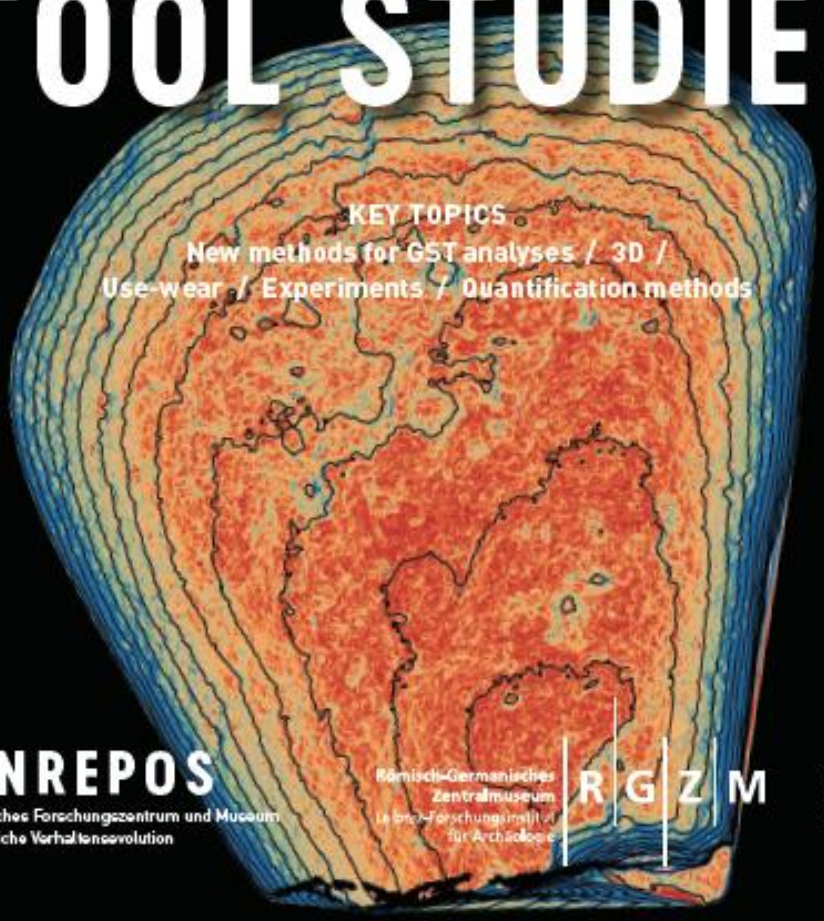
TRACEOLOGY & CONTROLLED EXPERIMENTS

TraCEr

Workshop / 5. and 6. March 2020

Multidisciplinary approaches on Pleistocene and Early Holocene

GROUND STONE TOOL STUDIES



KEY TOPICS
New methods for GST analyses / 3D / Use-wear / Experiments / Quantification methods

MONREPOS
Archäologisches Forschungszentrum und Museum für menschliche Verhaltensevolution

Römisch-Germanisches Zentralmuseum
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Workshop

Multidisciplinary approaches on Pleistocene and Early Holocene Ground Stone Tools studies

TraCEr, MONREPOS

Workshop Abstract

In paleoanthropological research, studies on Ground Stone Tools (GST) technology and function are of great interest for understanding the evolution of human behavior throughout time and space. These artifacts are assumed as a testimony of the most persistent and durable technological adaptation in human evolution during the Pleistocene, their appearance stretches from the earliest evidence of human activity to the present day across wide geographic distribution. By definition, this group includes any stone item that is primarily manufactured through mechanisms of abrasion, polish, or impaction, or itself used to abrade, polish or impact.

Today due to the development of new methods and techniques, namely related to microscopic and residue analyses is possible collect much more detailed information from lithic artefacts such Ground Stone Tools, that can represent a chance to observe evidences of diverse types of resources (e.g. perishable materials) even when only the lithic tools "survive" in the archaeological record.

This workshop aims to bring together researchers specialized in different specific methods but with the common goal of understand in detail GST technology and function in a diachronic perspective, in order to use this type of artifact as bridge to major questions related with Human behavior during the Pleistocene.

Contributions to this workshop should debate different methodologies of analyses (e.g. lithic raw materials; technology; use-wear; experiments, residues analyses, geometric morphometrics). All talks will be followed by a healthy discussion in order to share knowledge and new ideas about how to improve and standardize research on GST. We intend the eventual publication of papers from this workshop as a special journal issue on GST research.

Keywords: lithic technology, use-wear analysis, residue analysis, ground stone tools, raw material studies.

Workshop venue

The workshop will take place at MONREPOS Archaeological Research Centre and Museum for Human Behavioural Evolution, Neuwied, Germany. As a possible accommodation MONREPOS provides collegiate rooms available for guest researchers. Note that MONREPOS is isolated located and is not accessible by public transport, but we will arrange the transport by car from Neuwied train station. Here are the details for address and directions: http://monrepos-rgzm.de/home.html.

Due to the guest house limitations some guest researcher will be accommodated in local hotels. This will be organized by the workshop organization and arrange individually with each guest.

All meals and coffee-breaks during the workshop will be provided by the workshop organization. The social dinner will take place in a local restaurant and is not covered by the organization. Participation should be confirmed in advance.

Organization

- Eduardo Paixão, TraCEr, Laboratory for Traceology and Controlled Experiments. MONREPOS. **e-mail :** paixao@rgzm.de **telf:** +351 960464052
- João Marreiros, TraCEr, Laboratory for Traceology and Controlled Experiments. MONREPOS. marreiros@rgzm.de

Program:

Day 1 (March 5th):

Morning

9.30 - Eduardo Paixão (Opening talk)

9.45 - João Marreiros, *et al*. (Introductory lecture on Controlled Experiments and quantitative use-wear methods)

10.30 - Susana Carvalho, *et al. – Fifteen years of tracing archaeologically invisible steps in the technological evolution of early hominins: where should we be heading next?*

11.15 - Adrián Arroyo, *et al. - Wild capuchin monkeys (Sapajus libidinosus) pounding tools: a use-wear approach to understand early hominin activities*

12.00 - Lunch break

Afternoon:

14.00 - Danny Rosenberg - *Where were we? Where are we standing? And where are we going? The history of ground stone tools research in the southern Levant and feature challenges*

14.45 - Marion Prévost, *et al - Percussion tools as indicators for sites function and spatial organization during the Middle Paleolithic: preliminary data from the unit III, Nesher Ramla (Israel)*

15.30 - Eduardo Paixão, *et al - Multi-scale analytical approach to understand Ground Stone Tools from the Middle Paleolithic of Far'ah II (Southern Levant)*

16.15 - Debate

19.00 - ***Social Diner***

Day 2 (March 6th):

Morning

09.00 - Laure Dubreuil, *et al - Exploring the use of pebbles in burnishing activities*

09.4 5- Daniela Holst - *Functional analyses on Mesolithic Ground Stone Tools*

10.30 - Emanuela Cristiani, *et al - Combining Use Wear and Residue Analyses with Surface Metrology and Geomatic Techniques to Investigate the Function of Macro Tool. Preliminary Data from the Mesolithic Site of Vlasac (Serbia)*.

11.15 - Debate

12.00 – Lunch break

Afternoon:

14.00 - Laura Dietrich - *Understanding plant food technologies in Early Neolithic Göbekli Tepe: a quantitative approach to the functional analyses of Neolithic grinding stones and experimental replicas*

14.45 - Andrea Zupancich, *et al* - *"A matter of Qs": Combining Qualitative & Quantitative Approaches for the Study of Quartzite Macro Tools*

15.30 - Antonella Pedergnana - "*Talking residues": common methodologies and challenges*

16.00 - Debate

17.00 - Closing Talk (Eduardo Paixão)

Abstracts

Fifteen years of tracing archaeologically invisible steps in the technological evolution of early hominins: where should we be heading next?

Susana Carvalho[1,2,3]

[1]Primate Models for Behavioural Evolution Lab, School of Anthropology, Oxford University
https://primobevolab.web.ox.ac.uk/home
[2]Gorongosa National Park, Sofala, Mozambique
[3]ICArEHB, Algarve, Portugal

Percussive tools, *aka* pounding technology, are ubiquitous in the archaeological record, from the Pliocene (ca. 3.3 Ma) to the present. Traditionally, these tools were neglected due to their inner trait of being 'modified by use' and not 'prior to use' and were considered less sophisticated and less optimal to understand cognitive complexity and strategies of raw material selection, use, and abandonment. Paradoxically, percussive technologies allow for a rare comparative approach between human and non-human primate technology, including the use of stone and robust wooden anvils and hammers to crack nuts. Over the past 15 years much progress has been accomplished, both regarding the quality of these studies and the methods to analyse hominin archaeological assemblages and non-human primate behaviour (e.g. GIS, Deep Learning & Machine Learning, see Schofield et al. 2019, experimental). Equally, we have progressed with respect to what we know about the behaviours, socially and functionally (see Thompson et al. 2019), and the ecology that produces the damage we see and wish to interpret from past records (for reviews and key publications see Benito-Calvo et al. 2015; Carvalho and Beardmore-Herd 2019; Carvalho and Almeida-Warren 2019; Carvalho et al. 2008, 2009, 2012, 2019). In this talk, I will review the state of the art, and discuss data on processes of raw material selection, of use, reuse (recycling), discard, as well as some of the ecological variables affecting the location and formation of pounding tool sites (as per Almeida-Warren et al. 2019). The boundaries of science are being pushed further by including in this equation perishable materials and the possibility is open to analyse damage in wooden materials that could preserve in archaeological collections (see work by Pascual-Garrido 2018, 2019, and Luncz et al. in prep). I will end with a provocative idea: there may be behaviours that are not the product of tool-use, that could leave damage that is identifiable and measurable, and could fossilize, and I will provide a concrete example of ongoing research on this front (Muschinski et al. 2019). Finally, I discuss similarities and differences between the human and non-human primate records, and the hypothesis that our LCA (*Pan-Homo*, 7-12 Ma) was already a user of percussive technology (Rolian and Carvalho 2017).

References cited:

Almeida-Warren K, Matsuzawa T, Carvalho S. September 2019. A Home Range approach to the ecology of site selection in wild chimpanzee nut cracking. European Federation of Primatology/Primate Society of Great Britain Meeting

Benito-Calvo A.*, Carvalho S.*, Arroyo A., Matsuzawa T., de la Torre I. First GIS analysis of modern stone tools used by wild chimpanzees in Bossou, Guinea, West Africa. *PLoS ONE* 10(3): e0121613. doi:10.1371

Carvalho S, Braun D, Kaplan R, Beardmore-Herd M, Plummer T, Biro D and Matsuzawa T. 2019. Stone selection by chimpanzees reveals parallel patterns to Oldowan Hominins. Meetings of the European Society for Human Evolution, Liège (Abstract).

Carvalho S., Beardmore-herd M. (2019). Technological Origins: Primate Perspectives and Early Hominin Tool Use in Africa. *Oxford Research Encyclopedia of African History.* Ed. ThomasSpear.http://oxfordre.com/africanhistory/view/10.1093/acrefore/97880190277734.001.0001/acrefor e-9780190277734-e-75.

Carvalho S. and Almeida-Warren K. (2019). Primate Archaeology. In: Choe, J.C. (Ed.), Encyclopedia of Animal Behavior, (2nd ed.). vol. 1, pp. 397–407. Elsevier, Academic Press. ISBN: 9780128132517.

Carvalho S., McGrew W.C. (2012). The origins of the Oldowan: Why chimpanzees (*Pan troglodytes*) still are good models for technological evolution in Africa. In: Domínguez-Rodrigo, M. (Ed.) *Stone Tools and Fossil Bones: Debates in the Archaeology of Human Origins.* Cambridge University Press. Pp.222-244.

Carvalho S., Biro D., McGrew W.C., Matsuzawa T. (2009) Tool-composite reuse in wild chimpanzees (*Pan troglodytes*): Archaeologically invisible steps in the technological evolution of early hominins? *Animal Cognition* 12: 103-114.

Carvalho S., Cunha E., Sousa C., Matsuzawa T. (2008) Chaînes Opératoires and resource exploitation strategies in chimpanzee nut-cracking (*Pan troglodytes*). *Journal of Human Evolution* 55: 148-163.

Costa C, Braun D, Matsuzawa T, Carvalho S, Almeida-Warren, K. 2019. Water sources and tool site distributions: hominins and chimpanzees compared. *Annual Meeting of the Paleoanthropology Society*, April 9-10, Albuquerque, NM.

Muschinski J, Biro D, **Lewis-Bevan L, Carvalho S**. Could it be culture? An inter-troop comparison of baboon behaviour in Gorongosa National Park, Mozambique. Poster Session. European Federation of Primatology/Primate Society of Great Britain Meeting.

Rolian C. & Carvalho. S. (2017). Tool use and manufacture in the last common ancestor of *Pan* and *Homo.* In: Muller M., Wrangham R., Pilbeam D. (Eds.), *Chimpanzees and Human Evolution*. Harvard University Press. ISBN 9780674967953. Pp. 602-644.

Schofield D., Nagrani A., Zisserman A., Hayashi M., Matsuzawa T., Biro D., Carvalho S.

(2019). Chimpanzee face recognition using deep learning. *Science Advances*

Thompson J., Carvalho S., Marean C., Alemseged Z. (2019). The origins of the human predatory pattern: The transition to large animal exploitation by early hominins. *Current Anthropology*. https://doi.org/10.1086/701477

Wild capuchin monkeys (*Sapajus libidinosus*) pounding tools: a use-wear approach to understand early hominin activities

Adrián Arroyo[1,2*], Tiago Falótico[3] and Tomos Proffitt[4]

[1] Institut Català de Paleoecologia Humana i Evolució Social (IPHES), Zona Educacional 4, Campus Sescelades URV (Edifici W3) 43007, Tarragona (Spain).
[2] Universitat Rovira i Virgili (URV), Àrea de Prehistòria, Avinguda de Catalunya 35, 43002 Tarragona, Spain
[3] School of Arts, Sciences and Humanities. University of São Paulo. Brazil
[4] Institute of Archaeology, University College London, 31–34 Gordon Square, London WC1H 0PY (UK)

* adri.arroyourena@gmail.com / aarroyo@iphes.cat

Wild Capuchin monkeys (*Sapajus libidinosus*) from Serra da Capivara (Brazil), are among the non-human primates that perform the widest variety of activities using stone cobbles. Primatologists have closely documented these actions from a behavioral perspective, but very little is known about the physical characteristics of the tools themselves. Here we redress this imbalance and adopt an archaeological perspective to the analysis of capuchin pounding tools. We apply, for the first time, microscopic use wear techniques to the analysis of a group of capuchin stone cobbles used for digging, nut cracking (cashew nuts, *Anacardium occidentale*) and seed processing to characterise their damage patterns. This work contributes to a growing reference collection of non-human primate percussive technology that can be used to identify different activities within the primate archaeological record, and to understand use-wear patterns on percussive objects to investigate if similar activities could have been part of early hominin behaviors.

Where were we? Where are we standing? And where are we going? The history of ground stone tools research in the southern Levant and feature challenges

Danny Rosenberg

Laboratory for Ground Stone Tools Research, Zinman Institute of Archaeology, University of Haifa, Haifa, Israel.

drosenberg@research.haifa.ac.il

Over a century of archaeological research in the southern Levant, spanning from the 19th century to the 1990's, resulted in a surprisingly limited corpus of ground stone tools research and related publications. This reflects limited scholarly interest in these archaeological artifacts and a depreciation of their potential to contribute to our understanding of human behavior. This situation changed during the early 1990's with a gradual increase in the number of publications and specific site reports; the change was mainly influenced by the development of ground stone tools research in Europe and the United States. The beginning of the 21st century reflects a dramatic rise in the number of ground stone tools-focused studies, with the development of new approaches and methodologies and an increase in published assemblages. Today, extensive datasets and research pertaining to ground stone tool assemblages from prehistoric through historic periods in the southern Levant are published, mainly yet not solely the results of various studies conducted by the Laboratory for Ground Stone Tools Research (LGSTR) at the Zinman Institute of Archaeology, University of Haifa. The current presentation will illuminate some of the developments within ground stone tools studies in the southern Levant in the last two decades, through a survey of a series of case studies on some of the approaches chosen and research conducted in the LGSTR in recent years. Some general comments and conclusions, regarding the future of ground stone tools research will also be discussed.

Percussion tools as indicators for sites function and spatial organization during the Middle Paleolithic: preliminary data from the unit III, Nesher Ramla (Israel)

Marion Prévost, Yossi Zaidner

Institute of Archaeology, The Hebrew University of Jerusalem, Israel

Even though, the passive and active percussions elements (*ie*; Ground stone tools) are indispensable tools to proceed with a wide diversity of domestic's activities like flint knapping, food processing or butchering, they are hardly found and barely described within the Middle Paleolithic record. Generally, the knapped lithic and faunal remains records are used as proxy for the understanding of the function of the site and to apprehend the site spatial organization. Adding data on the percussion activities may help exploring these issues and open new perspectives in understanding prehistoric technical behaviors.

The unit III at the open-air site of Nesher Ramla, dated to the beginning of marine isotope stage 5, brings the possibility of combining data from the lithic technology, the archaeozoology and the large percussion tools assemblage. The lithic technological organization of the large assemblage (~27 000 items) indicates that intense knapping activities took place on site. The unit III also shows a good preservation of spatial features; with the presence of several anthropogenic accumulations of artifacts spread over the surface and associated with several combustion features. These accumulations are composed of lithics, animal bones, manuport and percussion tools.

In this communication we present a preliminary characterization of the percussion tools assemblage. Our analysis is only based on naked eye observations. The studied sample includes a large amount of limestone pebbles and blocks and few flint pebbles. The techno-typological study of the stones includes general morphological and metrical data together with a description of the types of marks and wears, and their location on the surfaces. For now, preliminary classification of the artifacts is as follows: around 140 hammerstones, 15 possible anvils, few polished/abraded and striated pebbles as well as other 150 manuports which do not wear marks visible to naked eye. The context of discovery of these tool types, their association with other artifacts and features are discussed through spatial distribution analyses.

Using this data and by comparison with published archaeological and ethnographical evidence we want to test the role of the percussion tools for the understanding of the site function, the length of occupation and the use of space.

Multi-scale analytical approach to understand Ground Stone Tools from the Middle Paleolithic of Far'ah II (Southern Levant)

Eduardo Paixão[1,2,3], João Marreiros[1,2,3], Mae Goder-Goldberger[4], Walter Gneisinger[1]

1- Laboratory for Traceology and Controlled Experiments (TraCEr), MONREPOS – Archaeological Research Centre and Museum for Human Behavioural Evolution. RGZM. GERMANY. paixao@rgzm.de
2- Institute for Prehistoric and Protohistoric Archaeology. Johannes Gutenberg University
3- ICArEHB – Interdisciplinary Center for Archaeology and Evolution of Human Behaviour, Universidade do Algarve, Portugal
4- Bible, Archaeology and Ancient Near East Department, Ben-Gurion University of the Negev,10 Beer Sheva, Israel

Ground Stone Tools (GST) technology and function are of great interest for understanding the evolution of human behavior throughout time and space. These artifacts are a testimony of the most persistent and durable technological adaptation in human evolution, their appearance stretches from the earliest evidence of human activity to the present day across wide geographic areas. GST can preserve traces related with a wide range of uses, amongst which diet, technology and non-functional behavior are the most prominent. In this sense, the type of materials that compose these traces, can provide information about important changes in the archaeological record.
Although GST have been identified in several Middle Paleolithic Levantine sites, the detailed study of this type of artifact is still minimal , leaving huge gaps in the knowledge about many aspects of this technology, such as: a) specific function/s of this type of tools, b) relation with the location and type of site c) raw material management, c) the implication of these tools to understanding diet and technology.

Located in the north western Negev desert, the site of Far'ah II (49-48ka BP) presents a rich Late Middle Paleolithic archaeological assemblage composed of fauna, charcoal and lithic artifacts. Among the lithic assemblage, Ground Stone Tools (GST) are represented by several limestone tools with clear presence of impact marks and striations. The variety and good state of preservation of these artifacts , associated with an in situ well defined living surface, makes Far'ah II an exceptional case study for the study of GST in the Levant.

In order to characterize and understand the GST assemblage from Far'ah II, we present here a methodological study based on a multi-scale analytical approach, combining 3D scanning data and microscopic analyses.

Scans of entire artifact with a portable 3D scanner (Light 3D-Scanner Pro S2), are used to generate Digital Elevation Models for spatial and topographic surface analyses of the surfaces. This method generates quantitative data that allow us to identify patterns of possible use-wear damage on the natural surfaces of the artifacts. 3D scans will also be used for morphometric analyses including measurements, volume and mass. In this study microscopic analyses allow the characterization of use-wear traces, including impact marks, striations and polish areas. This project seeks to attribute a GST classification based on combining quantitative and qualitative data, with the support of an experimental background.

Exploring the use of pebbles in burnishing activities

Laure Dubreuil[1], Jérôme Robitaille[2], and Anna Stroulia[3]

1- Trent University, Canada
2- EHESS, Toulouse, France
3- University of Southern Indiana, USA

Ground stone tool analysis has expanded in the last decade, focusing not only on 'formal' tools (e.g., celts and grinding implements) which have traditionally attracted most scholarly attention, but also exploring 'ad hoc' implements (used without prior manufacture). The development of use-wear approaches has been particularly instrumental for the identification of 'ad hoc' tools and has shown the potential of these artifacts to illuminate a wide range of ancient activities. Among these activities is the burnishing of mineral matters such as mud, clay, or plaster carried out in the context of pottery production or construction. This paper presents various examples of such tools from different contexts (Natufian of the Southern Levant and Greek Neolithic), explores their use-wear characteristics and those of experimental specimens, and also discusses ethnographic data. It is argued that: 1) the recurrent use-wear features observed on these tools may allow us to define a 'family wear' characteristic of burnishing activities; 2) quantification appears to be an important step to better define the wear patterns associated with specific use contexts.

Functional analyses on Mesolithic Ground Stone Tools

Daniela Holst

University of Cologne, Germany

The recently started project aims to reconstruct the use history of GST from selected early Holocene Mesolithic sites in Northern Germany. The case studies include find materials from the sites of Duvensee, Rothenklempenow, Friesack and Neustadt, that are distinguished by an excellent organic preservation and careful documentation. The analyses focus on quantitative reconstructions of the functions and the economy of ground stone tools in the respective settlement and subsistence contexts.

Worldwide the early Holocene is characterised by profound changes in subsistence, the beginning of a more intensive management of landscapes and the resources therein. Regionally this let to increasing sedentism and territoriality and/ or the cultivation and domestication of food resources respectively.

Bog sites with well-preserved organic remains indicate such profound changes in food processing and storage, fire and crafts technology also for the Mesolithic of Central and Northern Europe. Ground stone tools seem to have played a major role in Mesolithic subsistence and economy. They are regularly detected, sometimes in sufficient numbers and sizes. According to their find contexts and surface alterations GST seem to have been used for a wide range of activities, including food preparation, manufacturing of tools, as building material or heat conductor. Furthermore, in the Mesolithic period ground stones - for the first time - have been deliberately modified by polishing and drilling into mace-heads or axes. Still, GST receive very little attention in Mesolithic research.

Analysis include identification of raw material and morphology, analyses of use wear and residues, measuring of heating temperatures as well as experiments on tool use and heating. Intra-site spatial investigations will contextualize the results.

Combining Use Wear and Residue Analyses with Surface Metrology and Geomatic Techniques to Investigate the Function of Macro Tool. Preliminary Data from the Mesolithic Site of Vlasac (Serbia).

Emanuela Cristiani[1], Andrea Zupancich[1]

[1]DANTE - Diet and ANcient TEchnology Laboratory, Sapienza University of Rome, Italy

In this presentation we discuss the scientific benefits of an integrated approach consisting in the use of 3D modeling, surface metrology, GIS, use wear and residue analyses devoted to the interpretation of ancient stone tool use. We discuss the possibility of monitoring changes in surface morphometry using 3D modeling and surface metrology as well as the potential to improve the results obtained by the application of use wear at low and high magnifications. Geomatic analysis of tools' surfaces allows to objectively quantify patterns of surface-modifications associated to specific activities (e.g., grinding, crushing and pounding) and/or worked materials. Our study focuses on the analysis of experimental macro tools utilized in a variety of activities and substances including vegetal, animal and mineral materials. Along with presenting the results of our dedicated experimental framework, we will provide preliminary data coming from the application of the aforementioned combined approach to the archaeological materials. In particular, we will show that the application of such an approach led us to provide a solid interpretation concerning the use of macro tools found at the Mesolithic site of Vlasac (Serbia) located in the Danube Gorges of the central Balkan region. We will show how an integrated approach combining geomatic techniques such as 3D modeling surface metrology, residue and use wear analyses has provided new means for (a) understanding the use of archaeological macro tools under investigation, and (b) acquiring and evaluating relevant morpho-functional information on stone artefacts while in the field.

Understanding plant food technologies in Early Neolithic Göbekli Tepe: a quantitative approach to the functional analyses of Neolithic grinding stones and experimental replicas

Laura Dietrich

German Archaeological Institute

During the 10th and 9th millennia BC, at Göbekli Tepe in southeastern Anatolia hunter-gatherers constructed the first monumental architecture of mankind. Important questions regarding this site concern the way in which small-scale groups joined their forces for the massive construction work, and how they secured their subsistence during the prolonged work at the site. More than 10.000 grinding stones were discovered at Göbekli Tepe, ranging from flat slabs over deep bowls to mortars, pestles and handstones. In order to handle such an unusually high number of finds, the functional analyses were conducted in three steps. On a first level, all finds were analyzed by optical examination and tactile investigation. On selected diagnostic pieces 3D-modeling and spatial analysis of microscopically visible use-wear traces were carried out on a second level. On a third level, a comparison of the results with experimentally manufactured and used objects was realized. During the experiments, use-wear was related to shapes and to grinding motions as important analytical parameters. This quantitative approach allows to process a large amount of objects and to identity distinct plant food technologies, as for example the production of fine or coarse cereal flour.

“A matter of Qs”: Combining Qualitative & Quantitative Approaches for the Study of Quartzite Macro Tools

Andrea Zupancich, Emanuela Cristiani

DANTE - Diet and Ancient Technology Laboratory, Sapienza Università di Roma

The application of quantitative analysis in the field of study of stone tool biographies has seen a significant growth in the last few years. Numerous studies have proven the reliability of geomatic approaches and surface measuring techniques in the study of use wear patterns derived from the use of macro lithic tools, namely groundstones and handstones. Within the wealth of works recently published on the matter, yet, a comparison between the data achieved through the analysis of stone tools at low and high magnifications and the one originated from the application of quantitative approaches is still lacking. In this talk we will present the results of qualitative and quantitative approaches applied to the same experimental sample of groundstones and handstones utilised in a variety of activities including the working of plant foods as well as animal and mineral matters. We discuss the application of quantitative analyses as 3D 360° surface morphometric analysis and GIS, based upon the processing of 3D models created through Close Range Photogrammetry, to monitor use-related surface modification patterns and their combination with the data obtained through the analysis of the tools at low and high magnification. We will highlight the potentials of certain quantitative approaches in use wear and residue studies (i.e. identification of functional and prehensive areas, morphometric data regarding use related damages) along with its limits in the study of macro lithic tools function. Finally, we will underline the importance of combining quantitative and qualitative data in use wear and residue analyses for a thorough functional interpretation of material culture.