- and cyclostratigraphy and mammal-fauna's of the Pleistocene lacustrine Megalopolis Basin, Peloponnesos, Greece. *Geologica Ultrajectina*, 189: 69-92.



# ABSTRACTS

## **Geometric morphometric analysis and internal structure measurements of the Neanderthal lower fourth premolars from Kalamakia, Greece**

**Catherine C. Bauer<sup>1</sup>, Stefano Benazzi<sup>2,3</sup>, Andreas Darlas<sup>4</sup>, Katerina Harvati<sup>1</sup>**

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<sup>2</sup>*University of Bologna, Department of Cultural Heritage, Via degli Ariani 1, Ravenna, 48121, Italy*

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<sup>4</sup>*Ephoreia of Paleoanthropology and Speleology, Ardittou 34 b, 11636 Athens, Greece*

This study investigates two Neanderthal lower fourth premolars from Kalamakia, Greece. Our goals are two-fold: 1. to better explore and document the morphology of the Kalamakia assemblage, and 2. to improve our understanding of taxonomic and geographical variation in human lower fourth premolar external and internal anatomy. The material consisted of micro-CT scans of the Kalamakia premolars (KAL6 and KAL9), and a comparative sample of 50 specimens, including 10 Neanderthals, one early *Homo sapiens*, and 39 recent *Homo sapiens*. The premolars were analyzed applying geometric morphometric methods on crown outlines as well as collecting measurements on internal dental structures. Data were subjected to principal components and other standard statistical analyses. A principal components analysis of the outline shape coordinates separated Neanderthals from modern humans with little overlap. KAL9 showed the most extreme Neanderthal shape while KAL6 fell within the NEA shape range. The additional measurements on internal dental structures contributed to distinguish between Neanderthals and modern humans. Our results show that the analysis of the crown outline, combined with internal structure measurements, can distinguish Neanderthal from modern human lower fourth premolars, in accordance with non-metric traits typical for Neanderthals that also involve the shape of the crown. Furthermore, the results highlight the great variability of modern human lower fourth premolar crown outline shape and accentuate the need to include more geographically diverse samples in future analyses of dental crown shape of fossil humans.

# ABSTRACTS



## Tripling The Pleasure: ESR Dating of Ungulate Teeth and Molluscs from Marathousa 1, Greece

Bonnie A.B. Blackwell<sup>1,2</sup>, Neeraj Sakhrani<sup>1</sup>, Kalyani K. Gopalkrishna<sup>1</sup>, Impreet Singh<sup>1</sup>, Vangelis Tourloukis<sup>3</sup>, Eleni Panagopoulou<sup>4</sup>, Panagiotis Karkanas<sup>5</sup>, Joel I.B. Blickstein<sup>1</sup>, Katerina Harvati<sup>3</sup>, Anne R. Skinner<sup>2</sup>

<sup>1</sup>RFK Science Research Institute, Glenwood Landing, NY, 11547-0866, USA

<sup>2</sup>Dept. of Chemistry, Williams College, Williamstown, MA, 01267-2692, USA

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<sup>4</sup>Ephoreia of Palaeoanthropology-Speleology, Ardittou 34b, 11636, Athens, Greece

<sup>5</sup>Malcolm H. Wiener Laboratory for Archaeological Science, American School of Classical Studies, Soudias 54, Athens 10676, Greece.

ESR dating for molluscs uses one of several carbonate ESR signals that grow with dose near  $g = 2.007-2.0$ , while dating teeth uses the HAP signal at  $g = 2.0018$ , which respond differently to dose both in nature and artificially. Therefore, the two methods act as independent geochronometers. In standard ESR dating teeth, uncertainty arises from the external dose rate,  $D_{\text{ext}}(t)$ , and the tooth's U uptake rate,  $p$ . Isochron analysis uses 4-8 subsamples from large teeth having different U concentrations to assess the time-averaged external dose rate,  $\overline{D}_{\text{ext}}^{\text{I}}(t)$ , seen by the tooth, given a  $p$  value. Since the isochron depends on  $p$ , it can also indicate secondary U mobilization. If one knows the value for the time-averaged and volumetrically averaged external dose rate measured at the site,  $\overline{D}_{\text{ext}}^{\text{BG}}(t)$ , setting  $\overline{D}_{\text{ext}}^{\text{I}}(t) = \overline{D}_{\text{ext}}^{\text{BG}}(t)$  will reveal the tooth's  $p$ . Using isochrons to find  $p$  occurs more quickly than doing a coupled ESR-<sup>230</sup>Th/<sup>234</sup>U dating analysis. From an archaeological site with Paleolithic tools and associated fauna, five subsamples from one cervid molar, AT39, and one from another cervid tooth fragment, AT68, were dated, as were molluscs, AM66, from an overlying layer. The standard ESR ages were calculated using time-averaged and volumetrically averaged external dose rates, modelling the dose rates by assuming typical sedimentation rates and cover thicknesses estimated from the geological strata. AM66 dates indicated that the tooth had to predate  $414 \pm 42$  ka. The standard ESR tooth analyses indicated a maximum age for AT39 at 697 ka.



# ABSTRACTS

The isochron analysis, however, suggested that AT39 had experienced some secondary U remobilization. By equating  $\overline{D}_{\text{ext}}^{\text{I}}(t) = \overline{D}_{\text{ext}}^{\text{BG}}(t)$ , AT39's U uptake parameter,  $p = 2$ . Assuming  $p = 2$ , AT39 dated at  $484 \pm 13$  ka, which correlates with Marine (Oxygen) Isotope Stage 13. From its U concentrations and accumulated radiation dose, AT68 experienced a very similar geochemical history as did AT39. Assuming that AT68 absorbed U at a very similar  $p$  to AT39, i.e.,  $p = 2$ , the mean age for the two teeth rises to  $498 \pm 7$  ka, which correlates to MIS 13. This ages agrees with the indications for the vertebrate paleontology biozone and other dating results. Coupled ESR- $^{230}\text{Th}/^{234}\text{U}$  analyses should be analyzed to confirm that  $p = 2$ .



# ABSTRACTS



## The small mammal fauna from the Palaeolithic site Marathousa 1 (Greece)

Constantin Doukas<sup>1</sup>, Thijs van Kolfschoten<sup>2</sup>, Katerina Papayianni<sup>3</sup>

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<sup>2</sup>Leiden University, Faculty of Archaeology, van Steenisgebouw, Einsteinweg 2, 2333 CC Leiden, Zuid Holland, The Netherlands

<sup>3</sup>Muséum national d'Histoire naturelle, Archéozoologie, Archéobotanique, UMR 7209 du CNRS, Paris, France

The lacustrine deposits exposed at the Palaeolithic site Marathousa 1, (Mega-Iopolis; S. Greece) yielded a collection of small vertebrate remains including fish and small mammals. The small mammal assemblage includes a variety of species and is dominated by voles (Arvicolids) of the genera *Arvicola* and *Microtus*. Other rodents are a dipodid cf. *Alactaga* and a murid of the genus *Apodemus*. In addition there are a number insectivore remains refer to the family Soricidae. The occurrence of the unrooted *Arvicola* molars indicate that the Marathousa 1 assemblage is for sure younger than the Choremi assemblage collected ca. 20 years ago in the same basin. In the Choremi assemblage, *Mimomys*, the predecessor of the genus *Arvicola* is the predominant arvicolid. The rather advanced evolutionary stage of the *Arvicola* molars suggest a late Middle Pleistocene age.



# ABSTRACTS

## **A plant macrofossil investigation of organic sediments from Marathousa, Megalopolis basin, Greece**

**Michael H. Field<sup>1</sup>, Didi van Berge-Henegouwen<sup>1</sup>**

<sup>1</sup>*Leiden University, Faculty of Archaeology, van Steenisgebouw, Einsteinweg 2, 2333 CC Leiden, Zuid Holland, The Netherlands*

A recent archaeological excavation at Marathousa in the Megalopolis basin, Greece (Marathousa 1 site) exposed fossiliferous lacustrine sediments (Panagopoulou *et al.*, 2015). The organic sediment samples were wet sieved and plant macrofossils (mainly carpological in nature) were picked from the residues once they had been dried. The preliminary results presented are from Excavation Area A. The assemblages recovered are diverse and are dominated by aquatic, and waterside and damp ground plant taxa. Submergent (*e.g. Zannichellia palustris*), emergent (*e.g. Brasenia schreberi, Euryale ferox, Nuphar lutea* and *Nymphaea alba*) and floating (*e.g. Aldrovanda vesiculosa, Azolla filiculoides* and *Salvinia natans*) aquatic taxa are recorded. Large concentrations of *Potamogeton* (pondweed) fruits were encountered in all the samples so far analysed. The marginal reedswamp was inhabited by tall plants, such as *Buto-mus umbellatus, Cladium mariscus, Oenanthe aquatica, Scirpus lacustris, Sparganium erectum* and *Typha* sp. In addition, some woodland and shade tolerant taxa are represented that would have probably grown in the vicinity on drier ground. For example, *Acer* sp., *Rubus fruticosus*, and *Sambucus cf nigra*. Mädler (1971) identified fruitstones of the liane *Vitis parasilvestris* Kirchheimer from the Megalopolis basin. One Vitaceae fruitstone has been recovered from the Marathousa 1 Area A sediments, but its morphological characteristics most closely match those of the North American climber *Parthenocissus quinquefolia*. Of note is that a number of the taxa recorded are exotic (*e.g. Brasenia schreberi*).

The new palaeobotanical data supports previous vegetation reconstructions based on studies of the carpological remains from the Megalopolis basin (see Mädler, 1971 and Velitzelos *et al.*, 2014). The composition of the assemblages identified from sediments collected from Excavation Area A are remarkably similar to those recognized by Mädler (1971). The plant taxa represented indicate that sediment deposition took place in slow moving or still water which was basic, mesotrophic to eutrophic, with low suspended sediment, and probably a metre or two deep. The prevailing climate was warm.

# ABSTRACTS



## References

- Panagopoulou, E., Turloukis, V., Thompson, N., Athanassiou, A., Tsartsidou, G.E., Giusti, D., Karkanis, P. & Harvati, K. 2015. Marathousa 1: a new Middle Pleistocene archaeological site from Greece. *Antiquity*. 343.7pp. (Project Gallery section).
- Mädler, K. 1971. Die Früchte und Samen aus der frühpleistozänen Braunkohle von Megalopolis in Griechenland und ihre ökologische Bedeutung. *Beihefte zum Geologischen Jahrbuch*. 110, 1-79.



# ABSTRACTS

## **Late Pleistocene Neanderthal occupation of Western Mani: the evidence from the Middle Palaeolithic assemblages of Mavri Spilia**

**Charalampos Garefalakis<sup>1</sup>, Eleni Panagopoulou<sup>2</sup>, Katerina Harvati<sup>3</sup>**

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*<sup>2</sup>Ministry of Culture, Ephorate of Palaeoanthropology-Speleology, Ardittou 34B,  
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*<sup>3</sup>Eberhard-Karls University of Tübingen, Paleoanthropology, Institute for Archeological Sciences, Senckenberg  
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This paper presents the results of the analysis of the lithics from the Palaeolithic layers of Mavri Spilia, excavated during the first and only up to now excavation season of the site in 2013. For the most part, these were correlated with hearth formations, both at the back and at the entrance of the cave. A wide range of raw materials both local and non-local was used, most likely in the form of pebbles. Evidence points to the application of both Levallois and non-Levallois reduction sequences, with no indication that different techniques were applied on different materials. The most common retouched tool type is the scraper, with most of these being ordinary side scrapers, only a few indicating more invasive, Quina-like retouch. Using all available information, an attempt to understand the site in the context of the Late Pleistocene Neanderthal occupation of the Mani Peninsula is made and some tentative conclusions are drawn.

# ABSTRACTS



## **Beyond maps: Patterns of site formation processes at Marathousa 1 (Megalopolis basin) and Tsiotra Vryssi (Mygdonia basin)**

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Interpretation by representation is an epistemological cornerstone in archaeology. However, deductive inference from the graphical representation of the archaeological space is prone to subjectivity (and not reproducible). On the other hand, statistical inference allows for the interpretation of spatial patterns by adopting a more inductive (and reproducible) approach. Beyond maps, spatial statistics boost the characterization of the spatial processes behind the observed patterns. The current study applies a set of multiscale and multivariate spatial statistics, in order to unravel the entity and intensity of the post-depositional processes underlying the distribution of the archaeological and paleontological record at the sites of Marathousa 1 and TSR. A spatial analytical approach to archaeological inference, combined with a taphonomic perspective, is essential for the evaluation of the integrity of the archaeological assemblage, and consequently for the interpretation of past human behaviors.



# ABSTRACTS

## The PaGE Project 2012-2016: A Retrospective

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The ERC Starting Grant Project 'Paleoanthropology at the Gates of Europe' (PaGE) was awarded in 2011 and began its work in January of 2012 with the goal of helping fill the research gap in the Paleoanthropology of the Balkans, and more specifically in Greece. PaGE had set specific goals: 1. To increase the number of sites from a stratified context, and thus contribute to the primary data available from the region; 2. To foster the understanding of the human fossil record from the region; and 3. To promote networking and collaboration across teams conducting paleoanthropological research in the Balkans.

Over the last five years, the PaGE team has worked in collaboration with colleagues in Greece and across the Balkans to fulfill those goals. Since 2012, in collaboration with the Ephoreia of Paleoanthropology and Speleology (EPS), the Universities of Athens (UA) and Thessaloniki (AUT) and the American School of Classical Studies at Athens (ASCSA), PaGE has conducted systematic survey in five different regions in Greece. This work has resulted in identifying ca. 40 new Paleolithic sites and many more find-spots and in test and systematic excavations at Paleolithic and paleontological sites. These include the Middle Paleolithic sites Mavri Spilia (with the EPS), Popovo and Morfi (with the UA); the Lower Paleolithic site Marathousa 1 (with the EPS); and the early Pleistocene paleontological sites Apollonia and Tsiotra Vryssi (with the AUT). This research effectively doubled the excavated Lower Paleolithic sites in Greece, and identified in Marathousa 1 the oldest radiometrically dated archaeological site in Greece. In parallel to our work in the field, PaGE focused on the analysis of existing hominin and earlier hominoid fossils from the region. This work included the detailed analysis of both external and internal features of the Kalamakia Neanderthal isolated teeth; the analysis of the inner ear of Petralona; the comparative morphological and genetic study of the Romanian Upper Paleolithic human fossils; the re-evaluation of the *H. erectus* cranium from Kocabas, Turkey; and the virtual reconstruction and 3-d analysis of the Miocene hominoid *Ouranopithecus macedoniensis*.

# ABSTRACTS



## **A new three dimensional analysis of the *Ouranopithecus macedoniensis* cranium (Late Miocene, Central Macedonia, Greece)**

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The genus *Ouranopithecus* has been documented since 1974 in the late Miocene deposits of Northern Greece in the form of several mandibles, a number of teeth and an almost complete face (XIR-1) of *Ouranopithecus macedoniensis*. The specimen XIR-1 belongs to an adult male individual and was discovered in 1989 in the locality Xirochori 1 (XIR), in association with mammal fauna (de Bonis and Koufos, 1993). The facial area of the XIR-1 is well preserved, but slightly distorted as a result of taphonomic processes. The right side of the lower face is complete, and a big portion of the frontal bone as well as part of the left side of the face is preserved. The magnetostratigraphic study of the Xirochori section suggested an estimated age of ~ 9.6 Ma (late Vallesian,) for the fauna (Koufos et al., 2016). Genetic studies utilizing methods of ‘Molecular Clocks’ (Yoder and Yang, 2000), based on protein-coding regions of mtDNA, suggest that the split between humans and African apes is between 5-10 Ma. Since the age of *Ouranopithecus macedoniensis* is close to the divergence of hominoids and African apes, its phylogenetic position relative to known hominids is of great importance.

The aim of this study is, first, to virtually restore symmetry to the deformed face of *Ouranopithecus macedoniensis* (XIR-1) and to reconstruct its facial anatomy using mirror imaging, a virtual anthropology technique. The most important advantage of such methods, relative to traditional reconstruction techniques, is that they allow digital manipulation of the objects and therefore are not destructive or damaging the precious fossil specimens (Benazzi et al., 2010). Our second aim is to analyze the facial morphology of the virtual reconstruction using 3D geometric morphometrics and to explore shape variation between *O. macedoniensis* and a comparative sample of other fossil hominoids and extant great apes.





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High-resolution computed tomography (CT) was used to create a digital representation of the XIR-1 specimen. A virtual reconstruction of the facial area of XIR-1 was achieved by using a mirror image of the better-preserved side, so as to restore bilateral symmetry. Additionally, a set of anatomical landmarks (51), representing standard osteometric points, were registered on the virtual reconstruction of XIR-1. The same landmarks were collected from adult crania of *Homo sapiens*, *Gorilla gorilla*, *Pan troglodytes*, *Pongo pygmaeus* and fossil hominoids, including the Eurasian *Pierolapithecus catalaunicus*, *Dryopithecus*, *Rudapithecus hungaricus* and the African *Proconsul*, as well as the hominins *Sahelanthropus tchadensis*, and *Australopithecus africanus*.

Preliminary results indicate that *Ouranopithecus* is more similar to *Gorilla* than to *Homo*, *Pan* or *Pongo*, and support the hypothesis that the overall shape of the face of *O. macedoniensis* is similar to *Gorilla* and other Eurasian dryopithecines (*Pierolapithecus catalaunicus*, and *Dryopithecus*).

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# ABSTRACTS



## Luminescence dating of sediment samples from Marathousa, Greece

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Luminescence dating of the sedimentary deposits at Marathousa in Greece has been a challenge. The age equation used in luminescence dating consists of two parts: the equivalent dose ( $D_e$ ) and the environmental dose rate as the numerator and denominator, respectively. At Marathousa, the optically stimulated luminescence (OSL) signal from quartz grains, as well as the infrared stimulated luminescence (IRSL) signal from potassium feldspar (K-feldspar) grains, was saturated with respect to absorbed dose. Finite  $D_e$  values could not be obtained and only minimum ages could be reported. Extending the age range of luminescence-based dating techniques has been a research priority over the last few years, and a number of new and exciting experimental techniques have been proposed. One such method is the pre-dose multiple elevated temperature post-infrared IRSL (pMET-pIRIR) procedure for K-feldspar (Li et al., 2014; Guo et al., 2015).

We tested this method for one sample from Marathousa (MAR-1) and obtained a finite  $D_e$  value. Although this  $D_e$  value of  $>1000$  Gy was close to dose saturation, the result gave us confidence that it may be possible to obtain finite ages for sediment samples from the site. Since the size of the  $D_e$  value is directly related to the size of the environmental dose rate, we first collected a number of small samples from different sedimentary units to determine which of the units may have the lowest radioactivity and would, therefore, have lower  $D_e$  values if the sediments are assumed to be the same age. We measured the beta dose rates from these units directly and found that the sandier units had beta dose rates that were half that measured for the original sample. This suggested that similar-age sedimentary units from Marathousa may have a large range of burial doses; the estimated  $D_e$  values for samples collected from sandier units may, therefore, give  $D_e$  values that were not close to dose saturation and more reliable than so far obtained from MAR-1. To test this proposition, we conducted a sampling trip targeting those sedimentary layers that had the lowest beta dose rates, and the preliminary results of those samples will be presented and discussed at this workshop.



# ABSTRACTS

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# ABSTRACTS



## **Sedimentology and micromorphology of the Lower Palaeolithic lakeshore site**

### **Marathousa 1, Megalopolis basin, Greece**

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The present study describes the sedimentology and formation processes of Marathousa 1 site, part of a Pleistocene lignite-bearing succession at Megalopolis basin (Southern Greece). The sedimentary sequence of the site comprises about 4-5 m lacustrine and fluviolacustrine clastic deposits found between Lignite Seam II and III. The latter is found ca 50 m below the modern, pre-mine operation surface. The two excavated areas A and B, which are about 80 m apart, share some general characteristics. In both sequences, a lower part is observed which shows discontinuous, high rate subaqueous sedimentation of massive to bedded muds and sands with local evidence of slumping and liquefaction. This part of the sequence contains fluctuating but generally low organic and carbonate content. Remnants of a distinct gray bluish sandy mud layer with characteristic load deformation structures caps the lower sequence in both areas. This horizon demarcates the beginning of the upper part of the sequence which includes a series of erosional bounded depositional units. Erosional boundaries are associated with temporal subaerial exposure and formation of indurated mud surfaces. Their erosion produced very distinct mud intraclasts which characterize the overlying flows. The subaqueous emplacement of these units is attributed to subaerial flood-generated, organic- and carbonate-rich mudflows to hyperconcentrated flows and end up with massive organic-rich mud deposition. Organic-rich sedimentation culminates with the formation of the overlying lignite seam.

In the excavated Areas A and B, the fossiliferous and cultural levels are associated with a major erosional and exposed surface of the upper part of the sequence. The formation processes associated with the deposition of the elephant and lithic remains are analyzed and discussed.



# ABSTRACTS

## A new Early Pleistocene locality with vertebrates from the Mygdonia Basin

### (Macedonia, Greece): Tsiotra Vryssi

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The Pleistocene vertebrate localities of the Mygdonia Basin (Macedonia, Greece) are known since the end of the 1970s. Numerous fieldwork campaigns, carried out by the Laboratory of Geology and Palaeontology of the University of Thessaloniki, led to the discovery of several fossiliferous sites from which a great amount of fossils has been unearthed and studied. During a survey expedition conducted by the University of Thessaloniki and the University of Tübingen in 2014 a new locality –Tsiotra Vryssi (TSR)– was discovered (Konidaris et al., 2015). The locality was further excavated in 2015 and 2016 and the so far collected material includes the following taxa: Chelonii indet. (Reptilia), the corvid *Corvus pliocaenus* (Aves), the hyaenid *Pachycrocuta brevirostris*, the canid *Canis etruscus*, the ursid *Ursus etruscus*, the elephantid *Mammuthus meridionalis*, the rhinocerotid *Stephanorhinus* sp., two species of *Equus*, Antilopinae indet., the bovids *Leptobos* sp. and *Bison* sp., the cervids *Metacervocerus rhenanus* and *Praemegaceros* sp., and the giraffid *Palaeotragus* sp. The presence of *Pachycrocuta brevirostris* clearly indicates a late Villafranchian age for TSR, while the presence of two *Equus* species, *Praemegaceros* sp. and the co-occurrence of *Leptobos* and *Bison*, suggest that TSR is chronologically intermediate between the localities Gerakarou-1 and Apollonia-1 (Mygdonia Basin), and therefore it can be preliminary dated to 1.8–1.2 Ma. Data from TSR will cover previous gaps in the Pleistocene local succession of mammal faunas, and will provide additional palaeogeographical and palaeoecological information about a crucial time interval for mammal migrations and turnovers.

# ABSTRACTS



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# ABSTRACTS

## **The *Elephas antiquus* skeleton and other large mammals from Marathousa 1 site (Megalopolis Basin, Greece): preliminary results on taxonomy, biochronology, palaeoecology and taphonomy**

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The Megalopolis Basin (Peloponnesus, Greece) has long been known for its Middle Pleistocene mammal fossils (see Melentis, 1961). In 2013 a palaeolithic/palaeoanthropological survey, conducted by a joint team of the Ephorate of Palaeoanthropology-Speleology of the Greek Ministry of Culture and the University of Tübingen in the frame of the ERC project PaGE, led to the discovery of a new locality – Marathousa 1 (MAR)–, when stratified bones and lithic artefacts were identified in a section of the Marathousa Member, Choremi Formation (Panagopoulou et al., 2015). The large mammal faunal material collected so far (2013–2016) includes the castorid *Castor fiber*, the mustelids *Lutra simplicidens* and *Mustela* sp., the felid *Felis* sp., the canid *Canis* sp., the elephantid *Elephas (Palaeoloxodon) antiquus*, the hippopotamid *Hippopotamus antiquus*, the bovid *Bison* sp., and the cervids *Dama* sp. and *Cervus elaphus*. This faunal association is common in the Galerian mammal communities of Europe (ca. 0.9–0.4 Ma). Furthermore, it is consistent with a temperate climate, and is indicative of a landscape with substantial woodland components and more open areas, close to permanent and large freshwater bodies.



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Of particular interest are an elephant cranium and several postcranial elements, which were found in close anatomical association and are attributed to a single individual of the straight-tusked elephant *Elephas (P.) antiquus*. The good state of preservation of the MAR bones allows to identify taphonomic modifications. Cut marks and percussion damage indicate hominin exploitation of elephant and other mammal bones by means of butchering activities. Carnivore gnawing is also evident on some specimens, suggesting a certain degree of carnivore competition with humans for early access to the animal carcasses.

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# ABSTRACTS

## **Updating Apollonia-1 fossil mammal assemblage through the contribution of the PaGE project; the far southeast Epivillafranchian**

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Though not yet fully adopted by the European paleontological community, the biochronological term Epivillafranchian, originally introduced by Bourdier (1961) and later by Kahlke (2001), represents a particular late Early Pleistocene time interval (appx. 1.2-0.9 Ma) during which a major re-organization of the European (and partly Eurasian) mammal fauna took place. Currently, a significant set of fossil mammal localities across Southern Europe (and not only), documents this transitional phase between purely Villafranchian and Galerian mammal communities. The fossil mammal assemblage from the locality of Apollonia (Apollonia-1, APL, Mygdonia Basin, Greece) is so far the best known record of an Epivillafranchian mammal coenosis in the southeastern extreme of Europe, and thus of great importance for local and transcontinental comparisons.

Apollonia-1 has been extensively explored between 1991 and 1998 by the paleontological team of the Aristotle University of Thessaloniki. Data and fossils collected from this period provided a list of more than 25 mammal taxa. Among them, several new species/subspecies (e.g., *Canis apolloniensis*, *Meles dimitrius*, *Equus apolloniensis*, *Soergelia brigittae*, *Pontoceros ambiguus mediterraneus*) and a lot of taxa recognized for the first time in Greece (Koufos 2001). Nevertheless, a significant number of other taxa remained blurry, recognized only at a broader (Family or Genus) level. A new campaign initially sponsored by the Research Committee of the Aristotle University of Thessaloniki (Project 87845) started in 2012 and continued from 2013 to 2015 through the PaGE project (PI: K. Harvati). Over 200 new specimens have been unearthed from this last period, providing important data that allow completing, revising and updating the Apollonia fauna and its status within the European Epivillafranchian.

# ABSTRACTS



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# ABSTRACTS

## Revisiting *Ursus etruscus* from Greece with description of new material from the Early Pleistocene locality Tsiotra Vryssi (Mygdonia Basin)

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The fossiliferous site Tsiotra Vryssi (TSR) is located in Mygdonia Basin (Macedonia, Greece) and provided a rather rich vertebrate fauna, including mainly mammals, but also some reptiles and birds. Based on the mammal biochronology, a late Villafranchian age is proposed for TSR, between 1.8 Ma and 1.2 Ma (Konidaris et al., 2015, this volume). Among the collected material, ursids are quite well represented with important material, which includes an almost complete cranium, as well as other cranial, dental and postcranial remains. The TSR ursid differs from *Ursus dolinensis* from the Epivillafranchian localities Trinchera Dolina (Atapuerca, Spain) and Untermassfeld (Germany), e.g., in the smaller size of the teeth and the weaker styles on the first upper molar. On the other side, several morphological and metrical features of the TSR cranium (e.g., convex dorsal profile in the parietals; elongated neurocranium; small occipital condyles; broad, flat and slightly convex forehead; elongated facial region) and the teeth (e.g., very small upper premolars separated by large diastemas; rectangular M1 with weak parastyle and metastyle; elongated M2) are diagnostic features of *Ursus etruscus* (Mazza & Rustioni, 1992), permitting the attribution to this species. The TSR specimens have some differences from *U. etruscus* from the middle Villafranchian locality St. Vallier (France) and they best match the late Villafranchian representatives of the species from Upper Valdarno, Pietrafitta and Pirro Nord (Italy); more precisely its narrow first and second upper molars coincide to those of *U. etruscus* from the last two localities.

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The geographic distribution of *U. etruscus* in Europe is discussed, as well as the biostratigraphy of the Greek ursids. The records of *U. etruscus* in Greece were rather scarce and isolated. The TSR material is so far the richest and most complete one, and offers the opportunity for a more comprehensive comparison with other European samples, as well as the possibility to virtually reconstruct the cranium and to study its endocranial traits.

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# ABSTRACTS

## **The Middle Kalamas Archaeology project, Thesprotia, Greece: 2011-2015**

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The “Middle Kalamas Archaeology Project” in Thesprotia (Greece) was carried out during the years 2011-2015 by the Department of History and Archaeology of the University of Athens with the collaboration of the Ephoreia of Antiquities of Thesprotia and the contribution of other scientific institutions among them the Eberhard Karls University of Tübingen in the frame of the PaGE Program. Its aim was to undertake a study of the paleoenvironmental context and the human presence in the northern part of Thesprotia, an area hitherto largely unstudied. The field research was conducted through a geoarchaeological approach, linking closely the identification and interpretation of archaeological finds with the systematic study of the relief and geomorphological dynamics. During this five-year project an important number of new archaeological sites spanning the Paleolithic to the end of Late Antiquity and beyond were discovered. This has allowed us to further enrich the archaeological map of the area and to contribute to the reformulation of issues raised by previous research projects in Epirus. This paper presents and discusses the preliminary results and research perspectives with special focus in the Prehistoric period.

# ABSTRACTS



## **The ornithological remains from Tsiotra Vryssi (Early Pleistocene; Mygdonia Basin, Greece) and Marathousa 1 (Middle Pleistocene; Megalopolis Basin, Greece) under the auspices of the ERC StG project 'PaGE'**

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The Early Pleistocene (late Villafranchian) fossiliferous locality Tsiotra Vryssi (Mygdonia Basin, Macedonia, Greece) was discovered in 2014 and provided a rather rich vertebrate fauna, including mainly mammals, but also some reptiles and birds (Konidaris *et al.*, 2015). The avian remains collected during the 2014-2016 excavations yielded nearly ninety skeletal elements. The great majority of them belong to the corvid *Corvus pliocaenus*, while a few specimens can be referred to a wading bird. Corvids do not provide significant palaeoecological information since they are omnivorous and adapt to a variety of habitats; however, the presence of a wading bird attests to the presence of a body of water.

In the Middle Pleistocene locality Marathousa 1 (Megalopolis Basin, Peloponnesus, Greece), discovered in 2013, lithic artefacts are stratigraphically associated with faunal remains (Panagopoulou *et al.*, 2015). Among the latter, birds are known by nearly one hundred skeletal elements and represent an important part of the fauna. The majority of them are identified as anseriform birds of various sizes, from swan size (*Cygnus* sp.) to teal size (*Anas* cf. *crecca*). The next largest group is gruiform birds, while, at least one small-sized passerine is also present (thrush-sized). The avifaunal composition and its richness demonstrate the importance of the palaeolake system, which would have contributed to the development of habitats capable of supporting a large number of taxa.





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## **Magnetostratigraphy of the Pleistocene continental sediments of the Megalopolis**

### **Basin, Greece: constraints on the age of the Marathousa-1 archeological levels**

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We investigated the magnetostratigraphy of the Megalopolis Basin in central Peloponnese, Greece, which encompasses a record of Pleistocene lacustrine and coal-bearing sedimentation where lithic tools stratigraphically associated with remnants of a virtually complete skeleton of *Elephas (Palaeoloxodon) antiquus* were recently found at the Marathousa-1 site. A magnetic polarity reversal was observed within a ~10 m-thick coal seam at the base of the (exposed) stratigraphic sequence, and it was interpreted as a record of the Brunhes/Matuyama (B/M) boundary (0.78 Ma), in agreement with previous results. Assuming that coal seams were deposited generally under warm and humid climate conditions, this finding is in agreement with data from the literature indicating that the B/M boundary occurs within warm Marine Isotope Stage (MIS) 19. We then attempted to correlate the remainder of the lacustrine and coal-bearing intervals above the B/M boundary to a standard isotope record of Pleistocene climate variability.



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Two age models of sedimentation were generated: according to preferred option #1, lithic tool-bearing Layer 4 of the Marathousa-1 site should have an age comprised between  $\sim 0.48$  Ma and  $\sim 0.42$  Ma, while according to alternative option #2, the archeological Layer 4 would have an age comprised between  $\sim 0.565$  Ma and  $\sim 0.54$  Ma. Option #1 is at present considered the preferred option as it is in closer agreement with preliminary ESR dates from the Marathousa-1 site. This age model has been exported to other areas of the Megalopolis Basin, where additional archeological/paleontological sites could be present, by means of correlations to lithostratigraphic logs derived from commercial drill cores taken in 1958-1960 for coal exploration.

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## **Preliminary study of the wood remains from the open-air Lower Palaeolithic site**

### **Marathousa 1**

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Numerous wood remains of variable size and morphology were preserved in the sediments of the Lower Palaeolithic open-air site Marathousa-1, in what would have been the shores of a palaeo-lake. The study of the material is in progress and involves macroscopic and microscopic analysis. In this preliminary assessment of the material we focus on issues of preservation and post-excavation treatment. The distribution of the material in the sediments is discussed and a preliminary correlation of selected samples with the broader palaeoenvironment is attempted.



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## **Marathousa 1: overview of the excavation and preliminary results**

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The Marathousa 1 Lower Palaeolithic site is situated at the Megalopolis basin, inside an open-cast lignite mine. Mining activities uncovered a 8m thick sequence of Middle Pleistocene lacustrine deposits representing the environment of a palaeolake that periodically became a shallow swamp. The site was discovered in 2013 during a systematic palaeolithic/palaeoanthropological survey and excavated by a multidisciplinary team from the Ephoreia of Palaeoanthropology- Speleology and the University of Tübingen in the framework of the PaGE project. This article presents preliminary results from the ongoing excavation and reviews the state of knowledge about the site.

The three year excavation project revealed an almost complete skeleton of an elephant (*Elephas (Palaeloxodon) antiquus*) in direct association with a “small tools” lithic assemblage and rich faunal and floral records in a fine-grained depositional context that has allowed exceptional preservation. Radiometric dating, geological, palaeoenvironmental and biostratigraphical studies indicate that the hominin occupation at the site occurred around 0.5 Ma (MIS 13). The association of lithic artefacts with the elephant bones, the presence of broken bones and bones with cut-marks suggest that Marathousa 1 is a Lower Palaeolithic elephant butchering site, the only one so far known in the Balkans. Marathousa is a key site for documenting a high resolution palaeoclimatic and cultural context of the, so far, poorly known Middle Pleistocene archaeological record of Greece.

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## **Lithic raw materials in the Middle Kalamas basin, Thesprotia, NW Greece:**

### **A petrographical approach**

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Lithic raw materials studies contribute a lot to perceive human behavior and activities in Prehistory. Identifying sources of raw material and petrographic types that were used for the production of artifacts is important for the apprehension of human choice, exploitation territory, modes of acquisition, economic and technical systems, settlement and mobility patterns, but also relationships between close or distant groups and long-distance exchange networks.

The object of this paper is to present the first results of our research that has been taking place at the Middle Kalamas basin (Northwestern Greece), an area with abundant and high quality outcrops of siliceous rocks. Our research was embedded in a five year archaeological survey (2011-2015) organized by the Department of Archaeology of the University of Athens in collaboration with other scientific institutions, among them the Eberhard Karls University of Tübingen. The final purpose of this research is to examine the raw material availability and use in correlation with the archaeological material available in the archaeological sites. For the accomplishment of this target the first step was a petrographical analysis of the siliceous rocks in order to identify, characterize and classify raw materials that have been used for knapping tools. Almost all samples are coming from primarily geologic sources embedded in Jurassic, Senonian (Late Cretaceous) and Eocene limestones. All the samples were macroscopically described and thin sections from representative rock samples were observed microscopically. The results of these investigations provide already a reference database that can be useful for identifying the provenance of artifacts or assemblages not only in the Kalamas basin archaeological sites but in a broader geographical context. In this lecture we will present our methodology, the results of the field survey, the macroscopical and microscopical observations and discuss the perspectives of our study.



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## Inner ear form of the Middle Pleistocene cranium from Petralona Cave (Chalkidiki, Greece)

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Since its discovery in 1959, the Petralona cranium has led to controversial interpretations of hominin phylogeny and dispersal. The taxonomic assignment of the cranium has varied because its outer cranial form exhibits affinities to pene-contemporaneous fossils from both Europe and Africa, putting to question its relationship to Neanderthals as well as suggesting cross-continental contact between hominin populations during the Middle Pleistocene (Harvati, 2009). However, the Petralona specimen's affinities to other fossils is more variable when comparing the form of its endo-cranial structures, sometimes in conflict with inferences from the ecto-cranium (Prossinger et al., 2003; Seidler et al., 1997). While the bony labyrinth structure of the inner ear is thought to preserve a strong phylogenetic signal in hominins, it has thus far not been studied for the Petralona cranium. In this study, we therefore quantify the form of its inner ear semi-circular canals in order to further assess its taxonomic affinities. We do so using a suite of exploratory and multivariate statistical analyses, which include data from other Middle Pleistocene hominins, as well as Late Pleistocene fossils and extant modern human populations. Our results show that the Petralona specimen has greater affinities to other Middle Pleistocene fossils from Europe than those from Africa or Asia. We discuss our results in the context of current debates on the origins of the Neanderthal lineage and possible gene flow from Africa, previously hypothesized from paleontological and archaeological evidence and recently reiterated by paleo-genomic data (Meyer et al., 2016).

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## **In search of Pleistocene remains at the Gates of Europe, results from PaGE Project's directed surface survey of Pleistocene sediments in the basin of Megalopolis**

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The PaGE Project Megalopolis Basin consisted of a double intensive target specific surface survey of Pleistocene sediments from the Megalopolis basin in Arcadias, Peloponnese. Implementing field methods applied previously in the location of cave systems and Pleistocene cave sediments, the main goal of this systematic research focused on the identification of intact stratified remains in either stratigraphic sections or on remnants of exposed ancient surfaces. Conducted in 2012 & 2013 over a period of two field seasons, the project area consisted of the active open-cast lignite mine of Megalopolis where access to recently exposed sections were abundant and in the surrounding uplands/alluvial fans where *hominins* exploited the commanding views of the ancient lake. This paper presents the applied field methods and the archaeological results in conducting field research within the remnants of an Early to Middle Pleistocene ancient lake and lake system.

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## **The cultural material from the Lower Palaeolithic site of Marathousa 1, Megalopolis, Greece: preliminary results**

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The technological sophistication and behavior of early hominins in South-East Europe is poorly understood due to the scarcity of well-preserved, excavated assemblages. In this paper we present preliminary results from the study of the cultural material unearthed at the Lower Palaeolithic site of Marathousa 1 (MAR-1), Megalopolis, Greece. The MAR-1 lithic assemblage is composed of small-sized flakes and flake fragments, retouched tools, cores that are commonly small and exhausted, as well as a large number of debitage products, such as chips and shattered pieces. So far, there are no indications of bifacial debitage and a key aspect of the material refers to its 'microlithic' character. The MAR-1 industry fits well in a group of important Eurasian sites with flake-based, small-tool, non-handaxe assemblages, such as Isernia, Ficoncella, Bilzingsleben, Schöningen, Vértesszőlős and Revadim, many of which, like MAR-1, have yielded evidence of elephant or other mega-fauna exploitation. On the basis of the ongoing analysis of lithic material from three field seasons, we discuss aspects of assemblage composition and the role of raw material types, the main technological and typological traits of the industry, as well as the potential contribution of the MAR-1 evidence in broader discussions about Middle Pleistocene lithic techno-complexes and subsistence strategies in Europe. Moreover, we briefly present faunal material with flake scars and bone flakes, which suggest that hominin exploitation of the carcasses was not restricted only to marrow extraction and bone processing for nutritional needs, but included also the knapping of bones, potentially with the aim of using the knapped products as tools. Finally, we address research questions and methodological approaches that we plan to employ in the future, in order to further investigate the wider techno-functional, socio-economic and ecological contexts of the MAR-1 cultural material.



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## **The invisible record of the Marathousa 1 sediments:**

### **Phytoliths and diatoms**

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Three environmental proxies have been analysed in order to shed some light on our understanding of the vegetation and climate during the past human visits in Marathousa 1 site. Phytoliths, a terrestrial proxy as well as diatoms and sponges, both wet body proxies, were extracted from the sediments following the same methodology as all of them belong to silicate micro-remains. A pilot sampling was conducted focusing on archaeological and paleoecological questions. The results of the analysis show that the preservation of all proxies is poor causing interpretation problems. The method used was tested and needs to be improved in order to acquire better results given the poverty of remains. Nevertheless, the reproducibility test of the method shows relatively good results and therefore a first estimation of the palaeoenvironment is attempted. Phytolith assemblages provide evidence of different climate with respect to time and different vegetation with respect to space, i.e. area A vs area B. On the other hand diatoms are badly weathered and have been recovered in minor quantities indicating turbulence by stream energy and transportation away from the shore resulting in frustule absence.