INTERNATIONAL OPEN WORKSHOP
Socio-Environmental Dynamics over the Last 12,000 Years: The Creation of Landscapes IV

March 24 – 27, 2015 / Kiel University

PROGRAMME and ABSTRACTS

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INTERNATIONAL OPEN WORKSHOP
Socio-Environmental Dynamics over the Last 12,000 Years: The Creation of Landscapes IV
Kiel, March 24-27, 2015

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PROGRAMME and ABSTRACTS

Publisher:
Graduate School Human Development in Landscapes at Kiel University
Leibnizstr. 3, DE-24118 Kiel
office@gshdl.uni-kiel.de
Phone +49 431 880 5924

Editing:
Jirka Niklas Menke

Proofreading:
Eileen Kücükkaraca

Closing date: March 10, 2015
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Preface

A warm welcome to Kiel!

In its fourth edition, the International Open Workshop “Socio-Environmental Dynamics over the Last 12,000 Years: The Creation of Landscapes” has attracted more than 200 active participants who will present their talks or posters. I am particularly delighted about the engagement that our PhD students have shown in the workshop: They will not only present their research projects, but also chair and organize entire sessions. The same applies to the post-doctoral fellows, principal investigators and international partners of the Graduate School Human Development in Landscapes.

In addition to emphasizing the Graduate School’s focus on early-stage researchers, the workshop also mirrors the interdisciplinarity that we enjoy in the School every day: archaeologists and archaeobotanists have organized sessions as well as classicists, aDNA and isotope researchers. I am sure the event will be a great opportunity for all participants from around the world – yes, we even welcome participants from “down under” – to gain insight into fascinating new research fields and projects and to broaden their networks.

I wish you an inspiring, fruitful workshop.

Johannes Müller

Speaker of the Graduate School
Human Development in Landscapes
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Programme overview

Unless otherwise specified, venue is Leibnizstraße 1.

Tuesday, March 24

Registration
9:30  |  > Workshop Office, Room 104

Introduction and Keynote lectures
> Klaus Murmann Lecture Hall, Leibnizstr. 1
13:30  |  Welcome address by Johannes Müller, Speaker of the Graduate School Human Development in Landscapes
13:45  |  Presentation of the Johanna Mestorf Award
14:00  |  Keynote lecture: Judith Barringer (University of Edinburgh / FU Berlin) - The Multiple Landscapes of Olympia
14:45  |  Keynote lecture: Pál Raczy (Eötvös-Loránd-University, Budapest) - A century of changing archaeological perspectives at Polgár-Csőszhalom (Hungary)
15:30  |  Coffee
16:00  |  Keynote lecture: Ben Krause-Kyora (Graduate School Human Development in Landscapes / Institute of Clinical Molecular Biology, Kiel University) – Ancient DNA - tracing the molecular past

Sessions
Please be aware that room allocations might change during the workshop.

17:00  |  Session 1-2 > Room 207 | Session 1-3 > Room 209 | Session 2 > Room 204 | Session 3-3 > Room 106 | Session 5 > Room 105
> Please refer to the respective session programmes on the following pages for details.

Icebreaker
19:30  |  > Geologisches und Mineralogisches Museum, Ludewig-Meyn-Str. 12

Wednesday, March 25

Sessions
Please be aware that room allocations might change during the workshop.

9:00  |  Session 1-3 > Room 209 | Session 2 > Room 204 | Session 3-3 > Room 106 | Session 4 > Room 207 | Session 5 > Room 105 | Session 8 > Room 208
> Please refer to the respective session programmes on the following pages for details.

10:30  |  Coffee
11:00  |  Session 1-3 > Room 209 | Session 2 > Room 204 | Session 3-3 > Room 106 | Session 4 > Room 207 | Session 5 > Room 105 | Session 8 > Room 208
12:30  |  Lunch
14:00  |  Session 1-3 > Room 209 | Session 2 > Room 204 | Session 3-1 > Lecture Hall | Session 3-2/3-3 > Room 106 | Session 4 > Room 207 | Session 5 > Room 105 | Session 8 > Room 208
15:30  |  Joint Poster Session / Coffee
16:30  |  Session 1-1 > Room 208 | Session 1-3 > Room 209 | Session 2 > Room 204 | Session 3-1 > Lecture Hall | Session 3-2/3-3 > Room 106 | Session 4 > Room 207 | Session 5/11 > Room 105

Conference Dinner
19:30  |  > Restaurant Kieler Schloss, Wall 74
Thursday, March 26

Sessions

Please be aware that room allocations might change during the workshop.

9:00 | Session 1-1 > Room 208 | Session 1-3 > Room 209 | Session 3-1 > Room 204 | Session 9 > Room 105 | Session 10 > Room 106
> Please refer to the respective session programmes on the following pages for details.

10:30 | Coffee

11:00 | Session 1-1 > Room 208 | Session 3-1 > Room 204 | Session 7 > Room 209 | Session 9 > Room 105 | Session 10 > Room 106

12:30 | Lunch

14:00 | Session 1-1 > Room 208 | Session 3-1 > Room 204 | Session 7 > Room 209 | Session 9 > Room 105 | Session 10 > Room 106

15:30 | Coffee

16:00 | Final Plenary Meeting / Session Reports > Lecture Hall

Friday, March 27

Excursion "Land between the Seas – Natural and Artificial Boundaries"

8:00 | Start >in front of Leibnizstr. 1
Programme Session 1-1

Fish(ing) communities and fishing technologies in inland waters, rivers and at the coast

Wednesday, March 25

16:30 | Ulrich Schmöelcke [Center for Baltic and Scandinavian Archaeology; presenting author], Dirk Heinrich
The mid-Holocene development of the fish fauna and the related environmental change in the southwestern Baltic area

17:00 | Harry Robson (University of York; presenting author), Søren H. Andersen
Eel fishing in the Mariager Fjord during the Late Mesolithic and the Early Neolithic: New archaeoichthyological data

17:20 | Kenneth Ritchie (Center for Baltic and Scandinavian Archaeology; presenting author), Svend Hansen
Chalcolithic fishery at Pietrele, Romania as described from fish and fishing technology remains

17:40 | Henriette Kroll (Römisch-Germanisches Zentralmuseum Mainz)
The Diversity of Regional Fisheries in the Early Byzantine Empire

Thursday, March 26

9:00 | Vladimir Lozovski (presenting author), Olga Lozovskaya [both Institute for the History of Material Culture, St. Petersburgh]
Stone Age fishing communities and fishing structures in Eastern Europe: 137 years of studies

9:30 | Lisbeth Pedersen (Museum Lolland-Falster)
8000 years of eel fishing in Denmark from coast to coast

9:50 | Terje Stafseth (Museum Lolland Falster)
Breaking news – Unearthed Weirs reveal new knowledge about Neolithic fishery in Denmark

10:10 | Lars Ewald Jensen (Museum Lolland Falster)
Fishery in the dawn of agriculture

10:30 | Coffee
Programme Session 1-2

Tracing Disease through Time

Tuesday, March 24

16:30  |  Nils Müller-Scheßel (Römisch-Germanische Kommission; presenting author), Carola Berszin, Annette Schwentke, Anja Staskiewicz, Joachim Wahl
Comparing health impairments and diseases of Iron Age individuals from ‘regular’ and settlement burials in Central Europe

16:50  |  Verena Schuenemann (Institute for Archeological Sciences, University of Tübingen)
Insights into the evolutionary history of Mycobacterium leprae from medieval genomes

17:20  |  Marion Bonazzi (Graduate School Human Development in Landscapes / Institute of Clinical Molecular Biology, Kiel University)
The St. Jorgen Leprosarium Cemetery: A glimpse into Mycobacterium Leprae and tuberculosis genomics and co-evolution

17:40  |  Lena Möbus (Institute of Clinical Molecular Biology, Kiel University)
Detection of inflammation associated SNPs in Danish leprosy samples from the Middle Ages

18:00  |  Dorthe Dangvard Pedersen (University of Southern Denmark, ADBOU)
The presence of tuberculosis in the German-Danish border region in the medieval period
Programme Session 1-3

Ancient Human Diets in Context

Tuesday, March 24

17:00 | Margaret Schoeninger (University of California, San Diego)
Divergent human diets across different new world socioenvironmental systems

17:30 | Francisca Santana Sagredo (presenting author), Julia Lee-Thorp, Rick Schulting, Mauricio Uribe (1 Research Laboratory for Archaeology and the History of Art, University of Oxford, Oxford, UK; 2 Departamento de Antropologia, Universidad de Chile, Santiago, Chile)
Dietary variability and mobility patterns in the world’s driest desert: application of stable isotope analysis to ancient populations from the Atacama

17:50 | Veronica Silva-Pinto (Max Planck Institute for Evolutionary Anthropology; presenting author), Domingo Salazar-Garcia (University of Cape Town / MPI for Evolutionary Anthropology)
Diet and nutrition in the process of adoption of agriculture in western valley regions of the South Central Andes, Chile

18:10 | Maria Dobrovolskaya (presenting author), Asya Engovatova (both Russian Academy of Sciences Institute of Archaeology)
The isotopic signatures of the “kremlin diet”: A bioarchaeological reconstruction based on human skeletal remains from medieval Russian cities

Wednesday, March 25

9:00 | Michael Richards (UBC and MPI)
Aquatic foods and the spread of early modern humans into Eurasia

9:30 | Marcello A. Mannino (presenting author), Sahra Talamo, Antonio Tagliazzeto, Daniele Albertini, Monica Gala, Vincenzo Formicola, Elisabetta Starnini, Angiolo Del Lucchese, Renata Grifoni Cremonesi, Francesco Mallegni, Michael P. Richards (1 Department of Human Evolution, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany; 2 Museo Nazionale Preistorico ed Etnografico "Luigi Pigorini", Roma, Italy; 3 Dipartimento di Etologia, Ecologia, Evoluzione – Unità di Antropologia, Università di Pisa, Italy; 4 Soprintendenza per i Beni Archeologici della Liguria, Genova, Italy; 5 Dipartimento di Scienze Archeologiche, Università di Pisa, Italy; 6 Museo Archeologico e dell’Uomo "Alberto Carlo Blanc", Viareggio, Italy; 7 Department of Anthropology, University of British Columbia, Vancouver, Canada)
Mediterranean diets during the Pleistocene/Holocene transition: Isotopic studies on bone collagen of hunter-gatherers buried at cave sites in Italy

9:50 | Alexander Weide (University of Tübingen, Institute for Archaeological Sciences; presenting author), Britt M. Starkovich, Mohsen Zeidi, Nicholas J. Conard
Changing subsistence strategies at the aceramic Neolithic site of Chogha Golan (Iran)

10:10 | Nils Müller-Scheeßel (Römisch-Germanische Kommission; presenting author), Gise-la Grupe, Carola Berszin, Annette Schwentke, Anja Staskiewicz, Joachim Wahl
Diet in the Iron Age of Central Europe according to age and social status

10:30 | Coffee

11:00 | Julia Beaumont (School of Archaeological Sciences, University of Bradford)
Identifying Famine in the Human Past

11:20 | Catrine Jarman (Department of Archaeology and Anthropology, University of Bristol; presenting author), Reidar Solsvik (Kon-Tiki Museum), Terry Hunt (University of Oregon), Brian N. Popp (University of Hawai’i)
Why terrestrial diets in marine locations? Considerations of nitrogen isotopic results from Rapa Nui

11:40 | Thomas Larsen (Leibniz Laboratory for Isotope Research, Christian-Albrechts-Universität zu Kiel; presenting author), Brian Fry, Australian Rivers Institute, Griffith University, Australia
Dietary reconstructions with stable isotope analysis of amino acids

12:00 | Ricardo Fernandes (Kiel and Cambridge Universities)
Improved quantitative human diet reconstruction: Combining multiple sources of archaeological evidence

12:30 | Lunch

14:00 | Roksana Chowaniec (presenting author), Anna Gręzak (both University of Warsaw, Institute of Archaeology)
General remarks about diet of inhabitants of ancient Akrai, Sicily

14:20 | Markus Fjellström (Archaeological Research Laboratory, Stockholm University)
Approaching reindeer domestication in Northern Sweden – Analysis of carbon, nitrogen and sulphur stable isotopes on archaeological bone material
**Session 1-3 contributions to the joint poster session**

**Ricardo Fernandes** (Kiel and Cambridge Universities)

*Using 14C as a dietary tracer in ancient human diet reconstruction*

**Natalia Shishliina**, R.Fernandes$^{1,2,3}$, E.Kaverzneva, V.Sevastyanov$^5$, A.Bobrov$^4$ (1 State Historical Museum, Moscow, Russia; 2 Institute for Ecosystem Research, University of Kiel, Kiel, Germany; 3 Leibniz-Laboratory for Radiometric Dating and Isotope Research, University of Kiel, Kiel, Germany; 4 McDonald Institute for Archaeological Research, University of Cambridge, Cambridge; 5 GEOKI RAS, Moscow, Russia; 6 State Moscow University)

*Investigating the dietary habits of Eneolithic-Bronze Age populations in the forest zone of Eastern Europe (Shagara cemetery) using stable isotope analysis*

**Marco Bonafini** (Radiocarbon dating laboratory IRPA/KIK; presenting author), Quintelier K. (Flanders Heritage Agency, Royal Belgian Institute of Natural Sciences), Moro G. (University of Venice), Palmer J. (University of Leiden), Boudin M. (Royal Institute for Cultural Heritage IRPA/KIK)

*Exploring social variability by stable isotope (C, N) ratios within the monastic and lay population buried at the post-medieval Carmelite friary of Aalst (Flanders, Belgium)*

**Rebecca Nicholls** (presenting author), Buckberry, Jo; Koon, Hannah E. C. (all Department of Archaeological Sciences, University of Bradford, UK)

*A high resolution isotopic investigation of infantile scurvy*

**Patrícia Saragoça** (Laboratório HERCULES, Universidade de Évora, Portugal; presenting author), Anne-France Maurer, Lucija Soberl, Maria da Conceição Lopes, Rafael Alfenim, Inês Umbelino, Teresa Fernandes, Maria João Valente, Sara Ribeiro, Cristina Dias, José Francisco Santos, Ana Isabel Janeiro

*Multianalytical and isotope investigation of a Late Roman/Palaeochristian population from the far west corner of the Roman Empire [Pax Julia]*

**Lorenzo Zamboni** (University of Milan-Bicocca, Milan, Italy)

*The GR-EAT Project: Greek eating culture in the Western Mediterranean, 6th–3rd century BC*

**Vera Klontza-Jaklova** (Institute of Archaeology and Museology, Faculty of Arts, Masaryk University at Brno, Czech Republic; presenting author), Sue Bridgford, Sylvia Desmond, Valasia. Issakidou, Georgia Kotsamani, Frank Lynnam, Barry Molloy, Ioanna Moutafi, Ruth O’Donoghue

*Diet in Priniotikos Pyrgos (Crete): Preliminary results*

**Carmine Lubritto** (Dep. of Environmental Science and Technology - Second University of Naples; presenting author), Paola Ricci, Simona Altieri, Maite Iris García Collado, Juan Antonio Quirós Castillo
Social archaeology in Basque rural communities between the early and late medieval period (Spain): radiocarbon dating and palaeodietary studies

Daria Zavgorodnyaya (Novosibirsk State University, Russia)

Dental pathologies of the Iron Age Pazyryk culture population (materials of the Barangol nekropolis)

Catherine Walker (UCL Research Department of Genetics, Evolution and Environment, University College London)

Human genetic adaptation to dietary changes: Are we optimised to an ancient Paleolithic diet?
Programme Session Block 2

Discourse and Perceptions of Landscape: views from antiquity

Tuesday, March 24

16:45  |  Opening remarks

17:00  |  Jan Reinhold Stenger [University of Glasgow, Classics]
Into the Wild: Mirror Landscapes in Late Antiquity

17:25  |  Veronika Egetenmeyr [Graduate School Human Development in Landscapes, Kiel University]
The perception of “barbarians” and landscape in the work of Sidonius Apollinaris

17:50  |  Maren C. Biederbick [Graduate School Human Development in Landscapes, Kiel University]
The salamander – From legitimization of power on the threshold to early modern times to touristic re-enactment-marketing of today’s cityscapes

Wednesday, March 25

8:45   |  Alice Landskron [University of Vienna]
The perception of landscapes in Lycia: Lycian tombs

9:10   |  Jessica Susanne Krause [Graduate School Human Development in Landscapes, Kiel University]
Theseus abroad: On the depiction of the cycle of deeds performed by Theseus on the reliefs of the Heroon at Trysa

9:35   |  Florian Schimpf [GRK 1876 Frühe Konzepte von Mensch und Natur, Johannes Gutenberg-Universität Mainz]
Suburban nature as a sacred landscape

10:30  |  Coffee

10:45  |  Nathan Wright [The University of Queensland]
Woodland modification in Bronze and Iron Age Central Anatolia: An anthracological signature of the Hittite state?

11:10  |  Milinda Hoo [Graduate School Human Development in Landscapes, Kiel University]
Faces of Ai Khanum: On cultural identification and the Greek question

11:35  |  Raphael Weyland [Université de Montréal / Département d’histoire]
A river runs through it: The relative localisation of Seleukeia, Ctesiphon, Vologesias and Veh-Ardashir

12:00  |  Lunch

13:30  |  Lutz Käppel [Graduate School Human Development in Landscapes, Kiel University]
Physical, social, and imaginary landscape in Ancient Greece

13:55  |  Kleoniki Rizou [Graduate School Human Development in Landscapes, Kiel University]
The landscape of the Muses in Euripides’ Heracles

14:20  |  Maria Deoudi [Arch. Institut Universität Erlangen]
Maroneia. A new urbanistic interpretation

14:45  |  Nadine Krütgen [Graduate School Human Development in Landscapes, Kiel University]
Different concepts of the visualization of luxury in Roman landscape art

15:30  |  Joint Poster Session / Coffee

16:15  |  Thomas Meier [Universität Heidelberg, Institut für Ur- und Frühgeschichte und Vorderasiatische Archäologie]
Spatial materialisations of discourse

16:40  |  Martin Furrholz [presenting author], Martin Hinz [both Institute of Pre- and Protohistoric Archaeology at Kiel University]
Putting things into practice: Exploring the consequences of pragmatic theory for archaeology

17:05  |  Gustav Wollentz [Graduate School Human Development in Landscapes, Kiel University]
A Question of Means and Ends. The Need to integrate multiple biographical Approaches

17:30  |  Artur Ribeiro [Graduate School Human Development in Landscapes, Kiel University]
Minimal ontology and archaeological theorizing
Programme Session 3-1

Fortifying Bronze Age Landscapes

Wednesday, March 25

14:00 | Opening remarks

14:10 | Anthony Harding [University of Exeter, Department of Archaeology]
*Landscapes of fortification in the Late Bronze Age Banat*

14:40 | Gabriella Kulcsár [presenting author], János Dani, Klára P. Fischl, Viktória Kiss, Vajk Szeverényi  
(1 Institute of Archaeology Research Centre for the Humanities Budapest, Hungary; 2 Déri Museum, Debrecen, Hungary; 3 University of Miskolc, Hungary)
*Dividing space, time and society: Fortified settlements in the Carpathian Basin (ca. 2800–1500 BC)*

15:05 | Mateusz Strózyk [Poznań Archaeological Museum]
*Fortifications in the landscape: Preferences of location of Early Bronze Age settlement from Bruszczewo*

15:30 | Joint Poster Session / Coffee

16:30 | Jozef Batora, Peter Toth [Department of Archaeology, Faculty of Arts, Comenius University in Bratislava; presenting author], Knut Rassmann
*On the problems of fortifications of the Early Bronze Age in the region of the middle Danube*

16:55 | Nicole Taylor [Institute for Pre- and Protohistory and Graduate School Human Development in Landscapes, Kiel University; presenting author], Gabriella Kulcsár [co-presenting author], Timothy K. Earle, Mateusz Jaeger [co-presenting author], Viktória Kiss, Gábor Márkus, Johannes Müller, Gábor Serlegi, Vajk Szeverényi
*Bronze Age landscapes along the Danube – Benta project and Kakucs Archaeological Expedition*

17:20 | Florin Gogăltan [Romanian Academy of Sciences, Institute of Archaeology and Art History, Cluj Napoca, Romania]
*Building power without power? Bronze Age fortified settlements in the Lower Mureş Valley*

17:45 | Leonard Dorogostaisky [presenting author], Micle, Dorei, Stavila, Andrei  
(1 ArheoVest NGO, Timisoara, Romania; 2 Department of History, West University of Timisoara, Faculty of Letters, History and Theology, Timisoara, Romania)

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Bronze Age fortifications from the Romanian Banat Plain: A status of research

18:10 | Valeriu Cavruţ [State University of Moldova; presenting author], Maria Magdalena Ştefan, Dan Ştefan
*Bronze Age salt production landscapes in the eastern part of the Carpathian Basin*

Thursday, March 26

9:00 | Vajk Szeverényi [Hungarian Academy of Sciences; presenting author], Péter Czukor, Anna Priskin
*Late Bronze Age fortifications in the southern Carpathian Basin: ritual, memory and politics*

9:25 | Marcin S. Przybyła [Jagiellonian University; presenting author], Jan Chochorowski, Karol Dziegielewski, Anna Gawlik, Tobias L. Kienlin, Marta Korczyńska, Mihael Mazur
*Inheritance, social network or local adaptation? Bronze and Early Iron Age societies in western Małopolska*

9:50 | Uwe Sperling [presenting author], Valter Lang [both Tartu University, Institute of History and Archaeology]
*Bronze Age “Fortified Settlements”: Tradition and present of Hill Fort Research in the eastern Baltic*

10:30 | Coffee

11:00 | Michaela Lochner [Institut für Orientalische und Europäische Archäologie, Österreichische Akademie der Wissenschaften]
*Thunau am Kamp – A fortified hilltop settlement of the Urnfield Culture*

11:25 | Stephan G. Schmid [Humboldt-Universität zu Berlin]
*The Late Bronze Age fortification of the Rocher des Aures (Drôme, France)*

11:50 | Zoran Čučković [UMR 6249 Chrono-environnement, Université de Franche-Comté, Besançon]
*Fortifying seascapes: Bronze Age fortified sites of the north-eastern Adriatic Sea*

12:30 | Lunch

14:00 | Hrvoje Kalafatić [Institute of Archaeology, Zagreb, Croatia]
*Beyond fortification: Interactions between settlement and cemetery in the Late Bronze Age of the Southern Carpathian Basin*

14:25 | Daria Ložnjak Dizdar [Institute of Archaeology, Zagreb, Croatia]
*Late Bronze Age settlements in western Syria*

14:50 | Final discussion
Programme Session 3-2

Abrupt environmental and cultural changes in southwest Europe around 4.2 ka BP

Wednesday, March 25

16:30 | Bülent Arikâ (Istanbul Technical University)
Connecting the Regions and Cultures through Crises: The Inter-regional Comparisons of Climate Change and Human Adaptive Responses to Environmental Stress around the Mediterranean

17:00 | Carsten Lemmen (C.L. Science Consult and Helmholtz-Zentrum Geesthacht)
Regional and subcontinental demographic change around the 4.2 BP event

17:20 | Ingmar Unkel1,2 [presenting author], Christian Heymann1,2, Sturt W. Manning3, John L. Bintliff, Walter Dörfler1,5, Oliver Nelle1,2, Helen Zagan6 [1 Graduate School Human Development in Landscapes, Kiel University, Germany; 2 Institute for Ecosystem Research, Kiel University, Germany; 3 Malcolm and Carolyn Wiener Laboratory for Aegean and Near Eastern Dendrochronology, Department of Classics, Cornell University, Ithaca NY, USA; 4 Department of Archaeology, Edinburgh University, United Kingdom; 5 Institute for Pre- and Protohistory, Kiel University, Germany; 6 Department of Geology, University of Patras, Greece]
The impact of climate changes on the Bronze Age societies in Greece

17:40 | Mara Weinelt [presenting author], Christian Schwab, Martin Hinz, Jutta Kneisel [all Graduate School Human Development in Landscapes, Kiel University]
Socio-cultural transformation/crises and environmental alteration in the circum-Mediterranean realm 2200 BC

18:00 | Tuna Kalayci (Inst. for Mediterranean Studies)
Paleoprecipitation reconstruction from oxygen isotope data: A case study from Upper Mesopotamia

Session 3-2 contributions to the joint poster session

Asli Oflaz [presenting author], Mara Weinelt (both Graduate School Human Development in Landscapes, Kiel University)
Spatial and temporal distribution patterns of archaeological sites in the Lake District Region, Southwest Turkey

Christian Schwab [presenting author], Mara Weinelt, Martin Hinz, Jutta Kneisel [all Graduate School Human Development in Landscapes, Kiel University]
Synoptic view on environmental (climatic) changes in the Mediterranean region around 2200 BC
Programme Session 3-3

Modes of change – inhumation versus cremation in Bronze Age burial rites

Tuesday, March 24

17:00 | Oliver Nakoinz (presenting author), Jutta Kneisel, Martin Hinz (all Institute for Pre- and Protohistory and Graduate School Human Development in Landscapes, Kiel University)

Switching from inhumation to cremation: event or process

17:30 | Guy De Mulder (Department of Archaeology, Ghent University)

Radiocarbon dates and cremated bones: The appearance of the cremation rite in protohistorical cemeteries in Belgium

17:50 | Verena Tiedtke (Graduate School Human Development in Landscapes, Kiel University; presenting author), Susanne Storch

Same old story? The cremation ritual of the Late Bronze Age urn field Müllrose (East Brandenburg)

18:10 | Stefanie Schaefer (Institute for Pre- and Protohistory, Kiel University; presenting author), Stefan Flindt (Osterode am Harz)

An urnfield inhumation under special circumstances in the southern Harz

Wednesday, March 25

9:00 | Mateusz Cwaliński (Institute of Prehistory, Adam Mickiewicz University Poznań)

"Cremation vs. inhumation" and other indicators of diversification between burial rites of the Tumulus Culture from the areas of Bohemia and Poland

9:20 | Przemystaw Makarowicz (Institute of Prehistory, Adam Mickiewicz University Poznań)

Inhumation and cremation in the Trzciniec cultural circle

9:40 | Klara Sabatova (Masaryk University, Brno; presenting author), David Parma

Invisible barrows, pits full of people: The issues relating to the beginning of cremation in Bronze Age Moravia (Czech Republic)

10:00 | Eszter Melis (Gyula Forster National Centre for Cultural Heritage Management, Budapest)

On the border of the inhumation burial rite in the Early Bronze Age Northwestern Carpathian Basin (2000–1600 BC)?

10:30 | Coffee

11:00 | János Dani (Déry Múzeum, Archaeological Department, Debrecen, Hungary)

"Show me your grave, and I tell you, who you are…"

11:20 | Viktória Kiss (Institute of Archaeology, Research Centre for the Humanities, Hungarian Academy of Sciences; presenting author), Szilvia Fábián, Tamás Hajdu, Kitti Köhler, István Major, Gábor Serlegi, Géza Szabó

From inhumation to cremation: Changing burial rites in Early and Middle Bronze Age Hungary

11:40 | Julian Laabs (Institute for Pre- and Protohistory, Kiel University)

The impact of wealth consumption on cultural changes: The example of Dunajújváros–Duna-dűlő and the Middle Bronze Age Carpathian Basin

12:00 | Mario Gavranovic (presenting author), Daria Ložnik Dizdar (Institute of Archaeology Zagreb, Croatia)

To burn or not to burn – inhumation versus cremation at the end of the Bronze Age in the southern Carpathian Basin

12:30 | Lunch

14:00 | Ana Ignat (Romanian Academy, Institute of Archaeology and History of Art, Cluj-Napoca, Romania; presenting author), Victor Sava (Arad Museum Complex, Arad, Romania)

Generating change: How Late Bronze Age society relates to funerary practices in the Lower Mureș Valley?

14:20 | Sabine Reinhold (Eurasia department DAI)

Incinerate the dead: Caucasian Bronze Age cremation burials and their wider context

14:40 | Giacomo Capuzzo (Universitat Autonoma de Barcelona; presenting author), Juan A. Barceló

Cremation burials in Central and Western Europe: Quantifying an adoption of innovation in the 2nd millennium BC

15:30 | Joint Poster Session / Coffee

Session 3-3 contributions to the joint poster session

Anne Dombrowsky (Greifswald University)

Times of change – times of battle? Bronze finds from period III in the Tollense Valley, Mecklenburg-Western Pomerania
Michaela Lochner (Institut für Orientalische und Europäische Archäologie, Österreichische Akademie der Wissenschaften)
Inzersdorf ob der Traisen and Franzhausen-Kokoron: Burial grounds of the Middle Danubian Urnfield culture from Lower Austria

Miroslav Daňhel (Archaeological centre Olomouc, Silesian University in Opava)
Cremation in Early Bronze Age of the Czech Republic
Programme Session 4

From the East to the West - Palaeoethnography of the Late Palaeolithic Tanged Point groups

Wednesday, March 25

9:00 | Welcome
9:05 | Morten Fischer Mortensen (National Museum of Denmark, Copenhagen)
Where have all the flowers gone? Vegetation and environment in the Allerød/Younger Dryas/Holocene transitions
9:30 | Martin Theuerkauf (Institute of Geography and Geology, University of Greifswald)
Younger Dryas vegetation patterns of Central Europe
9:50 | Sonja Grimm (MONREPOS Archaeological research centre and museum for human behavioural evolution, RGZM)
The Younger Dryas in North-West Europe: Deconstructing the monolith
10:10 | Ilga Zagorska (Institute of Latvian History, LU, Latvia; presenting author), M. Winiarska-Kabacinska, Archaeological Museum in Poznan, Poland
Tanged point finds from Latvia, eastern Baltic
10:30 | Coffee
11:00 | Katarzyna Pyżewicz (Institute of Prehistory, Adam Mickiewicz University in Poznań; presenting author), Damian Stefański (Archeological Museum in Kraków; Institute of Archaeology, Jagiellonian University), Kamil Serwatka (Department of Archaeology, Wroclaw University)
Kraków-Bieżanów site 15: The Late Palaeolithic settlement of Swiderian culture in the light of spatial, functional and comparative analysis
11:20 | Iwona Sobkowiak-Tabaka (Institute of Archaeology and Ethnology Polish Academy of Sciences)
Ahrensburgian and Swiderian societies – together or separate?
11:40 | Katja Winkler (Graduate School Human Development in Landscapes, Kiel University)
Same same but different – Ahrensburgian and Swiderian in the area around the Middle Oder River
12:00 | Felix Riede (Aarhus University)
The Bromme culture – fact or artefact?
12:20 | Discussion
12:30 | Lunch
14:00 | Inger Marie Berg-Hansen (Museum of Cultural History, University of Oslo)
Blade technology in Ahrensburg culture – a comparative study of four sites
14:20 | Mikkel Sørensen (University of Copenhagen)
Evidence of Long-Blade Industries (LBI) in Scandinavia
14:40 | Miguel Biard (University of Copenhagen)
The extreme end of the Upper Palaeolithic in Normandy: Example from two sites (Calleville and Alizay, France)
15:00 | Mara-Julia Weber (Centre for Baltic and Scandinavian Archaeology, Foundation Schl.-Holst. Landesi. Schloss Gottorf), Boris Valentin (Université de Paris 1 & UMR 7041 ArScAn)
It’s all about volume – New observations on initialisation and progression of core reduction at the Belloisian site Donnemarie-Dontilly (Seine-et-Marn)
15:20 | Discussion
15:30 | Joint Poster Session / Coffee
16:30 | Witold Migal (State Archaeological Museum Warsaw)
Picture of Swiderian core processing as viewed by “refitting calculus”
16:50 | Peter Bye-Jensen (University of Southampton)
Experiments with tanged arrowheads of flint: Use wear analysis as a method to improve archaeological interpretation
17:15 | Sebastian Johannes Pfeifer
Making bows and arrows in a cold environment: Greenland Thule archery as a case study
17:35 | Harm Paulsen
Bow and arrow technology in the Ahrensburgian: Technological and experimental aspects
17:55 | Final discussion
Programme Session 5

The organization of social space:
Late Neolithic and Chalcolithic domestic spheres of Southeast Europe and the Ponti

Tuesday, March 24

17:00 | Introduction
17:20 | Mykhailo Videiko (Institute of Archaeology NAS of Ukraine)
Some basic units of Trypillia megasite structures
17:40 | Knut Rassmann (Deutsches Archäologisches Institut, Römisch-Germanische Kommission; presenting author), Aleksey Korvin-Piotrovskij, Johannes Müller
Kilns and their distribution in Tripolian settlements: Tracing the labour division and the social organization of Copper Age communities
18:00 | René Ohrnau (Graduate School Human Development in Landscapes, Kiel University)
Defining social space inside Tripolian megasites: An architecture-sociological approach
18:20 | Aleksandr Diachenko (Institute of Archaeology of the NAS of Ukraine), Francesco Menotti
Socio-political landscape of the Western Tripolye populations in the Southern Bug and Dnieper interfluve

Wednesday, March 25

9:00 | Natalia Burdo (Institute of Archaeology NAS of Ukraine)
The sacred component in the interpretation of remains of buildings of Trypillia-Cucuteni
9:20 | Sławomir Kadorw (Institute of Archaeology and Ethnology, Polish Academy of Sciences, Kraków, Poland), Dalia Pokutta (Gothenburg University, Sweden)
The Werturea Cave in Bilcze Zlote: A subterranean sanctuary of the Cucuteni-Trypillia culture in Western Ukraine
9:40 | Thomas Saile (presenting author), Maciej Dębiec, Martin Posselt (all Universität Regensburg, Lehrstuhl für Vor- und Frühgeschichte)
Geomagnetic prospection on Tripillian sites in Central Ukraine
10:00 | Stanislav Ţernă ("High Anthropological School" University, Chisinau, Republic of Moldova)
The distribution of Neolithic and Copper Age settlements in the Republic of Moldova: an overview
10:30 | Coffee
11:00 | Knut Rassmann (Deutsches Archäologisches Institut, Römisch-Germanische Kommission; presenting author), Alexandru Popa, Sergiu Musteata, Hans-Ulrich Voss
Size, internal structure and hierarchical sequence of Copper Age settlements in Moldova: Insights into complex phenomena from recent geomagnetic prospections
11:20 | Maria Ivanova (University of Heidelberg; presenting author), Petar Leshtakov (Institute of Archaeology, Bulgarian Academy of Sciences)
Paths to complexity: Regional survey and excavations at the Late Chalcolithic Site of Bobata on the Avren Plateau, Bulgaria
11:40 | Valeska Becker1, Ralf Gleser1; Krum Bacvarov2; Nikola Tonkov2; Petar Leshtakov2; Friedrich Lüth3; Rainer Komp4 (1 Westfälische Wilhelms-Universität Münster; 2 National Institute of Archaeology and Museum of the Bulgarian Academy of Sciences; 3 Deutsches Archäologisches Institut Berlin, Arbeitsbereich Kulturgüterschutz und Site Management; 4 Referat für Informationstechnologie an der Zentrale des Deutschen Archäologischen Instituts Berlin)
Spatial and social organization of a Chalcolithic tell site at Sarnevo [Stara Zagora, Bulgaria]
12:00 | Tuna Kalyayci (Inst. for Mediterranean Studies; presenting author), Simon, F-X; Cantoro, G.; Donati, J.; García, C.C.; Manataki, M.; Sarris, A.
Domestic patterns of the Neolithic agricultural villages in Eastern Thessaly: A remote sensing approach
12:20 | Discussion
12:40 | Lunch
14:00 | Kristina Penezić (Center for Digital Archaeology, Faculty of Philosophy, University of Belgrade)
Settlement and its place in the landscape – The example of Vinča
14:20 | Robert Hofmann (Graduate School Human Development in Landscapes, Kiel University), Alexander Diachenko (Ukrainian Academy of Science, Kiev), Johannes Müller (Graduate School Human Development in Landscapes / Institute for Pre- and Protohistory, Kiel University)
Trajectories of demographic development in late prehistory
14:40 | Pál Raczy [Institute of Archaeological Sciences, Eötvös Loránd University, Budapest; presenting author], Alexandra Anders, Katalin Sebk

One site – several stages: Multi-faceted localities for social places at the Late Neolithic site of Polgár-Csőszhalom (Hungary)

15:00 | Discussion

15:20 | Robert Hofmann [Graduate School Human Development in Landscapes, Kiel University; presenting author], Sabrina Autenrieth, Alexandar Medović, Ildiko Medović, Tijana Pešterac, Lidja Balja, Antonia Hofmann

Multiregional relations and organization of social space in the Late Neolithic settlement of Borđoš, Vojvodina, Serbia (5000–4500 BCE)

15:40 | Joint Poster Session / Coffee

16:30 | Heiko Tiede [Graduate School Human Development in Landscapes, Kiel University]

Demographic trends in the Chalcolithic in Southeast Europe

16:50 | Final discussion

Subsequently, session 11 presentations will be held in the same room.

Session 5 contribution to the joint poster session

Nataliia Chub [Freie Universität Berlin/ BerGSAS]

Cucuteni-Trypillia culture and the innovation of the wagon?
Programme Session 7

The Holocene history of European Mountain Landscapes – Dynamics of the environment, and settlement, resources and subsistence strategies

Thursday, March 26

10:30 | Pawel Valde-Nowak (Jagiellonian University, Institute of Archaeology) Highland Neolithic: The case of a different archaeology
11:00 | N.N. Keynote lecture
11:30 | Vanessa Py-Saragaglia (CNRS GEODE UMR 5602; presenting author), Jean-Paul Métailié, Bruno Ancel, Sandrine Baron, Raquel Cunill i Artigas, Didier Galop, Hugues Barcet, Sandrine Paradis-Grenouillet Forest cover changes and trajectories in an ancient mining area of the Pyrenees from Antiquity to the 19th century (Aulus-les-Bains, France)
11:50 | Jakub Niebieszczanski, Iwona Hildebrandt-Radke, Janusz Czebreszuk, Stelios Andreou, Maria Pappa (1 Institute of Prehistory, Adam Mickiewicz University; 2 Institute of Geocology and Geoinformation, Adam Mickiewicz University; 3 Department of Archaeology, Aristotle University in Thessaloniki; 4 XVI EFOREA, Thessaloniki) Anthemountas Valley (Northern Greece) archaeological project: Gold extraction, settlement and natural processes in a mountainous hidden landscape
12:10 | Marie Bal-Serin, Allée Philippe, Garcia Alvarez, Salvia, Benatti Alessandra, Rubiales Juan Manuel, Mercuri Anna Maria, Garcia Amorena Ignacio, Bosi Giovanna (1 Laboratoire Geolab UMR/CNRS 6042, Université de Limoges, France; 2 Instituto politécnico de Madrid, Spain; 3 Laboratorio di palinologia e paleobotanica, Università degli Studi di Modena e Reggio Emilia, Italy) European open landscapes – The comparison of human land use strategies of three Mediterranean mountains: Mont Lozère (France), the Sierra de Gredos (Spain) and the Monte Cimone (Italy) since the Neolithic
12:30 | Lunch
13:30 | Vincent Robin (Dept. TESAF, Padova University, Italy; presenting author), Hans-Rudolf Bork (Institute for Ecosystem Research, Kiel University, Germany), Oliver Nelle (Tree-ring Lab, Baden-Wuerttemberg State Historic Preservation Office, Germany) History of land cover change of the Harz Mountains (Central Germany) as inferred from soil charcoal analysis
13:50 | Thomas Knopf (Institut für Ur- und Frühgeschichte und Archäologie des Mittelalters, Universität Tübingen; presenting author), Manfred Rösch, Elske Fischer, Andrea Bräuning, Lucas Kämpf, Karl-Heinz Feger Land-use in the mountainous Southern Black Forest: archaeological and palynological research
14:10 | Jan J. Ahlrichs (Collaborative Research Centre 1070; presenting author), Jessica Henkner, Thomas Knopf, Peter Kühn, Thomas Scholten The mind in the mountain: resources and the development of marginal areas
14:30 | Johann Friedrich Tolksdorf (presenting author), Hannes Knapp, Rengert Elburg (1 Landesamt für Archäologie Sachsen; 2 Institut für Ur- und Frühgeschichte / Graduate School Human Development in Landscapes, Universität Kiel) Economic frontiers: Comparing settlement dynamics, economic development and historical background of the Medieval Harz Mountains and the Erzgebirge
14:50 | Andrzej Pelisiak (Institute of Archaeology, University of Rzeszów) Man and the mountain landscapes: Recent research in the Bieszczady Mountains (eastern part of the Polish Carpathians)

Session 7 contributions to the joint poster session

Carlos Duarte (International Institute for Prehistoric Research of Cantabria, University of Cantabria, Spain; presenting author), António Fausctino Carvalho (University of Algarve, Portugal), Catarina Tente (Nova University of Lisbon, Portugal) A sample of ice and fire: Holocene frost in Neolithic deposits promotes ash cementation and podzolitation in the Estrela Mountains, Portugal

Jan Novák (Laboratory of Archaeobotany and Palaeoecology, Faculty of Science, University of South
Bohemia; presenting author), Pokorný P., Šída P., Prostředník J.

_The anthracological reconstruction of the vegetation in the Neolithic mining areas at the Jizera Mountains_

**Werner Schön**¹ (presenting author), Birgit Gehlen¹, Doris Mischka² [¹ Universität zu Köln, Institut für Ur- und Frühgeschichte; ² Friedrich Alexander Universität Erlangen-Nürnberg, Institut für Ur- und Frühgeschichte]

_From the Alpenvorland into the Alps – Mesolithic and Neolithic sites in Western Bavaria_
Programme Session 8

Method development to reveal past plant-people interactions

Wednesday, March 25

9:00 | Patricia C. Anderson (CNRS, CEPAM, Nice, France)
Researching people-plant interactions: Potential of ethnoarchaeology and experimentation to interpret enigmatic traces of harvesting and threshing

9:30 | Linda Scott Cummings (PaleoResearch Institute)
Morphometric analysis of Zea mays cob phytoliths as a proxy for genetic analysis and movement of people across the landscape

9:50 | Radoslaw Grabowski (Environmental Archaeology Laboratory, Umeå Univ. Dpt. of Hist. Religious and Philosophical Studies)
Multiproxy application of geochemical (phosphate analysis and LOI) and geophysical (magnetic susceptibility) methods to grasp plant-human interactions on prehistoric settlements in Northern Europe

10:10 | Edoardo Vanni (University of Foggia, Italy)
Reconstructing the landscape in central coastal Etruria: Defining agro-sylvo-pastoral practices through pollen analysis and the archaeological record

10:30 | Coffee

11:00 | Linda Scott Cummings (presenting author), Peter Kovacik (both PaleoResearch Institute)
Tracks across landscape and lime: Creating habitats from occasional occupations

11:20 | Erika Nitsch (School of Archaeology, University of Oxford; presenting author), Armelle Gardeisen, Paul Halstead, Valasia Isaakidou, Angeliki Karathanou, Daphne Nikolaidou, Chryssa Petridou, Sevi Triantaphyllou, Soultana Valamoti, Anastasia Vasilieiadou, Stelios Andreou, Aikaterini Papanthimou, Amy Bogaard
Landscape use and dietary practice in the northern Aegean Bronze Age inferred through stable isotope analysis

11:40 | Meltem Cemre Ustunkaya (The University of Queensland; presenting author), Andrew Fairbairn
Integration of N and C stable isotope analysis with grain weight analysis to understand the impact of climate change on agricultural production

12:00 | Nathan Wright (presenting author), Meltem Cemre Ustunkaya (both The University of Queensland)
Multiple proxies, single story: Wood charcoal, seeds and isotopes at Kaman-Kalehoyuk, Turkey

12:20 | Filipe Costa Vaz (presenting author), M. Martín-Seijo, J.P. Tereso (1 Universidade de Santiago de Compostela, Dep. Historia I. Facultade de Xeografía e Historia, Santiago de Compostela; GEPN-Grupo de Estudios para a Prehistoria do Noroeste Ibérico; 2 CIBIO – Research Center in Biodiversity and Genetic Resources, University of Porto, Faculdade de Ciências, Departamento de Biologia, Portugal)
ArchWood – A database as a tool to record, manage and interpret archaeological uncharred wooden remains

12:40 | Lunch

14:00 | Caroline Vermeeren (BIAX Consult, presenting author), Kirsti Hänninen, Welmoed A. Out
A method to recognize woodland management in archaeology: new developments

14:20 | Mans Schepers (Groningen University)
General perception of wetland landscapes: getting a specialist message across

14:40 | Santeri Vanhanen (University of Helsinki, Archaeology)
How forager (plant) food transforms into a charred archaeobotanical assemblage

15:00 | Steinar Solheim (presenting author), Almut Schülke (both Museum of Cultural History, University of Oslo), Magdalena Wieckowska-Lüth, Walter Dörfler, Wiebke Kirleis (all Institute of Pre- and Protohistoric Archaeology, Kiel University)
Towards a refined understanding of Mesolithic coastal landscapes – new investigations on human-environment interactions in Telemark, Norway

15:20 | Final remarks from session organizers
Programme Session 9

Lining the monuments – creating landscapes?

Thursday, March 26

8:45 | Paul Garwood (University of Birmingham)
Straight Talking in Prehistory: linearity, history and truth in the 4th and 3rd millennia BC

9:10 | Martin Furholt (Institute of Pre- and Protohistoric Archaeology at Kiel University)
The transformation of Neolithic landscapes in Europe

9:30 | Carlos Didelet (Nova University of Lisbon)
The Sacred and the Profane – A landscape image analysis

9:50 | Aleksander Dzbynski (Zurich University)
The power of the line: Metaphor, mathematics and material culture in prehistoric Europe

10:10 | Sabine Reinhold (Eurasia Department DAI)
Lining the ancestors – ordering the world: Horizontal and vertical spatiality of Early Bronze Age burials in the North Caucasus and beyond

10:30 | Coffee

11:00 | Marina Daragan (DAI Eurasia department)
Spatial organization of Eneolithic and Early Bronze Age in the North Pontic steppe

11:20 | Mateusz Stróżyk (Poznań Archaeological Museum)
Study on the location of burial rites in the landscape: Tumul culture mounds in the Krotoszyn Forest at the Silesia-Great Poland borderland

11:40 | Niels Johannsen (Aarhus University; presenting author), Torben Egeberg (Arkæologi Vest)
Orientations and linearity of Neolithic burial monuments on the Jutland Peninsula: Causes and consequences of monumental alignments

12:00 | Renata Żych (Instytut Archeologii, Uniwersytet Rzeszowski, Rzeszow)
Linear space organization in Linear Pottery culture longhouses and Funnel Beaker culture Kujavian long barrows – similarities and differences

12:20 | Reena Perschke (Museum Lichtenberg)
Stone rows and earthen barrows – significant connection or diachrone hazard?

12:40 | Lunch

14:00 | Przemystaw Makarowicz (Institute of Prehistory, Adam Mickiewicz University in Poznań, Poland; presenting author), Jakub Niebieszczański, Jan Romaniszyn, Robert Staniuk, Rafal Skrzyniecki, Mateusz Cwaliński, Hubert Lepionka, Igor Kochkin, Yuriy Boltrik, Vitaliy Rud
Lines, groups or landscapes? Arrangements of prehistoric barrows in the upper Dniester Basin

14:20 | Quentin Bourgeois (Leiden University)
Networked landscapes— The structure of corded ware barrow lines

14:40 | Franziska Faupel (Institute for Pre- and Protohistory / Graduate School Human Development in Landscapes, Kiel University)
Reconstruction of Early Iron Age pathway models in Southwest Germany and the Alsace

15:00 | Oliver Nakoinz (Institute for Pre- and Protohistory / Graduate School Human Development in Landscapes, Kiel University)
Methods for reconstructing linear structures of monuments

Session 9 contributions to the joint poster session

Maria Gelabert Oliver (Graduate School Human Development in Landscapes, Kiel University)
Talaiotic tower-like monuments: Construction methods and estimates of invested work

Przemystaw Makarowicz (Institute of Prehistory, Adam Mickiewicz University in Poznań, Poland; presenting author), Siergiej D. Lysenko, Igor T. Kochkin, Robert Staniuk, Jan Romaniszyn, Rafał Skrzyniecki, Weronika Skrzyniecka, Hubert Lepionka
Bukivna: A Bronze Age elite barrow necropolis in the Dniester basin
Programme Session 10

Records of Neolithic transformation processes – social and/or environmental crisis?

Thursday, March 26

9:00 | Welcome
9:05 | Maximilian Schuh (Historisches Seminar, University of Heidelberg)
The subsistence crisis in 14th century England. The entanglement of environmental, social and political factors.

9:35 | Walter Dörfler (Institute of Pre- and Protohistoric Archaeology / Graduate School Human Development in Landscapes, Kiel University)
Records of Neolithic transformation processes – social and/or environmental crisis?

9:50 | Manfred Rösch (Landesamt für Denkmalpflege Baden-Württemberg; presenting author) Jutta Lechterbeck, Elske Fischer, Lucia Wick
Late Neolithic environmental change in South-west Germany according to pollen profiles in the Black Forest and pre-Alpine lowlands

10:10 | Jutta Lechterbeck (presenting author), Matthias Merkl, Manfred Rösch (all Landesamt für Denkmalpflege Baden-Württemberg, Gaienhofen)
Land use, settlement dynamics and demography between the Western Lake Constance Area and the Hegau between 3500 and 2800 BC

10:30 | Coffee
11:00 | Niels Bleicher (Underwater Archaeology and Dendrochronology, City of Zürich)
Some critical remarks on interpretations concerning relations of climate and culture

11:20 | Meriel McClatchie1, Amy Bogaard2, Sue Colledge3, Nicki J. Whitehouse4, Rick J. Schulting5, Phil Barratt6, T. Rowan McLaughlin7 (1 School of Archaeology, University College Dublin, Ireland; 2 School of Archaeology, University of Oxford, UK; 3 Institute of Archaeology, University College London, UK; 4 School of Geography, Earth and Environmental Sciences, UK; 5 School of Geography, Earth and Environmental Sciences, Plymouth University, UK; 6 School of Geography, Archaeology and Palaeoecology, Queen’s University Belfast, UK)
Measuring agricultural decline: Potential effects of differential sampling in archaeobotany

11:40 | Detlef Gronenborn (RGZM Mainz)
Michelsberg and beyond: 4th millennium dynamics in the northern Upper Rhine and Middle Rhine valleys.

12:00 | Martin Hinz, Ingo Feeser (both Institute of Pre- and Protohistoric Archaeology at Kiel University)
Economic and social dynamics of the late 4th millennium BC: Monumentality and its socio-environmental background

12:20 | Poster presentation
12:30 | Lunch
14:00 | Tobias Torfing (Graduate School Human Development in Landscapes, Kiel University)
Drastic changes in the settlement-structure in the Early and Middle Neolithic of Denmark

14:20 | Łukasz Sarkowicz (University of Rzeszow, Institute of Archaeology)
Between Boh and Kuban: Controversies about inter-cultural connections

14:40 | Malgorzata Rybicka, Aleksandr Diachenko (Institute of Archaeology of the NAS of Ukraine; presenting author), Dariusz Krol
The sheep, the wheel and pottery assemblage: Who or what shaped the Tripolye world ca. 3500–3000/2950 BC

15:00 | Jan Kolář (Institute of Botany CAS / Masaryk University, Brno, Czech Republic; presenting author), Petr Kuneš, Mária Hajnalová, Helena Svitavská Svobodová, Martin Macek, Peter Tkáč, Péter Szabó
Where were people in the Copper Age – dead, alive but invisible? A multi-proxy case study from southwestern Moravia (Czech Republic)

15:20 | Final discussion

Session 10 contributions to the joint poster session

Magda Wieckowska-Lüth (presenting author), Walter Dörfler, Wiebke Kirleis (all Institute of Pre- and Protohistoric Archaeology at Kiel University)
Palaeoecological evidence of an abrupt climate change between 3200 and 2600 BC from Lake Skogtjern, Southern Norway

Stefanie Kloß (Institute of Pre- and Protohistoric Archaeology at Kiel University)
Oldenburg-Dannau LA 77 - Development of Funnel Beaker farming in eastern Holsatia
Programme Session 11

Societal dynamics and pottery styles in southeast and East Europe during Neolithic and Chalcolithic

Wednesday, March 25

17:00 | Zsuzsanna Siklósi (Eötvös Loránd University, Institute of Archaeological Sciences; presenting author), Márton Szilágyi

*Culture, period or style? Re-evaluation of the Early and Middle Copper Age on the Great Hungarian Plain*

17:20 | Ralph Großmann (Institute of Pre-and Protohistoric Archaeology / Graduate School Human Development in Landscapes, Kiel University)

*Corded Ware pottery styles in Thuringia: Chronology or chorology?*

17:40 | Katalin Sebők (Archaeological Institute of the Eötvös Loránd University, Budapest)

*What’s melting in the pot? Cultural interaction and everyday life in the settlement of Polgár-Csőszhalom as reflected by the ceramic material*

18:00 | Florica Matau (Alexandru Ioan Cuza University of Iasi, Romania; presenting author), Valentin Nica, Mitica Pintilei, Alexandru Stancu

*An assessment on the origins and variability of the Cucuteni C pottery in Eastern Romania*

18:20 | Ingmar Franz (Graduate School Human Development in Landscapes, Kiel University)

*Baskets made of clay – Painted Neolithic pottery at Çatalhöyük/Turkey around 6000 BC*
Abstracts

General Keynote Lectures

The Multiple Landscapes of Olympia
Judith Barringer (University of Edinburgh / FU Berlin)
The ancient site of Olympia was, and is, a complex manmade and natural landscape catering to many different needs and interests. Olympia was famed for its prestigious and important Panhellenic athletic games, but was also one of the most important sanctuaries in the ancient Mediterranean world, a sacred space where politics and prestige were played out over some 1300 years. This paper explores the great variety of ways in which the ancient site and its functions can be regarded and studied by modern scholars.

A century of changing archaeological perspectives at Polgár-Csőszhalom (Hungary)
Pál Raczky (Eötvös-Loránd-University, Budapest; presenting author), Alexandra Anders - Katalin Sebők
Tiszapolgár, today simply known as Polgár, is located on the left bank of the Tisza River in the Upper Tisza Region. The environs of this village have been known to prehistorians in Europe since 1909 and 1910 when private collectors published short contributions about special finds (among others red-white painted shards) in the weekly Tiszapolgár. The location became famous primarily due to the discovery of the Late Neolithic mound of Csőszhalom, and the Copper Age cemetery of Basatanya, firstly reported by V. Gordon Childe and Ferenc Tompa in 1929.

In the recent phase of archaeological projects from 1989 at the Late Neolithic tell, efforts were aimed at contextualizing the primary archaeological results of the 1957 field season led by Ida Bognár-Kutzián on a continuously expanding frame of reference. Results of geoarchaeological investigations and surveys in the micro region exploring its natural geographic setting have shown that the site of Polgár-Csőszhalom was a dominant settlement complex on an alluvial island (Polgár island) covering an area of approximately 66–70 km² in Neolithic times. The mound surrounded by the enclosure-palisade system and the large flat settlement around it, extending over an area of 38 hectares, can be compared to the extensive Lengyel sites in Transdanubia. The Csőszhalom mound with the stratified tell-like settlements of Polgár-Bosnyákdom and Hajdúböszörmény-Prőd lie some 100 km north of the Neolithic Tisza-Herpály tell variants of the Great Hungarian Plain. This spatial pattern suggests two regional trajectories of development, hallmarked by the Csőszhalom and the Tisza-Herpály cultural variants. In addition to this macro-structural feature, it is also quite clear that diverse combinations of Late Neolithic tells, tell-like settlements and single-layer settlements formed manifold organic units within the spatial environments in the Tisza Region. A series of new and interwoven interdisciplinary approaches provided new understandings about the landscape of Csőszhalom. One goal of our current, long-term research project is a more detailed assessment based on the presently available 109 AMS dates, in order to move beyond the duality of the enclosed tell and the horizontal settlement, and to examine the internal dynamics of interactions between houses, pits, wells and burials representing the different physical loci of human activities and events, as well as spatial and functional associations of these loci and their spatial ranges.

On the basis of archaeological data series, physical and social interactions could be identified at the Csőszhalom tell that were fundamentally different from what had been observed with domestic activities on the external settlement. It seems to be very probable that the community/communities, who once used the settlement complex of Polgár-Csőszhalom, maintained different notions of time and space for the enclosure mound and the horizontal settlement in the first half of the 5th millennium BC.

Ancient DNA - tracing the molecular past
Ben Krause-Kyora (Graduate School Human Development in Landscapes / Institute of Clinical Molecular Biology, Kiel University)
Ancient-DNA analysis (aDNA) is a new research approach that provides insights into human evolution which were unobtainable before. Here we would like to demonstrate the potential of aDNA analysis in population genetics and researching the evolution of infectious diseases and their prevalence in populations through time.

We conducted whole-genome sequencing of aDNA retrieved from human remains from Germany of the Meso- and Neolithic periods (~10,000 - 2800 BC). The genomic data gained allowed us to draw conclusions on individual phenotypes and population history. An important question in European pre-history
research concerns the genetic continuity, resp. discontinuity, from Mesolithic hunter-gatherers to Neolithic agriculturalists. With aDNA analysis it is for the first time possible to validate that genetic shifts occur which had an impact on genotypes.

Secondly, we looked at leprosy, whose rise and fall in Europe is still unexplained for the greater part. It is still not completely clear why leprosy all but disappeared from Europe during the 16th century, but aDNA analysis provides an important lead: We found an unexpected absence of genetic variations in the *M. leprae* genome, which caused a decrease in virulence during the last 1,000 years. This suggests that the decline of leprosy in Europe is linked to factors such as human host genetics or changes in society and the environment, e.g. the occurrence of co-infections with TB (caused by *M. tuberculosis*) counteracting leprosy or immunization through infections with bovine TB (*M. bovis*). That TB infections influenced the virulence of leprosy only came to light through aDNA analysis.
Session Block 1

Ancient diet and disease in context of environment, culture, technology and theory

Abstracts Session 1-1

Fish[ing] communities and fishing technologies in inland waters, rivers and at the coast.

The mid-Holocene development of the fish fauna and the related environmental change in the south-western Baltic area

Ulrich Schmölcke (Center for Baltic and Scandinavian Archaeology; presenting author), Dirk Heinrich

Coastline changes are the result of the interaction between geological processes and climate, and their consequences have intensive impact on the human societies along the sea coasts. This interrelation has been studied in an exceptional manner on the southern Baltic Sea during the last decade. In this region, human populations living along the coast since Mesolithic times have reacted to the rising sea level by relocating settlements as well as by adaptations to the changing environment. Thanks to several archaeological excavations, it is now possible to trace the shift from a freshwater to a marine environment together with and dependent on the displacement of settlements on a large-scale. Fish remains play an important role in such reconstructions of environmental developments. This is shown for different sites near the island of Poel in the Wismar Bight and in the northwestern part of the Mecklenburg Bay. Corresponding sites are located in the Rügen area.

Eel fishing in the Mariager Fjord during the Late Mesolithic and the Early Neolithic: New archaeoichthyological data

Harry Robson (University of York; presenting author), Søren H. Andersen

Havnø and Thygeslund are two of a number of Danish stratified kitchen middens spanning the Late Mesolithic (Ertebølle) and the Early Neolithic (Funnel Beaker) cultures, ca. 5000–3500 cal BC. This paper presents the results of a study conducted on the fish remains recovered by hand as well as six column samples that were excavated through the midden sequence during the 2011 investigations at Havnø. These results are compared with hand collected fish remains recovered from the contemporary kitchen midden at Thygeslund that is situated <5 km away. The material is quantified and estimations of total fish lengths are provided. Interpretation focuses on taphonomy, including element size distribution and percentage completeness, relative importance of the fish represented, especially the European eel (Anguilla anguilla), significance of freshwater taxa, distribution of the fish remains, possible fishing methods employed, and season(s) of capture.

Chalcolithic fishery at Pietrele, Romania as described from fish and fishing technology remains

Kenneth Ritchie (Center for Baltic and Scandinavian Archaeology; presenting author), Svend Hansen

The Chalcolithic period (5th millennium BC) in the area of the Lower Danube River is of particular interest for archaeologists because of evidence for very early metallurgy, incipient social stratification, and (at many sites) a renaissance in the exploitation of wild animals in the subsistence economy (although domesticated animals continue to be important as well). Since 2002, excavations at the tell near Pietrele, Romania (on the floodplain of the Danube River) have produced abundant evidence of the exploitation of fish and other aquatic animals both in the form of faunal remains and some of the technologies used to procure them. An unexpected by-product of the excavation was the chance to interview Jujan Florea, a then 89 year-old former fisherman from the village of Pietrele, on August 7, 2010. His reminiscences on how fish were caught before the drainage of the bottomlands serve as an ethnographic source (along with other archaeological and historical records) in order to understand Chalcolithic fishery at Pietrele. Although analysis is ongoing, the data produced so far can enable us to start addressing questions of where, when and how aquatic resources were procured and how the settlement was provisioned.

The Diversity of Regional Fisheries in the Early Byzantine Empire
Henriette Kroll (Römisch-Germanisches Zentralmuseum Mainz)

In Late Antiquity, the Byzantine Empire stretched over the margins of three continents from the lush alluvial forests of the Danube, along the shores of the Black Sea, the Mediterranean Sea and the Red Sea down to the Egyptian Nile. The heterogenous landscapes and seascapes in this vast area harboured a complex variety of different ichthyofaunas, which played important roles in the feeding of regional communities. In this area, zooarchaeology is not sufficiently established yet as a standard component of archaeological fieldwork, and the worst state of research can be detected for the fish bone finds. Nevertheless, based on the comparably few published fish bone reports from Byzantine sites, it is possible to present a supraregional comparison of fish bone assemblages. The identified species spectra give evidence of exploited fishing grounds and to a certain degree of fishing techniques as well. In certain spots, e.g. on the Nile and in the fish-poor Levant, an organised fish trade can be perceived. In other areas, the Roman culinary tradition of salted fish products seems to fall into oblivion and apparently only fresh local fish was consumed.

Stone Age fishing communities and fishing structures in Eastern Europe: 137 years of studies

Vladimir Lozovski (presenting author), Olga Lozovskaya (both Institute for the History of Material Culture, St. Petersburg)

In the year of 1878, Prof. I.S. Polyakov found the remains of a fishery basket made from pine splinters on the site of Plekhanov Bor (Oka River Valley, Central Russia) at a depth of 4.5 m. In Eastern European archaeology, this was the first time fishery structures were discovered. Sixty years later, Dr. V.V. Fedorov (1937) analyzed this object and based on numerous ethnographic peers showed that this construction was a fish-trap vertically mounted on the bottom of the river. One year later E. Shturms started excavations at the site of Sarnate in Latvia. World War Two stopped any archaeological investigations in Eastern Europe and only at the beginning of 1950s was this work resumed. During the Soviet period (1950s–1980s), a large number of new wetland sites with fishery constructions were discovered and investigated: Zvidze, Abora 1, Sarnate (Latvia), Shventoji (Lithuania), Vis 1 and Marmugino (North-Eastern Russia), Usyaty IV, Rudnya Serteyaskaya (North-Western Russia), Sakhtysh 1 and Podzorovo (Central Russia). In the recent two decades, extensive field work brought new well-documented objects: the sites of Purkajasuo (Finland), Okhta 1 (S-Petersburg), Zamostje 2, Sakhtysh 2a, Serteya 1, Stanovoye 4 (Central Russia) are among the best samples of such studies. The dating of these objects covers almost the entire Mesolithic and Neolithic periods from 9600–4200 years uncal BP. The analysis of available materials shows that almost all the constructions were built from split wooden (pine, willow) planks with a length measuring from 0.5 to 4.0 m. The only exception is site Stanovoye 4 – here simple willow branches were used for basket making. Tapes of birch bark, inner bark, rush and bulrush were used to bind wooden splinters in constructions. Generally, all the fishery constructions can be divided into two types: the first – conical shaped baskets (mobile fish-traps) made from splinters with a length of up to 2.5 m (Zvidze, Abora 1, Shvyantoji 1A, 2B, Zamostje 2, Sakhtysh 1, 2a sites). Their use is suggested to have been in a horizontal position on the bottom of the river or lake. The second type is represented by the finds of long (up to 5 m length) screens made from split wood planks as well (Okta 1, Sarnate, Zamostje 2, Serteya 1 sites). Ethnographic resources demonstrate their use as mobile fish-fences, vertically mounted on the river or lake bottom to separate a special zone in the water basin. Recent investigations in 2010–2013 on the peat-bog site of Zamostje 2 (Sergiev Posad district, Moscow region) arouse additional interest due to the discovery of the specific fishery zone of the settlement dated to the late Mesolithic/early Neolithic periods. Here, several constructions made from wood were found: among them two fish-traps, mobile fish-fences and 150 wooden piles. These finds along with artifacts made from wood, bone, antler, pine bark (fish-hooks, harpoons, floats, fish-net knots, paddles, etc.) allow us to reconstruct that fishery was the basic economic activity of this site. This statement is supported by a huge number of fish bones and fish scales found in cultural layers of the site. Generally speaking, the analysis of the finds from other wetland sites supports our suggestion that the main economic activity of the Stone Age settlements was fishery.

8000 years of eel fishing in Denmark from coast to coast

Lisbeth Pedersen (Museum Lolland-Falster)

For millennia, fishing with wooden structures apparently provided the inhabitants of Denmark with a significant part of their diet. Eels have been a particularly attractive catch: They are rich in fat, can be caught in great numbers and can easily be stored, preserved and transported. In historical times, the use of stationary fish weirs from coast to coast was
dependent on the existence of exclusive rights to erect and exploit these fishing installations. In addition, their construction depended on a large and stable supply of wood produced in coppiced woodland. It is suggested that similar conditions also prevailed in prehistoric times, as far back as the Mesolithic.

Breaking news – Unearthed weirs reveal new knowledge about Neolithic fishery in Denmark

Terje Stafseth (Museum Lolland Falster)

A 1,800,000 m² area of prehistoric submerged landscape at Syltholm, Denmark is currently being excavated by the Museum Lolland Falster in connection with the construction of an immersed tunnel across the Fehmarn Bælt, linking Denmark and Germany. Several intact fish weirs dating to between 3000-2800 BC are being investigated as part of this large project. The fish weirs are deeply buried in shallow marine deposits which have preserved a complex stratigraphy of weirs standing more or less on top of each other. This gives a unique opportunity to study construction techniques and the former use of water resources and fishing equipment. The excavation is still ongoing, but it can already be seen that the techniques and concepts of landscape are different at Syltholm in comparison to those Stone Age fish weirs seen in other areas of Denmark, i.e. Olesløyst (Storebælt) and Slivse (Haderslev), which implies different fishing techniques. The Syltholm weirs give, therefore, a unique opportunity to gather information on prehistoric fishing with fixed devices in shallow waters. The system of fish weirs at Syltholm is located in sheltered coastal waters probably with an associated sand barrier. This landscape was, however, repeatedly subjected to inwash from stormy seas, which occasionally broke through the sandy barriers and thereby altered the local landscapes over time. A preliminary study of the wood material used in the fish weirs reveals forest management, but as compared to the studies of wood resources from previously excavated weirs in Denmark, the weir builders at Syltholm seem to have used inferior materials – where even the smallest top branches are included. Furthermore, we can also trace former unknown weaving techniques, e.g. how the wattle was laced with the use of fork branches. No traps have yet been found, but at the conjunction between two separate lines of weirs a noticeable pit is recorded which resembles the so-called Skuldegaard, which until recently were built for catching flatfish in tidal areas of the Waddensea.

Fishery in the dawn of agriculture

Lars Ewald Jensen (Museum Lolland Falster)

Prior to the building of the fixed link under the Fehmern Belt between Fehmarn, Germany and Lolland, Denmark, archaeological excavations revealed a large number of finds from the Funnel Beaker Culture. These finds include numerous leister prongs, bone points and several in situ fish weirs, most of which were still standing upright in the sediments! These finds indicate an intense use of resources from the sea and at the same time a sacral use of the zone where the land and the sea meet. The unusual situation is, in part, due to the fact that the excavations are conducted in an area dominated by reclaimed sea bed. The bulk of the dated material ranges from 3950 BC to 2500 BC. The earliest datings are contemporary with the introduction of agriculture in Denmark and the finds show a dual economy at the coastal settlement. So far, trial excavations on dry land have revealed the remains of houses from the Funnel Beaker Culture dating to approximately 3000 BC as well as cooking pits possibly originating in the Bronze Age. Furthermore, within an area of one square kilometre around these finds, the remains of at least seven megalithic structures are documented. Although finds are also present, which date to both before and after the period around 3000 BC, this heavy concentration of finds pertaining to this specific period helps generate a kind of snapshot of the settlement at exactly that time. Already before the real excavations have begun on dry land, it is clear that we have an unusual chance to examine what promises to be an entire coastal settlement of the Funnel Beaker culture with elements of both economic as well as sacral character represented in the archaeological material. Furthermore, Lolland has a large number of megaliths and several large diked fjords. This provides a unique opportunity to conduct follow-up excavations on a smaller scale when the large archaeological material from the developer driven archaeology of the tunnel has been analysed.

Alvastra pile dwelling - A new infrastructure project in Sweden

Jacqueline Taffinder (Swedish History Museum)

This paper is a presentation of a new project about to be launched in Sweden. The paper will describe the project and present a small part of the assemblage related to fishing. The Alvastra pile dwelling is a wooden platform in the middle of a mire connected to the mainland by a wooden causeway. The platform is surrounded by a fence or palisade of oak poles or piles driven into the ground. It was built
around 3000 BC in the Dags Mosse mire, Alvastra in the province of Östergötland. The wooden platform was not an everyday dwelling, even though pile dwelling is its archaeological name. On the contrary, it was the scene of large-scale ritual activities, activities that are focused on the meeting of cultures. The Alvastra pile dwelling was excavated for the first time from 1909 until 1930 by Otto Frödin. The results of this excavation were published in 2011 by Hans Browall. The second excavation was conducted between 1976 and 1980 by a group of archaeologists from Stockholm University under the leadership of Professor Mats Malmer. The results have, for various reasons, never been published in their entirety. As this is such an important site, the inaccessibility of the material has held back research on the cultural relations of the Neolithic. It is thus of vital importance that the material be made accessible to the archaeological community. The pile dwelling is for several reasons of immense archaeological significance, both nationally and internationally.

- At this place two archaeological cultures are represented – the Pitted Ware Culture and the Funnel Beaker Culture.
- This site is fixed in time – unusual in such an ancient archaeological context. The more than 800 piles used to build this platform can be related to each other by their tree rings. They represent 42 years, a floating chronology, which has also been attached to calendar year by numerous radiocarbon dates.
- Because of the waterlogged conditions in this mire, organic material has been preserved in unusually large amounts – tools of bone and antler, wooden objects apart from the piles in the platform, apples, carbonized grain, tinder mushrooms, human bones and animal bones.
- The non-organic material excavated from the site consists of potsherds, flint tools and stone tools of various kinds. It is diverse and very rich, making many different kinds of archaeological research possible. Other research is also possible, for example on climatic change. Much ongoing genetic research is based on the human bones, but much remains to be done on the other kinds of material. In 2014, the Swedish History Museum and the Department of Archaeology at Stockholm University was granted funding by the Swedish Foundation for Humanities and Social Sciences to digitize the assemblages from the 1976–1980 excavations and to construct a research platform for the Alvastra pile dwelling site. The project is to be launched in April or May of 2015 and will work for three years to make the assemblages digitally available and to collect all available resources in a digital platform accessible from the home page of the Swedish History Museum. The pile dwelling is situated about 2.5 km from the eastern shore of Lake Vättern, the second largest inland lake of Sweden, and 4 km southwest of the smaller Lake Tänken. Theses lakes together with numerous small rivers provided ample opportunities for fresh-water fishing. The ancient Littorina Sea was located at a distance of 70 – 80 km.

### Fishing tools made from organic materials in the Stone Age of Eastern Europe

**Olga Lozovskaya (presenting author), Vladimir Lozovski (both Institute for the History of Material Culture, St. Petersburg)**

In the Mesolithic and Neolithic of the forest zone of Eastern Europe, fishing became one of the main forms of economy and largely determined the way of life, the choice of the ecological niche, and even the vector of the historical development of the ancient population. Due to the investigations of peat-bog settlements, where we witness the whole range of organic materials, we can assess and explain the role of fishing. For Eastern Europe, we speak mainly about lake and river fishing, but also marine fisheries are found on the North Coast and in the Baltic region. Among the individual fishing tools, we note harpoon heads, barbed points, composite leisters and fishing hooks. Harpoon fishing is normally linked to the shallow water season or boat fishing. Barbed points and harpoons are represented by different types, which are widely distributed, and only some recurring forms can be linked to certain cultural traditions. Composite leisters are widespread in the Stone Age of the Baltic region. In Russia’s Vis 1 site and in the Baltic region [sites Shvyantoji, Sarnate], several fragments of wooden leisters were found. Fishhooks also vary by shape and are generally rather massive. We can distinguish complete and composite tools and specific types of fishhooks, for example, for the Upper Volga culture of the Early Neolithic. Recent use-wear analysis revealed the traces of fish teeth on the used fishhooks and identified separate fish species. In the late Mesolithic of the Volga-Oka region, a series of willow-shaped fish-hooks was found. The most widespread evidence of fishnet fishing is represented by floats made from the tree bark. They have different shapes and are widely represented in the Mesolithic and Neolithic of Finland and the Baltic countries. Remains of fishnets were found in a very small number of settlements. They were normally made from shredded willow branches, inner bark, and sometimes from bilberry-roots. All known nets were bound using the Becket bend. Very often, finds of fishnet weights indicate the use of fishnets. From
Fish(ing) in muddy waters? Evidence in the waterscapes of Canton Zug (Switzerland)

Renata Huber (Amt für Denkmalpflege und Archäologie, Kanton Zug, Schweiz; presenting author), Edu Gross, Gishan F. Schaeren

Zug derives its name from an old term for hauling in nets ("zuc": Dittli 2007). Current research shows the significance of fishing in several sites at least from the Neolithic onward. The excellent preservation conditions in wetland sites allows for a distinction between various patterns of wetland resource management at different sites. Abundance and composition of recorded wetland species seem to vary, probably depending on location, function, and seasonality of the sites: at Cham-Eslen around 4000 BC, a single building on an island seems to have been used predominantly for fishing activities, as we can tell from both finds of fishing gear and a large amount of fish bones (Huber/Rehazek 2014). Trans-disciplinary evaluations of a large bone midden and its overlying loam layers at the site of Zug-Riedmatt (around 3200 BC) show evidence of seasonally differentiated subsistence activities in the form of intense red deer hunting, fishing, gathering, and processing of different wetland species in and near the ambient river delta and lake shore (frogs, bleak, pikes, and whitefish: Billerbeck/Hüster-Plogmann/Ismail-Meyer et al. 2014). From later prehistoric and Roman times, we have as yet little to no information. A recent excavation in a silted-up small lake named “Bibersee” (beaver lake), however, has yielded very rich finds of fishing gear (traps, fences, dugout) from the Middle Ages which correspond well with the site of Steinhausen-Sumpfstrasse West (Roth Heege 2007). If we trace back waters and wetlands in the pre-industrial area of Canton Zug, manifold waterscapes emerge. Lakes, deltas, riparian zones, rivers, swamps of different sizes cover a large part of the surface of the Canton of Zug and provide an abundant mosaic of food resources as well as transport and communication routes throughout the times.


Of fish and men, from net to fillet: Ichthyarchaeology and palaeoethnology of hunter-fisher-gatherers in Northern Europe during the Early Holocene

Maxime Dangor

Underestimated until recently among hunter-gatherers subsistence activities during the Palaeolithic and the Mesolithic, aquatic resources (especially fish) foraging analyses are now fully a part of pluridisciplinary studies as they can provide precious information about the environment and human behaviour. However, ichthyofauna does not yet receive as much complex theoretical reflection and technical implements as its mammalian alter ego, which is a pity, since even if fishing is a marginal part of the subsistence strategies, it still involves a large variety of problems and constraints. This PhD thesis project proposes to consider fishing as a whole technical system; as a lot of complex interactions between resources, techniques, operation systems and specific knowledge from a specific group of craftsmen (i.e. society) and the archaeological record at our disposal. Here, we provide an investigation on the chronological and geographical diversity and technical evolution of fishing strategies of hunter-fisher-gatherers from Northern Europe during the first half of the Holocene by trying to answer several questions: what are the available resources lato sensu, which ones are exploited and to what purpose? What are the constraints, both physical and technical? How are technical actions to be understood and characterized? The project intends to use experimental archaeoichthyology, by obtaining and using a wide range of fishing tools (from nets to spears and from hooks to knives), in order to achieve several goals: to test the efficiency of these tools toward the fish species; and also to obtain two interdependent collections of specimens, processed fish skeletons, on one hand, and fishing usewear on fishing tools on the other hand. Such specimens would be useful in a wide, pluridisciplinary and systematic study of prehistoric fishing. Our methodology shall include the identification of fish species (from vertebrae and cranial bones to measure the diversity of fish and its possible evolutions), seasonality (estimation of the death season and seasonal mobility of the fishing groups and fish migrations from skeletal chronology on vertebrae) and whole-size estimation using vertebrae and cranial measurements applied to fish growth and power regression. As a true pluridisciplinary study, we shall combine our reflections together with that of colleagues carrying out analysis in adjacent disciplines: environmental and spatial archaeology for climatic and environmental variations impacting the accessibility of geographic and hydrographic networks and the availability of resources (fish, wood, stone); bone and flint technology as well as usewear and taphonomy studies to characterize the different ways of crafting and using fishing tools and the methods of fish processing. We should then demonstrate that fishing can be seen as a technical system that must be studied in its globality to understand the complexity of its patterns and its function within a more general system (material, cognition, action) of a society.

Different methods – different dietary patterns? The importance of aquatic resources in the European prehistoric dietary record

Alisa Scheibner (Institute of Prehistoric Archaeology, FU Berlin)

Aquatic resources have probably been used by humans and their ancestors as a food source since ca. 2 mya (Braun et al. 2010). In many regions, the Mesolithic is the period with the strongest aquatic influence on the diet. As isotope analyses show, aquatic resources were not only used in Mesolithic times, but also in the Upper Palaeolithic, the Neolithic and in later periods. Food as a marker of the Mesolithic-Neolithic-transition is well researched in many regions of the Old World through isotopic studies and further bioarchaeological analyses such as archaeozoology, archaeobotany and physical anthropology. However, the interpretation of isotopic values is not always straightforward, as carbon and nitrogen values can be influenced by different environmental factors. This applies especially to the interpretation of the proportion of freshwater resources and to a lesser degree to the amount of marine foods in the diet. In some regions (i.e. Sweden), dietary analyses indicate a delayed adoption of Neolithic diet and subsistence patterns and a continued use of aquatic resources (e.g. Eriksson et al. 2008). Contrarily, rapid dietary changes took place in other regions (i.e. Great Britain) at the onset of the Neolithic, which are evident from a decline in marine resources. The reason for the decreasing consumption of aquatic foods in the Neolithic is still a matter of debate and is even thought to be due to food taboos associated with the adoption of a “Neolithic identity” (Thomas 2003). In light of the changing coast lines during the last ca. 40,000 years, site localisation is an aspect that should not be underestimated when dealing with the consumption of marine resources. Other explanations are sample biases or problems with the interpretation of the isotopic data, as in some cases artefacts or bone assemblages can indicate the use of aquatic resources [Milner et al.
2004). However, archaeozoological contexts often do not contain fish bones due to different factors which can influence their chance for preservation. Therefore, the consumption of these food sources in isotopically less-well-studied regions might not be evident although fish or other aquatic resources could have played an important part in the diet. This talk addresses the question if different methods show different dietary patterns in the archaeological context. The aim of this presentation is to provide an overview of the current state of research of dietary patterns from the Upper Palaeolithic to the Late Bronze Age in Europe with particular attention paid to signs of fish consumption in the isotopic record in inland and coastal regions and by comparing these with the results of other bioarchaeological analyses.

Like a fish out of water: Is Alces alces a semi-aquatic animal?
Bente Philippesen (AMS 14C Dating Centre, Aarhus University)
Terrestrial herbivores are usually considered “safe” for radiocarbon dating, as they incorporate carbon in equilibrium with the atmosphere. Radiocarbon reservoir effects are therefore not expected in these animals. One species, however, might show reservoir effects: the elk/moose (Alces alces) is reported to incorporate large proportions of aquatic plants into its diet. Up to 50% of an elk’s diet may consist of aquatic plants. As those plants can have reservoir ages of up to thousands of years, significant reservoir effects are possible in elk bones. In summer, elk are observed to spend much of their time cooling down in lakes and rivers, munching away on the aquatic vegetation. This is the season when the antlers are formed, so the reservoir effect is expected to be greatest in the antlers. In this study, radiocarbon dating of historical known-age samples, archaeological elk bones from secure contexts, and paired samples of elk and terrestrial samples, or of elk bones and antlers, will show how great the risk of reservoir effects in elk is. I aim at great temporal and geographical variety of sample origins, with a special focus on areas with carbonate-rich water, where the largest effects are expected. Finally, I will outline the importance of elk in archaeology as an economical and symbolic resource – and that elk could well have been perceived as a semi-aquatic animal in past cultures.

External auditory exostoses [EAE] – An activity indicator for activities in or on the water?
Barbara Teßmann (FU Berlin, Institut für Prähistorische Archäologie)
Auditory exostoses are bone anomalies located in the external auditory canal. The size of either singular or bilateral external auditory exostoses ranges from very small to over a few millimetres and also the total ear canal can be closed as well. At the beginning of the presentation, the clear differences to tumors in the ear will be described. After that the focus is placed on the aetiology of the auditory exostoses. In addition to genetic factors, environmental conditions are discussed today in particular. It is commonly assumed that auditory exostoses occur on contact with cold water. Based on the anthropological material, a three-category grading system for the auditory exostoses is developed. In the second part of the lecture, various examples of the auditory exostoses are presented. Auditory exostoses were discovered virtually all over the world in prehistoric and historical skeletal series and originated, for example, from the Mesolithic of Serbia but also from the Prehispanic era of the Canary Islands. At the present time, this phenomenon is observed mainly for active water sports in, for example, swimmers, surfers and divers. Thus, auditory exostoses are indicators for certain activities which are made on or in the water, such as diving or fishing with nets fastened on the ground with net sinkers.

Eating loads – Big-scale shellfish exploitation on the Farasan Islands, Saudi Arabia
Niklas Haßmann (Department of Archaeology - BioArCh, University of York, UK)
Research in the southern Red Sea has revealed a dense cluster of over 3000 shell middens dating to the Early Neolithic on the Farasan Island archipelago. The middens are rich deposits, containing early pottery, human burials and a specialised subsistence strategy that is focused on local shell gathering. Most shell middens consist of a high amount of Conomurex fasciatus shells, a small gastropod that has been the centre of our studies. Stable isotopes and trace elements of the C. fasciatus shell carbonate provide us with a climatic archive that has a high potential as a very important environmental proxy for the southern Red Sea due to the consistent occurrence of C. fasciatus within different layers of the shell middens. Especially the rapid accumulation of shell deposits and its potential for behavioural studies is explored. These results will ultimately be used to develop models of human-environment interaction and marine resource exploitation during this period, as well as to provide a potential analogue for such exploitation in earlier prehistory.
Comparing health impairments and diseases of Iron Age individuals from ‘regular’ and settlement burials in Central Europe

Nils Müller-Scheßel (Römisch-Germanische Kommission; presenting author), Carola Berszin, Annette Schwentke, Anja Staskiewicz, Joachim Wahl

In general archaeological discourse, health impairments or hints on diseases are usually invoked only on a casuistic ad hoc-basis: Respective findings by the examining anthropologist are cited when they seem to fit into the archaeological narrative, but coherent and systematic comparisons of archaeological/anthropological collectives are the exception. This certainly also has to do with the difficulties in generalizing the anthropological results which, in turn, are attributable to the bad and often incomplete preservation of human bones. In our paper, we want to discuss this and other methodological issues in detail and then move on to our case study: the comparison of individuals from ‘regular’ and settlement burials of the Iron Age in Central Europe. As one of the main interpretative models for the practice of depositing human individuals in settlement pits has been the hypothesis that these individuals were of low social status, although possible information on the health status of these individuals is also of vital importance. If available and significant, it could be expected that they show signs of ill health and maltreatment. However, to be of any use this key information has to be related to that yielded from other parts of the Iron Age population, i.e. that from ‘regular’ burials. In doing this, we draw heavily on our preceding discussion on the methodological issues when comparing individuals from different collectives.

Insights into the evolutionary history of Mycobacterium leprae from medieval genomes

Verena Schuenemann (Institute for Archeological Sciences, University of Tübingen)

Leprosy, one of the oldest recorded and most feared diseases in human history, was prevalent in Europe until the 16th century. Today the disease is still endemic in many countries with over 200,000 new cases reported annually. Its causative agent, Mycobacterium leprae, shows exceptional DNA preservation in ancient skeletal remains allowing reconstructions of late medieval M. leprae genomes up to a 100-fold coverage and even a de novo assembly of one medieval genome. A phylogenetic comparison of ancient and modern strains indicates a low mutation rate compared to other pathogens and a pre-medieval origin of most contemporary human and armadillo leprosy lineages. The most basal lineages are present in Asia today pointing to an Asian origin of the disease. New data spanning the last 1500 years allow more insights into the evolutionary history of M. leprae and suggest a simultaneous presence of at least two M. leprae lineages in medieval Europe.

The St. Jorgen Leprosarium Cemetery: A glimpse into Mycobacterium Leprae and tuberculosis genomics and co-evolution

Marion Bonazzi (Graduate School Human Development in Landscapes / Institute of Clinical Molecular Biology, Kiel University)

Mycobacterium leprae is the etiologic agent of leprosy, a chronic dermatological and neurological disease. The 11th to 15th century AD medieval period in Europe saw the highest prevalence of the disease, especially in rural areas. In some communities, almost all inhabitants were infected. Even though no effective treatment of leprosy was available, the disease became almost absent during the 16th century. At around the same time, the prevalence of tuberculosis, caused by Mycobacterium tuberculosis, peaked in the region. This suggests an important co-evolutionary mechanism, and a complex interaction network between bacteria, humans, society and environment. As M. leprae and M. tuberculosis cannot be easily cultured, most of the knowledge available is based on modern genomic studies showing very low genetic diversity. Numerous studies on modern DNA have helped to discover the genomics of modern Mycobacteria. They are however limited in their capacity to evaluate the evolution of the diseases due to the heavy use of medication in the past 100 years. Up to now, work based on ancient remains has been limited to paleopathological diagnosis based on disease-specific bone lesions, PCR detection of small pathogen sequences and next-generation sequencing (NGS) of a small number of samples. This project uses for the first time a combination of aDNA analysis, NGS and bioinformatics to enable a genomic study of Medieval M. leprae interactions with its competitor M. tuberculosis. TB and leprosy have not been completely eradicated
and TB is still causing more deaths than any other infectious disease in developing countries. Moreover, the heavy use of antibiotics of recent times has triggered the appearance of strains resistant to most treatments that could potentially lead to new pandemics. This study focuses on the evolution of leprosy and tuberculosis through the Middle Ages to help understand the mechanisms behind the changes in the Mycobacteria pathogenicity. So far, 35 teeth from individuals showing bone lesions specific for leprosy and tuberculosis have been collected from the St. Joergensen leprosarium cemetery in Denmark, in use between the 12th and the 16th centuries AD. Up to date, a DNA preservation test using mtDNA PCRs showed a good general preservation of the site, with 31 samples (out of 35) yielding the expected mitochondrial DNA PCR products. PCR screening for M. leprae DNA has been conducted and the 17 samples showing amplicons specific for the M. leprae genome have been shotgun sequenced. Six (6) yielded enough M. leprae reads to attempt a de-novo assembly of the pathogen genome. A PCR screening for M. tuberculosis DNA has been tested but shows inconclusive results. This suggests that despite the high genetic similarity between the two species, it is difficult to directly transfer identification methods from one to the other. The 17 leprosy sample sequences were also mapped against the M. tuberculosis reference genome and, interestingly, 3 samples also yielded numerous sequences assigned to M. tuberculosis.

Detection of inflammation associated SNPs in Danish leprosy samples from the Middle Ages

Lena Möbus (Institute of Clinical Molecular Biology, Kiel University)

It is hypothesised that past epidemics have left humans more resistant to infectious diseases, but vulnerable to immune mediated disorders. One example is the previously described link between medieval leprosy and contemporary inflammatory diseases. This link was investigated in this project by means of ancient DNA (aDNA) analysis of a Danish leprosy sample of 22 individuals from the Middle Ages. aDNA was extracted from bone powder and samples were genotyped at six SNP (single nucleotide polymorphism) loci that are located in shared susceptibility genes for both inflammatory disorders and leprosy. The allele frequencies at the SNP loci in the medieval sample were compared with present frequencies. Allele and genotype frequencies at two SNP loci, namely rs1800795 (Interleukin-6 5’ flanking region) and rs5743618 (Toll-like receptor 1 flanking region), differed remarkably but not significantly from the reference frequencies. Interestingly, at SNP locus rs1800795, which is located in the IL6 5’ flanking region, the less proinflammatory CC genotype was enriched in the medieval lepers. The CC genotype protects from chronic juvenile arthritis and psoriasis, but is associated with type-2 leprosy reactions, which are aggressive inflammatory episodes that can be fatal. It seems the CC genotype has decreased in the European gene pool because of the leprosy epidemic. At SNP locus rs5743618, the GG genotype, which results in a deficient Toll-like receptor 1, is increased in the lepers. This observation seems biologically plausible, but in order to draw a definite conclusion with regard to the hypothesis, further disease association studies with this SNP locus are required. In conclusion, the observations for rs1800795, but not for rs5743618, might support the hypothesis that the past leprosy epidemic has left Europeans more resistant to leprosy, but vulnerable to contemporary inflammatory disorders. A further study with a larger sample size and a control sample of medieval non-lepers is required.

The presence of tuberculosis in the German-Danish border region in the medieval period

Dorthe Dangvard Pedersen (University of Southern Denmark, ADBOU)

Diagnosing tuberculosis in skeletal samples can be rather difficult due to both low skeletal involvement rates and problems of differential diagnosis. However, analyses of modern reference samples of skeletons with known diagnosis and aDNA detection of M. tuberculosis in archaeological skeletal material have led to well-documented descriptions of the bone pathology related to tuberculosis. Most attention within palaeopathological studies has, however, been given to clear diagnosed cases of the disease. An osteological approach to study tuberculosis in skeletal remains that includes early or little progressive stages of bone involvement has been developed by the author. The method enables better estimates of the prevalence of bone involving tuberculosis, and because the lesions are registered dichotomous as either 0 (absent) or 1 (present), large skeletal samples can be registered within a reasonable time frame.

In the study presented, the method is applied to 1064 skeletons – 110 from Schleswig and 954 from Ribe – dated to the Danish medieval period AD 1050–1536. The purpose is to study the epidemiological properties of tuberculosis in the German-Danish border region in the medieval period. Socio-economic aspects that affect the immune response
in humans such as housing, work load, health and nutrition are important factors behind the spread of tuberculosis. Thus, the analyses of the epidemiology of tuberculosis can give insight into the socio-economic aspects of life in the two medieval towns.
Divergent human diets across different new world socioenvironmental systems
Margaret Schoeninger [University of California, San Diego]

When the Spanish first encountered the local inhabitants of what is now the west coast of southern California and Baja, Mexico, they found small groups of foraging people who moved seasonally between the coast and inland as resource availability changed throughout the year. The early and middle Holocene archaeological record suggests that people lived for longer periods of the year on the coast, and may even have been sedentary, but in any event, agriculture was never practiced in the region prior to Spanish contact. In contrast, when the Spanish first encountered the local inhabitants of what are now the east coast of Georgia and its nearby barrier islands, they found settled agriculturists living in relatively stable towns or villages. The archaeological record indicates that people began maize agriculture late in the Holocene, several thousands of years prior to Spanish contact. This presentation explores the environmental differences in both the marine and terrestrial systems between the two coasts. It argues that the available plant and faunal resources differed significantly between the east and west coasts of the southern regions of today’s USA, thereby influencing human behaviors and giving rise to significant differences in their social, cultural, and economic systems.

Dietary variability and mobility patterns in the world’s driest desert: application of stable isotope analysis to ancient populations from the Atacama
Francisca Santana Sagredo [presenting author], Julia Lee-Thorp, Rick Schulting, Mauricio Uribe
[1 Research Laboratory for Archaeology and the History of Art, University of Oxford, Oxford, UK; 2 Departamento de Antropología, Universidad de Chile, Santiago, Chile]

Prior to the establishment of the Inka Empire, the Tarapacá and Atacama cultural groups inhabited the Atacama Desert from the Andes to the coast. During this period, known as the Late Intermediate (LIP; AD 900–1450), societies have been characterised as independent but with intense interaction. Archaeological reconstructions suggest subsistence based mostly on agriculture and pastoralism, and fishing activities are only evident for the Tarapacá Culture. However, these patterns are based on indirect evidence from the archaeological record. Here, we applied stable isotope analysis to individuals from two cemeteries associated with the Tarapacá and Atacama cultural groups, Pica 8 and Quitor 6, respectively, in order to better understand diet and its variability, and mobility patterns. We used both the organic and inorganic phases: stable carbon isotopes in bone collagen, bone apatite, and tooth enamel, nitrogen isotopes in bone collagen, and stable oxygen isotopes and radiogenic strontium isotopes from tooth enamel. The results show extensive diet variability in both sites of Pica 8 and Quitor 6. We were able to discern the consumption of modest to large amounts of maize at Pica 8 (δ13C bone apatite -5.9±2.6‰) while a more mixed C3/C4 diet is suggested for Quitor 6 (δ13C bone apatite -8.0±1.0‰). δ15N values show consumption of marine fauna only at the site of Pica 8 (δ15N 17.3±3.9‰), consistent with archaeological reconstructions. Dietary differences are associated with a non-local origin for at least seven (17% out of 30 individuals in total) and four individuals (40% out of 10 individuals in total), respectively in Pica 8 and Quitor 6 as shown by low δ18O (~ -10‰) and high 87/86Sr ratios (~0.710). The non-local individuals also present at both sites exhibited dietary differences in their δ13C and δ15N values, when compared to the local individuals. This data suggests possible origins in the high Andes for these outliers, with one exception. The dietary diversity observed for both groups suggests complex cultural systems possibly associated with identity and ethnicity rather than gender or status differences.

Diet and nutrition in the process of adoption of agriculture in western valley regions of the South Central Andes, Chile
Veronica Silva-Pinto [Max Planck Institute for Evolutionary Anthropology; presenting author], Domingo Salazar-García [University of Cape Town/ MPI for Evolutionary Anthropology]

The central Andean area represents the first focus of sedentarism in South America before agriculture (6000 BP). Recently, the role of the seemingly peripheral area to the centers of development of the Andes was reassessed (Shady 2003). The archaeological evidence shows the active role of local societies with inter-regional interaction that marked the development of high complex responses in the transition to Formative neolithization. In the western
valley regions of the South Central Andes, its origins are on the coast during the Archaic period (Nuñez and Santoro 2012). The Atacama Coastal Desert is one of the driest places on earth. The northern section, known as the Fertile Coast, is characterized by the presence of valleys or quebradas that traverse the desert. The coast of the Atacama Desert is populated during early Holocene. This population began a gradual specialization in a maritime economy system, based on fishing, hunting and gathering, denoted as Chinchorros. Their mortuary system shows a wide variety of forms to treat corpses (Arriaza 1994, 2003; Standen et al 2004; Santoro et al. 2012). The consolidation of agricultural development and village life during the Formative period is reflected in the Alto Ramírez phase (2500–1700 BP). It is characterized by the construction of funerary tumulos, which are interpreted as ideological components that modified the landscape and represented a new social order. The material includes 377 human skeletal samples from different sites in Azapa Valley and the coast of Arica and Camarones in the western valley regions within the South Central Andes in Chile. The collection is deposited in the Museo Universidad de Tarapacá de Arica San Miguel de Azapa. The results do not show significant differences in nutrition between hunter-gatherer or fishing populations and the first farmers. This reflects a mixed diet of maritime exploitation, which is verified through the analysis of stable isotope data from this time period appears to support this hypothesis. In this talk I will review this evidence and present a conjectural reconstruction of the typical diet consumed by these representatives of the uppermost social class. The majority of the δ13S values range between -21 ‰ and -19 ‰, corresponding to the vegetation of forest ecosystems and semi-open spaces. The values for δ15N range primarily from 10.5 ‰ to 12.5 ‰. Data for the same criteria from individuals of rural medieval cemeteries in the Moscow region had already been compiled in a separate earlier study. The δ15N values found in these groups do not exceed 10.8‰, although δ13C values are confined to a range of -20.5 ‰ to -19 ‰. These results permit us to conclude that the population of medieval Russian cities typically subsisted on a diet high in protein food reared on land (milk, and various kinds of meat). Water-borne animals do not occupy any significant place in the diet of city-dwellers. Diachronic analysis of the data obtained suggests that there was considerable stability in these dietary habits over a long period of time.

Aquatic foods and the spread of early modern humans into Eurasia
Michael Richards (UBC and MPI)
One of the key issues in understanding modern human spread and expansion out of Africa and into Eurasia is how modern humans were able to adapt and survive in new and unfamiliar environments. This talk focuses on the diet and subsistence aspects of that adaptation, and discusses the possibility that if marine and freshwater fish (and shellfish) were key dietary resources and modern humans expanded and moved into new environments along coastlines and waterways they would be able to exploit similar aquatic food resources that they were already familiar with. The limited human stable isotope data from this time period appears to support this hypothesis. In this talk I will review this evidence and the archaeological evidence to explore the importance of aquatic foods in early modern human diets.

Mediterranean diets during the Pleistocene/Holocene transition: Isotopic studies on bone collagen of hunter-gatherers buried at cave sites in Italy
Marcello A. Mannino1(presenting author), Sahra Talamo1, Antonio Tagliacozzo2, Daniele Albertini2, Monica Gala2, Vincenzo Formicola3, Elisabetta Starnini4, Angiolo Del Lucches4, Renata Grifoni Cremonesi5, Francesco Mallegni2, Michael P. Richards5,7 (1 Department of Human Evolution, Max Planck Institute for Evolutionary Anthropol-
Late Pleistocene and early Holocene hunter-gatherers diversified their subsistence strategies by broadening the range of taxa exploited, including a wider array of small mammals, birds, aquatic animals and plants. The role played by these resources in the Mediterranean is, however, poorly understood. Carbon and nitrogen isotope analyses have been undertaken on the bone collagen of Upper Palaeolithic (Epigravettian) and Mesolithic humans buried at cave sites in the Italian Peninsula (Caverna delle Arene Candide, Grotta Continenza and Grotta Romanelli) to evaluate the contribution of terrestrial, freshwater and marine protein to their diets. The results presented here, interpreted in the light of published zooarchaeological data, suggest that humans living in Italy during the Late Pleistocene/Holocene transition relied heavily upon animal protein from medium to small-sized terrestrial herbivores. At times of environmental change, and in favourable habitats, aquatic resources were exploited and may have contributed up to a fifth of the animal protein consumed annually. Our findings have important implications for the understanding of hunter-gatherer adaptations to non-analogue Mediterranean environments, as well as for the potential of these for intensification and diversification in resource exploitation.

Changing subsistence strategies at the aceramic Neolithic site of Chogha Golan (Iran)

Alexander Weide (University of Tübingen, Institute for Archaeological Sciences; presenting author), Britt M. Starkovich, Mohsen Zeidi, Nicholas J. Conard

The aceramic Neolithic site of Chogha Golan is located in the foothills of the Zagros Mountains in Iran and dates to between 11,700 and 9,600 cal. BP. Members of the Tübingen-Iranian Stone Age Research Project (TISARP) excavated the site in 2009 and 2010 and divided the stratigraphy into eleven archaeological horizons (AH). Zooarchaeological and archaeobotanical data available to date indicate several shifts in subsistence during the occupation of the tell. The lower horizons are characterized by the exploitation of a wide range of wild species, dominated by grasses, legumes, medium sized ungulates and fish. An increase of gazelle in AH VI and V, together with large amounts of small-seeded grasses in AH V-III, indicate a possible change in resource availability toward the middle of the sequence. Anthracological data support this interpretation. In the last phase of occupation (AH II and I), cattle seem to become more common and numerous finds of morphologically domesticated emmer rachises mark the beginnings of agriculture at the site. Whether domestic animal species were present cannot yet be determined, as the number of recovered specimens is too low. Our current analyses focus on these last horizons to gain a better understanding of the beginnings of agriculture at Chogha Golan.

Diet in the Iron Age of Central Europe according to age and social status

Nils Müller-Scheefel (Römisch-Germanische Kommission; presenting author), Gisela Grupe, Carola Berszin, Annette Schwentke, Anja Staskiewicz, Joachim Wahl

Recent years have seen an increasing amount of studies on stable isotopes of human bones which allow inferences on nutrition and diet (especially C13 and N15). However, there has been rarely an attempt to summarize and compare these studies in the light of the archaeological background from where the isotope data derives. In our paper, we want to link the isotope data stronger to the archaeological contexts taking the Iron Age of Central Europe as the point of departure. Apart from published studies, we thereby rely on a considerable body of new analyses (150 individuals) from different archaeological contexts, including ‘regular’ burials as well as individuals from settlement pits and caves. Our focus lies on the relation between diet and age as well as on the social status of the individuals. This combination of archaeological and isotope data is accompanied by a re-consideration of the available information on differences in body height which before the advent of isotope studies has been the usual proxy of choice for the quality of nutrition.
Identifying Famine in the Human Past
Julia Beaumont (School of Archaeological Sciences, University of Bradford)

Where famine is suspected in prehistoric populations, the diagnostic osteological markers for acute and chronic starvation could also be present when death was caused by epidemic disease. Modern studies of incrementally-forming tissues, such as hair and nail, can be used to show rises in the stable isotope ratios of nitrogen (\(\delta^{15}N\)) during periods of stress, but human bone turnover is thought to be too slow to record famine stress. Here we demonstrate variations in the \(\delta^{15}N\) profiles produced from incrementally-forming dentine from juveniles and adults who died in Kilkenny Union workhouse, Ireland, during the period of the Great Irish Potato Famine. These can be linked to changes in the isotope ratios of carbon (\(\delta^{13}C\)) as potatoes were replaced in the diet by maize, a relief food with a very different \(\delta^{13}C\). These \(\delta^{15}N\) variations in dentine offer potential markers for nutritional stress in juveniles.

Why terrestrial diets in marine locations?
Considerations of nitrogen isotopic results from Rapa Nui

Catriona Jarman (Department of Archaeology and Anthropology, University of Bristol; presenting author), Reidar Solvik (Kon-Tiki Museum), Terry Hunt (University of Oregon), Brian N. Popp (University of Hawai‘i)

Archaeology and isotopic studies have demonstrated several examples of initial colonists of Pacific Islands subsisting largely on terrestrial diets with exotic domesticates preferred over local seafood. This paper presents new isotopic evidence for terrestrial diets among prehistoric Rapa Nui populations through high-resolution compound specific analysis of individual amino acids from human and faunal remains. \(\delta^{15}N\) values indicate that seafood was not a significant component of the early Rapa Nui diet, which instead consisted largely of terrestrial resources such as chickens, rats, and protein-rich starches. To contextualise what may seem to be a poor adaptation to a remote island environment, we will firstly compare these results with other multidisciplinary approaches to the study of diet on Rapa Nui. Secondly, we will consider whether this reliance on terrestrial resources is best explained from an environmental perspective of access to and availability of marine resources, or whether it is instead a reflection of other factors restricting and controlling access to certain foods.

Dietary reconstructions with stable isotope analysis of amino acids

Thomas Larsen (Leibniz Laboratory for Isotope Research, Christian-Albrechts-Universität zu Kiel; presenting author), Brian Fry, Australian Rivers Institute, Griffith University, Australia

The reconstruction of prehistoric diets is one of the most important research topics in archaeology and physical anthropology because it forms the basis to assess how different cultures exploited their local resources and coped with environmental and demographic disruptions. In spite of the remarkable development in the methods employed for reconstructing diets, it remains a challenge to interpret biochemical and isotopic signals derived from bones and food residues. The last decade has seen a surge in the application of stable carbon isotope analysis of amino acids (\(\delta^{15}C_{AA}\)) because it holds great promise as a high fidelity diet marker. Some archaeological studies have shown that \(\delta^{13}C\) offsets between phenylalanine and glycine are informative of aquatic vs. terrestrial protein sources, and other studies that the offsets between phenylalanine and valine are informative of marine vs. freshwater protein sources. To explore whether these and other amino acids can distinguish between all three sources simultaneously, we conducted a meta-analysis with \(\delta^{15}C_{AA}\) data combining results from multiple studies. By applying multivariate statistics, we were able to distinguish between freshwater, marine and terrestrial consumers with almost 100 % certainty. We confirmed that phenylalanine, valine and glycine are the most informative amino acids to distinguish between the three protein sources; however, including additional amino acids, such as alanine and asparagines, increased accuracy suggesting that predictive models based on multivariate statistics are superior compared to those based on \(\delta^{13}C\) offsets between two amino acids. Ultimately, \(\delta^{15}C_{AA}\) data may also provide more details of prehistoric diets than outlined here. For example, people subsisting on marine protein sources also foraged for mollusks and crustaceans. Since these invertebrates feed on partially decomposed diets, we explored the possibility that bacterial proteins made it into to the marine food chain with a method called \(\delta^{15}C_{AA}\) fingerprinting. The fingerprinting method is based on \(\delta^{15}C_{AA}\) patterns unique for algae, bacterial fungi and plants, respectively. The isotope fingerprints of mussels resembled algae mostly but not entirely suggesting small protein contributions from either terrestrial or bacterial sources. In comparison, prehistoric people known to consume marine proteins had fingerprints resembling algae completely indicating that bacterial derived proteins were insubstantial. Taken to-
A dietary reconstructions may become even more major protein sources with high certainty and that dietary reconstructions may become even more accurate when combined with modern training data.

Improved quantitative human diet reconstruction: Combining multiple sources of archaeological evidence

Ricardo Fernandes [Kiel and Cambridge Universities]

Ancient human diet reconstruction studies relying on stable isotope analysis constitute an important source of archaeological evidence. However, instances occur where available isotopic proxies are unable to provide unambiguous dietary estimates. In these cases it would be advantageous to combine isotopic data with independent sources of historical and physiological information. The Bayesian mixing model Food Reconstruction Using Isotopic Transferred Signals (FRUITS) was developed with the capability of incorporating the uncertainties associated with the parameters involved in a diet reconstruction exercise relying on isotopic data (consumer isotopic signals, diet-to-tissue isotopic offsets, isotopic signals of food groups, nutrient concentrations, and dietary routing). FRUITS is a generic model and specific model instances can be defined that are fitted to each specific application. This includes the incorporation of prior information establishing relationships of equality or inequality between different model parameters. Sources of prior information may include, for instance, independent observations of the relative consumption of potential food groups (e.g. archaeological distribution of food remains, documentary sources, and pottery residue analysis). Prior knowledge of nutritional requirements can also be easily incorporated into FRUITS through the definition of acceptable ranges of dietary intakes (e.g. relative macronutrient intake). This study will present archaeological and modern human case studies with well-known diets in which different sources or prior information (documental, archaeological, and physiological) were integrated into FRUITS model instances to produce more accurate and precise dietary estimates. The adequate use of prior knowledge and forms of validating model output will also be discussed.

General remarks about diet of inhabitants of ancient Akrai, Sicily

Roksana Chowaniec [presenting author], Anna Grzęzak [both University of Warsaw, Institute of Archaeology]

The subject of the proposed paper is osteological material consisting of animal remains recovered during excavations from 2011–2014 in the Greek-Roman town of Akrai, located in south-eastern Sicily in the province of Siracusa. The colony was founded at ca. 664/663 BC by colonists from Syracuse and lasted until Late Antiquity. A new archaeological investigation was inaugurated in 2011. A huge quantity of archaeological artefacts, confirming the development and further functioning of the town, was discovered in the course of systematic, stratigraphic excavations. The new research has discovered the 3rd–8th c. AD stratigraphic levels, however, the excavations have also delivered splendid material dated to earlier periods, i.e. to the 1st–2nd c. AD and also to Hellenistic times. During the excavations, the osteological material, which mostly consists of post-consumption remains, has been discovered. For this reason, it can be used for drawing conclusions about the meat diet of the population of Akrai. The archaeozoological examination was performed according to standard rules and procedures. Written sources also help us in the reconstruction of the diet (e.g. Archestratus, a no-name cookbook written at the court of Hiero I, Apicius). We need to remember that ancient Sicily is regarded as a cradle of a tradition of sumptuous dining and appreciation for that which was first placed in a pot and next, served on a dish. The analysed material is also used as a starting point to trace change in nutrition over successive periods, covering almost 1500 years, and to measure and reconstruct the natural environment in which Akrai existed (e.g. types of animals and types of surroundings they lived in).

Approaching reindeer domestication in Northern Sweden – Analysis of carbon, nitrogen and sulphur stable isotopes on archaeological bone material

Markus Fjellström [Archaeological Research Laboratory, Stockholm University]

The archaeology of Northern Scandinavia has a lot to offer on the study of the human past. Information we have gathered from Northern Scandinavian material from the Late Iron Age to the Middle Ages can be found in both first-hand material, as archaeological artifacts, and in second-hand, written material originating from the Roman empire with Tacitus
Crop selection and food preparation at the Late Bronze Age tell of Sabi Abyad (Syria)

Federica Fantone (Faculty of Archaeology, Leiden University)

The preference for certain types of crops and food preparations depends on a number of factors. Among these are the availability, durability, palatability and transportability of food. An important role is also played by the technological development applied in food preparation. Recent models show that aspects, such as fuel and storage, may explain why certain types of cereals could be profitably selected in connection, for instance, with the production of bread. In turn, these aspects rely on environmental, economic and cultural interactions. The evidence for crop selection and food preparation in archaeology can be rich, but sometimes difficult to interpret. This includes botanical remains, artifacts and installations correlated with the processing of crops and the preparation of food (e.g. pounding installations and ovens). Textual and ethnographical sources can provide additional information. Tell Sabi Abyad is a fortified settlement (dunnu) dated during the Middle Assyrian period (ca. 1230–1180 BC) and located in Northern Mesopotamia at the margins of the area of rainfed agriculture. Over several excavation seasons under the auspices of the Dutch National Museum of Antiquities (Rijksmuseum van Oudheden) and the Faculty of Archaeology of Leiden University, this site offered a rich archeobotanical, artefactual and textual record. The purpose of this paper is to investigate the relationship between crop selection and food production at Tell Sabi Abyad during the Late Bronze Age in connection with the applied technology. Main questions include: to what extent can contexts of food storage and preparation...
be defined? Can any typology be recognized in the technology applied to food preparation? How can this be correlated with the preference for certain crop and food types? To tackle these issues I present new contextualized data from the ongoing archaeobotanical research on Tell Sabi Abyad in connection with ethnographical examples. At Late Bronze Age Sabi Abyad, hulled 2-row barley (Hordeum vulgare ssp. distichon) is the dominant crop, but also hulled 6-row barley (Hordeum vulgare ssp. vulgare), emmer (Triticum turgidum ssp. dicoccum) and tetraploid-hexaploid naked wheat (Triticum aestivum/durum) are present. Oven frequency increases with the flourishing of the settlement and finds correspond in the distribution of grinding and pounding tools. Different types of ovens are contemporaneously present in contexts defined as working areas. One preliminary conclusion is that an intensification of bread making took place in this period probably in relation with the function of the Assyrian stronghold. Furthermore, comparisons with the Late Neolithic period attested at the same site may explain dietary changes in connection with variations in environmental conditions and economic complexity.

Expect the unexpected: the vital need for wild plants in a Bronze Age farmer’s diet

Yvonne van Amerongen (Leiden University)

The Bronze Age in the Western Netherlands is characterized by permanent settlements and the practice of mixed farming. Crops and domestic animals are produced by these settlements and people are seemingly self-reliant, overthrowing the need for wild resource exploitation. Some would even go as far as to define these farmers as “living with their backs towards nature” and suggest that “edible wild plants (were) practically abandoned during the Bronze Age” (Louwe Kooijmans 1993; Brinkkemper 2013). However, one of the areas in the Western Netherlands, West Frisia, has yielded large amounts of botanical remains, also from wild plant crop. Therefore, the available data from West Frisia was utilized to re-evaluate the previously mentioned statements and to re-assess the importance of wild plant gathering for Bronze Age subsistence. The disciplines employed in this re-evaluation include ethnography, ethnobotany, archaeology, ecology, nutritional studies, and physical anthropology. Ethnography and ethnobotany have provided indications for the fact that farming communities still collect wild plants at present as well as in the recent past, especially for their vegetative parts. Furthermore, archaeological remains in bog bodies and on settlements have given information on the consumption and collection of wild plants in prehistory. To assess the importance of wild plant gathering and consumption in the Bronze Age, nutritional studies were employed. Human nutritional requirements have provided information on the critical micronutrients in a staple diet based on cereals. The application of this information on a Bronze Age farmer’s diet – consisting of cereal, meat, and milk – has provided clear evidence that the consumption of (the vegetative parts of) wild plants must have formed an essential part of the diet. Wild plants represented a constant source of vitamins that a Bronze Age farmer’s diet alone could never have provided. Vitamin deficiencies could have resulted in severe, if not lethal, diseases such as scurvy. In order to assess the probability of such deficiencies in the Bronze Age diet, physical anthropological information from Bronze Age skeletons was consulted. The skeletal material shows that general health levels were good and witness the fact that people possessed high statures and the ability to heal from trauma. Specific evidence for nutrient deficiencies in this period was rare, indicating that people were able to obtain a healthy diet that included adequate levels of the most essential micronutrients. In sum, the interdisciplinary approach employed in this research has resulted in concrete evidence that indeed wild plant collection and the consumption of vegetative parts still formed an essential part of the West Frisian Bronze Age diet, and subsistence at large.


Tracking the movement of millet in prehistoric Croatia using stable carbon and nitrogen isotopes

Emily Zavodny (presenting author), Brendan Cullen, Sarah McClure, Douglas Kennett (all The Pennsylvania State University, USA), Jacqueline Balen (Archaeological Museum Zagreb, Croatia), Emil Podrugi (Muzej Grada Šibenika, Croatia)

In this paper, we investigate the appearance and adoption of millet in prehistoric central and northern
This paper will present preliminary dietary isotopic analyses of human and animal remains from Slovenia dating to the Early Iron Age. This research forms part of a larger HERA-funded ENTRANS Project, examining Iron Age cultural encounters in Southeast Europe and the east Alpine region. One stream of this research involves the analysis of carbon and nitrogen isotopes to explore differences in diet and health status. Diet is seen to have played a significant role in many societies in the construction of identity attributes, such as status, age or gender. Preliminary results suggest that a homogenous, terrestrial C4 plant based diet was adopted across the research area during the Early Iron Age. Without evidence of marine protein, the high carbon values suggest a considerable input of C4 plants, most likely millet. Currently very few isotope studies with faunal data are available for this region. When first attempting to construct a dietary baseline from faunal reference material obvious questions spring to mind, for example, what and how many species should be used? How far from the burial site? How far chronologically from the site? This presentation will introduce the sites under study, show preliminary isotopic data and discuss some of the issues that one might need to think about when choosing faunal specimens to construct a dietary baseline. This project has received funding from the European Union’s Seventh Framework Programme for research, technological development and demonstration under grant agreement no. 291827. The project is financially supported by the HERA Joint Research Programme (www.heranet.info) which is co-funded by AHRC, AKA, BMBF via PT-DLR, DASTI, ETAG, FCT, FNR, FNRS, FWF, FWO, HAZU, IRC, LMT, MHEST, NWO, NCN, RANNIS, RCN, VR and The European Community FP7 2007-2013, under the Socio-economic Sciences and Humanities programme.

Global spatial distribution of natural stable carbon and nitrogen isotope ratios in modern humans

Frank Hülsemann1 [presenting author], Thomas Piper1, Christine Lehn2, Sabine Schneider3, Ulrich Flenker, Wilhelm Schänzer1 1 Institute of Biochemistry, German Sport University Cologne, Germany; 2 Center for Preventive Doping Research, German Sport University Cologne, Germany; 3 Institute of Forensic Medicine, Ludwig-Maximilians-University Munich, Germany; 4 Forensic Science Institute, Federal Criminal Police Office, Unit Central Analytics II (KT 12), Wiesbaden, Germany

Natural stable carbon ($\delta^{13}$C) and nitrogen isotope ratios ($\delta^{15}$N) of modern [and ancient] human tissue...
and (excreted) metabolised products are related to an individual’s dietary habits and geographical origin. It is known that geographical differences in the isotope ratio of human diets are detectable by stable isotope analysis of, e.g. fingernail and hair, as well as in urinary steroids. In forensic and archaeological science, the stable isotope analyses of human remains like bone, hair and/or fingernails are used for dietary reconstruction and/or geographical allocation of individuals. In doping control, the carbon isotopic composition of urinary steroids is used to identify exogenous administration of synthetic steroids. Human δ¹³C values are primarily correlated to the proportion of C3- and C4-plants in the diet. Due to differences in the biosynthetic pathways, C4-plants, such as maize, sugar cane, and sorghum, show increased δ¹³C values compared to C3-plants like wheat or potatoes. Another source for 13C-enriched human values is the consumption of marine food. In general, modern human δ¹³C values decrease with the increasing latitude of an individual’s residence. Thus, lowest δ¹³C values are found for Scandinavian samples, whereas highest δ¹³C values are found for subjects originating from Brazil or South Africa. In doping analysis, individual δ¹³C values of endogenous reference compounds (ERC) are used for the interpretation of a potential exogenous origin of target metabolites. Thus, geographical differences in the δ¹³C values of ERCs may have an influence of the interpretation of such stable isotope analyses. The knowledge of the global spatial distribution of δ¹³C values of humans is one component in the interpretation of isotope ratio measurements of ERCs in doping control as it is in forensic and archaeological science. In contrast to carbon, the global spatial distribution of human δ¹⁵N values is apparently not exclusively related to dietary but also to environmental and physiological factors. Modern human δ¹⁵N values are particularly (but probably not exclusively) influenced by changes in the diet (terrestrial versus marine food), geographical origin of food, use and kind of fertilizers, climate, nutritional stress, physical activity and disease. Therefore, interpretations of changes or differences in the δ¹⁵N values of humans are difficult to interpret. Up to now, no substantial global data sets on global human carbon and nitrogen isotope ratios are available, although the amount of available data of (modern) human isotope ratios has increased within the last years. Hair is the preferred matrix in forensic stable isotope analysis due to non-invasive sampling and comparatively easy analysis compared to the laborious and complex stable isotope analysis of urinary steroids. We summarized available literature and experimental data of the global spatial distribution of modern human δ¹³C and δ¹⁵N values of hair and urinary steroids in order to create global modern human isoscapes.

**Using ¹⁴C as a dietary tracer in ancient human diet reconstruction**

Ricardo Fernandes (Kiel and Cambridge Universities)

Stable isotope analysis represents a powerful tool in archaeological studies to provide insights into the dietary habits of past humans. The most commonly used isotopic proxies in these studies are carbon (δ¹³C) and nitrogen (δ¹⁵N) stable isotopes measured at a bulk level. However, confounding bulk carbon and nitrogen isotopic values between potential food groups result in non-univocal dietary solutions. To address these limitations, additional dietary proxies, such as sulphur (δ34S) or compound specific stable isotopes, are increasingly being employed. However, recent research has demonstrated that radiocarbon (¹⁴C), the radioactive isotope of carbon, in some cases may be even more informative on food sources. Aquatic food groups commonly consumed by humans (e.g. fish, bivalves) will often have a ¹⁴C concentration that is lower than contemporary terrestrial food groups. Thus, radiocarbon can be used in archaeological studies as an effective dietary proxy to distinguish between the contributions of aquatic and terrestrial food groups. This is particularly relevant in inland contexts where the δ¹³C values of aquatic and terrestrial food groups frequently overlap. This study will present different archaeological case studies from a variety of time periods and regions, illustrating how radiocarbon can be used to successfully identify the human intake of aquatic food groups when traditional isotopic proxies (δ¹³C and δ¹⁵N) fail to provide unambiguous estimates.

**Investigating the dietary habits of Eneolithic-Bronze Age populations in the forest zone of Eastern Europe (Shagara cemetery) using stable isotope analysis**

Natalia Shishlina¹, R.Fernandes²,³,⁴, E.Kaverzneva¹, V.Sevastyanov⁵, A.Bobrov¹ (1 State Historical Museum, Moscow, Russia; 2 Institute for Ecosystem Research, University of Kiel, Kiel, Germany; 3 Leibniz-Laboratory for Radiometric Dating and Isotope Research, University of Kiel, Kiel, Germany; 4 McDonald Institute for Archaeological Research, University of Cambridge, Cambridge; 5 GEOKHI RAS, Moscow, Russia; 6 State Moscow University)

The Meshera park cemetery in the vicinity of Lake Shagara (Russia) contains graves belonging to the
Volosovo Eneolithic and Shagara Bronze Age cultures. These populations exploited food resources in the forest zone of Eastern Europe during the IV-III mill. BC. The graves were placed in an occupational layer belonging to the abandoned Volosovo settlement. The Shagara graves are famous for the presence of clay vessels and amber and bronze items; a discovered boat clay model implies the use of this type of transport by the local population. However, funerary offerings also included significant amounts of fishing tools and bone figurines. Furthermore, analyses of ceramic vessel residues suggest that freshwater fish contributed significantly to human diet. A large number of fish scales and bones, as well as bones of wild and domesticated animals, were found in all layers of the cemetery and within the graves. Isotope analysis (δ13C and δ15N) of bone collagen samples from archaeological humans, animals and fish confirmed that an aquatic dietary component was significant for both Volosovo (second half of IV mill.– first half of III mill. BC) and Shagara (end of III mill. BC) populations. Current research is investigating inter-individual variations of human stable isotope values and the possibility of human bone collagen exhibiting a dietary radiocarbon reservoir effect. This research will also contribute to the establishment of the local chronology.

Exploring social variability by stable isotope (C, N) ratios within the monastic and lay population buried at the post-medieval Carmelite friary of Aalst (Flanders, Belgium)

Marco Bonafini (Radiocarbon dating laboratory IRPA/KIK; presenting author), Quintelier K. (Flanders Heritage Agency, Royal Belgian Institute of Natural Sciences), Moro G. (University of Venice), Palmer J. (University of Leiden), Boudin M. (Royal Institute for Cultural Heritage IRPA/KIK)

The Carmelite friary (16th–18th c. AD) in Aalst, Belgium, was excavated in two phases, in 2004/5 and 2011, revealing about 240 human burials. In 2014, a pilot study was published using stable isotope ratios (δ13C and δ15N) to explore the dietary patterns of 39 adult individuals excavated during the 2004/5 archaeological campaign (Quintelier et al. 2014). Samples derived from a mixed monastic and lay population buried in three different locations, i.e. the church, the cloister garth, and the northern and western cloister alley, reflecting groups with differing social status based on historic records and osteological data. The data of this pilot study showed significant differences in diet between females and males, as well as dietary differences between individuals buried at the different locations within the friary, likely reflecting social stratification. In 2011, the eastern and the southern part of the cloister alley and a larger part of the cloister garth were excavated, revealing another 160 human burials. This created the opportunity to enlarge the existing dataset by sampling and analysing individuals from all burial locations within the cloister walls for stable isotope ratios, including adult as well as non-adult individuals in order to further explore social variability in diet within the post-medieval population buried with the Carmelite friars. This paper presents the results of the 62 new samples and provides an overview and interpretation of the combined analyses (n=101).

A high resolution isotopic investigation of infantile scurvy

Rebecca Nicholls [presenting author], Buckberry, Jo; Koon, Hannah E. C. [all Department of Archaeological Sciences, University of Bradford, UK]

The poster will present a case study comprised of isotopic and osteological analyses of funerary assemblages from Croatia and Slovenia dating to the Late Bronze and the Early Iron Age. This research forms part of the larger HERA-funded ENTRANS Project, examining Iron Age cultural encounters in south-east Europe and the East Alpine region. Through the identification of pathological lesions and their distribution, it was possible to diagnose one individual (7.5 months of age based on dental development) with infantile scurvy, or severe vitamin C deficiency. Following this diagnosis, it was decided to investigate the diet of this individual via the application of incremental dentine sampling of the first deciduous canine. The subsequent data exhibited unusually high δ13C values (between -11.3‰ and -12.6‰) and δ15N values c. 3‰ above that of the contemporary population. A breastfeeding profile, such as that posited by Fuller (2006) and Millard (2000), was not recognised. Instead, it is suggested that the high δ13C values are indicative of a substitution of breast milk and the inclusion of C4 carbon based protein, which was subsequently insufficient for the requirements of the body. This is reflected in the δ15N values, which are evidence for an increasingly negative nitrogen balance, caused by sustained malnutrition. The application of this sampling method in conjunction with osteological analysis has provided a high resolution record of dietary and metabolic change from pre-birth to the time of death. It has also, potentially, provided information regarding perinatal care and the exploitation of C4
cereals. [This project has received funding from the European Union’s Seventh Framework Programme for research, technological development and demonstration under grant agreement no. 291827. The project is financially supported by the HERA Joint Research Programme (www.heranet.info) which is co-funded by AHRC, AKA, BMBF via PT-DLR, DASTI, ETAG, FCT, FRN, FNR, FWF, FWJ, HAZU, IRC, LMT, MHEST, NWO, NCN, RANNÍS, RCN, VR and The European Community FP7 2007-2013, under the Socio-economic Sciences and Humanities programme].

Multi-analytical and isotope investigation of a Late Roman/Palaeochristian population from the far west corner of the Roman Empire [Pax Julia]

Patrícia Saragoça (Laboratório HERCULES, Universidade de Évora, Portugal; presenting author), Anne-France Maurer, Lucija Sobert, Maria da Conceição Lopes, Rafael Afenim, Inês Leandro, Cláudia Umbelino, Teresa Fernandes, Maria João Valente, Sara Ribeiro, Cristina Dias, José Francisco Santos, Ana Isabel Janeiro

This first-time study examines the diet of a Palaeochristian population in the south of Portugal from the Roman villae of Monte da Cegonha in the region of Beja. Preliminary data are presented here and discussed in order to better understand the influence of the Roman occupation for several centuries on the way of life of rural inhabitants of the area of Pax Julia. Isotopic analyses (δ13C collagen, δ15N, δ18O carbonate-apatite) were conducted on long compact bones from 22 human individuals excavated from collective burials mixing sepultures and ossuaries in Monte da Cegonha. As comparative samples, the isotopic composition (δ13C collagen, δ15N, δ18O carbonate-apatite) of wild (red deer, rabbit) and domestic fauna (cattle, sheep/goat, pig), excavated at Monte da Cegonha, was examined. As a complement, some of the skeletons were analyzed by X-Ray Diffraction and Fourier Transformed Infra-Red Spectroscopy to estimate the preservation state of the bones, examining the crystallinity, the presence vs. absence of secondary minerals in the bone porosity, and the conservation status of the organic phase. In this study, we explore the diet (type of plants ingested, amount of animal resources, and terrestrial versus marine resources) and animal husbandry practices which prevailed at Monte da Cegonha during the early fifth until the end of the seventh century. In addition, potential sex-age variations in diet and a comparison with published data for Roman (Italy) and Palaeochristians (Italy) populations are discussed. Preliminary strontium isotope data recorded in teeth of some individuals buried in Monte da Cegonha as well as in environmental samples within the site catchment area are also presented in order to address potential mobility patterns of this Palaeochristian population.

The GR-EAT Project: Greek eating culture in the Western Mediterranean, 6th-3rd century BC

Lorenzo Zamboni (University of Milan-Bicocca, Milan, Italy)

For the first time, we introduce here a multidisciplinary project focused on the reconstruction of a multicultural ancient diet, as emerged from the ongoing archaeological and archaeometrical analysis on findings from the Greek-Etruscan Adriatic hub of Spina (near Comacchio, province of Ferrara, northeast Italy). At this site, longstanding although unpublished excavations revealed a complex framework where Greek fashions and lifestyle in cooking and consuming food (as well as drinking that has been more highly studied so far) met and melted with local traditions (i.e. Etruscan) in a frontier region. A good sample of those ‘acculturation’ processes already reported in other Mediterranean contexts is involved in the Greek colonization. The main archaeological object of the research is a particular cooking ware produced in Greece between the sixth century BC and the Romanization that was widespread all around the Mediterranean Sea, consisting of handy and refractory vessels (‘Greek cooking ware’, denoted, for example, as chytra, kakkabe, and lopas). The cultural and material influence of these imported goods and fashions within the local society and its territory will be addressed, as well as pottery production data (X-ray fluorescence analysis is underway) and residue molecular analysis. Another relevant point in terms of paleodietary implications is represented by stable isotope analysis on selected human bones from the local necropoleis and on faunal remains from recent excavations in the central settlement area, both already determined by anthropologists and archaeozoologists. The wealthy and varied archaeobotanical remains of both domesticated local and imported plants as well as wild plants are also included in the research. The project involves archaeological museums and international research institutes of several disciplines such as anthropology, archaeozoology, archaeobotany, chemistry and materials science (Universities of Milan, Ferrara, Bologna, Naples and Zürich). This project is funded on the occasion of the EXPO 2015 to be held in Milan (which is dedicated to food supply), during which our research team will organize
Diet in Priniatikos Pyrgos (Crete): Preliminary results

Vera Klontza-Jaklova (Institute of Archaeology and Museology, Faculty of Arts, Masaryk University at Brno, Czech Republic; presenting author), Sue Bridgford, Sylvia Desmond, Valasia Issakidou, Georgia Kotsaman, Frank Lynnam, Barry Molloy, Joanna Moutafi, Ruth O'Donoghue

Excavations from 2005–2010 and further research at Priniatikos Pyrgos, on Eastern Crete, have shown that this location represents a substantial settlement and, probably, an important harbour during the Early Byzantine period (Molloy et al. 2014; Tsipopoulou and Hayden 2012). This location, a limestone headland in Mirabello Bay, was almost continually settled from the Final Neolithic up to the Early Roman period. After very limited habitation, or even a hiatus in the Roman period, intensive construction had resumed by the end of the 6th century AD. The building complex which resulted was repeatedly remodelled during the 7th to 8th century AD, but was then abandoned and slowly collapsed during the 9th century AD. Habitation areas, storage rooms, kitchens and graves of the Early Byzantine period have been recovered within the complex. One of the oldest and most substantial structures, featuring an internal curved wall, has yielded items commonly found in ecclesiastical contexts indicating the possibility that the complex itself may have been monastic in nature. The aim of our paper is to demonstrate how we propose to use diet research, *inter alia*, to help address some specific historical questions with an emphasis on the Early Byzantine period (the so-called ‘Dark Ages’), for which the literary sources are extremely sparse and only a limited number of excavated and published sites exist. Included among the general questions arising from this site are: Who were the people living in Priniatikos Pyrgos during the Early Byzantine period? Why did they settle in this particular location? What was their social status? These questions can be approached from the point of view of the diet of the population, as was demonstrated by Ch. Bourbou (2010) for Byzantine Crete. However, to address these questions in detail, we must combine all the data available, including information provided by material culture, literary sources, cultural anthropology, and a wide range of biological sciences (including human osteology, animal osteology and palaeobotanics) together with that provided by a number of scientific techniques (including Sr, N and C isotope analyses, organic residues analysis and radiocarbon dating). Since our research is still at a relatively early stage, we intend, with the exception of some preliminary data, to present a schedule of the methodology we propose to apply to some general and some more specific questions and indicate our expectations concerning the results from each investigation.


Social archaeology in Basque rural communities between the early and late medieval period (Spain): radiocarbon dating and palaeodietsary studies

Carmine Lubritto (Dep. of Environmental Science and Technology - Second University of Naples; presenting author), Paola Ricci, Simona Attieri, Maite Iris Garcia Collado, Juan Antonio Quirós Castillo

In this presentation, we discuss the results of a study conducted at five sites, located in the south of the Basque Country (Spain) and belonging to the medieval period. Three of the studied sites (Aistra, Zornoztegi and Zaballa) were rural deserted villages, another village became a ‘villa’ in the 14th century (Dulantzi) and the last one (Treñiñ) was a ‘castral village’, i.e. a fortified village founded by lords in the 10th century, later on transformed into a ‘vila’ or proto-urban site. The main purpose of this study is the improvement of present knowledge on Spanish rural communities from the 5th to the 15th centuries through the study of palaeo-diet markers and their insight into the analysis of social differences between and within the different sites, stressing diachronic changes. Stable carbon and nitrogen isotope ratios were measured on collagen extracted from 205 bone samples: 149 human individuals and 48 fauna samples. The results have indicated that there are two distinct groups of sites: the first one is characterized by a predominantly carnivorous diet (Zaballa and Treñiñ) with no consumption of C4 plants, compared to the other sites with a predominantly herbivorous diet (Zornoztegi and Aistra) with C4 plants admitted to the diet, while the population of Dulantz showed a mixed diet between the two
groups. Statistical analysis has shown correlation between the use of grave goods in the early medieval period and a higher consumption of protein, confirming the information obtained from archaeozoological, palaeopathological and archaeobiological investigations. The chronologies of these Basque medieval sites have been also investigated. This chronological comparison is very significant, because deep social transformations occurred in these periods, and they can be clearly highlighted by cultural processes such as diet changes. The cemeteries have been dated from the stratigraphic sequence of the sites’ occupation, the typological study of funerary rituals and by radiocarbon dating of a large number of individuals.

Dental pathologies of the Iron Age Pazyryk culture population (materials of the Barangol necropolis)

Daria Zavgorodnyaya (Novosibirsk State University, Russia)

This research is based on the materials of Barangol necropolis (mound groups Barangol-1, Barangol-2, Barangol-4) in the Altay Mountains. It was discovered by A.P. Borodovskiy. It belonged to the northern variant of the Paryryk culture. The mound groups of Barangol are presented by different time periods. Barangol-1 is dated within the late V-IV to the early III centuries BC. Barangol-2 is dated within the IV - III centuries BC, whereas the group Barangol-4 ranges from the III-II centuries BC. 23 people were found in the Barangol-1 group, 18 individuals in the Barangol-2 group. The Barangol-4 group is presented by 5 individuals only. Enamel hypoplasia, caries, periodontal diseases and dental calculus were observed in each group. The periodontal disease frequency is quite high in all groups. It varies from 73.9% to 100%. The highest level of periodontal diseases is found in the Barangol-4 group (100%). Dental calculus is also a quite common pathology. The highest incidence of this pathology is in the Barangol-2 group (88.9%), whereby the lowest value is detected in the Barangol-1 group (73.9%). Enamel hypoplasia is not so widespread in the mound groups of the Barangol necropolis. The average value of this marker is 10.2%. The highest level of hypoplasia is found in the group Barangol-2 (17.6%), in the group Barangol-4 it wasn’t fixed (0%). Caries frequency varies from 82.6 - to 100%. The highest level was found in the Barangol-6 group (100%), the lowest in the Barangol-1 group (82.6%). Perhaps during the III-II centuries BC, factors in the environmental conditions of the northern Pazyryk culture negatively influenced the food rations of the people. These conditions may have appeared as food stress that manifested in the tendency to develop an increasing level of enamel hypoplasia, observed in the latest group (Barangol -2) in comparison with the earlier group (Barangol-1). Caries is a typical pathology for the agricultural populations. In the cattle breeders groups, caries were founded rarely or were not existant. In other groups of the Pazyryk culture, caries occurs less frequently than in the Barangol necropolis. For example, in the Barburgazy group, the caries level was 22.2% for males and 0% for females. In the group from Yustyd, it was fixed as 8.3% for men and 30% for women. In Ala-Gail, Balik-Cook, Borotal, and Ulandryk, tooth decay does not occur in both women and men. In the valley of the Bertek River, caries was found in Moinak-2 burials, and in the valley of Katun in the mounds of Bike and Kara Tenesh. Archaeological data confirmed that the Pazyryk culture population practiced nomadic pastoralism. But in the materials of different Pazyryk mounds, fragments of millstones and grain grinders were found, indicating that the people of the Pazyryk culture were acquainted with husbandry. Items confirming this fact were discovered at the Bertek-10 mound (graters), at Bertek-1 (grinding stone), and at Moinak-2 (stone chimes), whereas the same tools were found in the monuments of Borotal-2 and Yustyd. In addition, a stone grater was found in one of the graves of the Barangol-1 mound. In sum, we can suggest that the development of agricultural traditions among the populations of the Pazyryk culture was different in chronological and geographical aspects. Apparently, the groups of Pazyryks, whose burials were found in the valleys of the Katun, Bertek, Barburgazy and Yustyd Rivers, consumed soil products more than people from the valleys of the Chiua and Ulandryk Rivers.

Human genetic adaptation to dietary changes: Are we optimised to an ancient Paleolithic diet?

Catherine Walker (UCL Research Department of Genetics, Evolution and Environment, University College London)

With Professor Mark Thomas, Department of Genetics, Evolution and Environment, UCL and Professor Dorian Fuller, Institute of Archaeology, UCL, I am investigating mismatches between ancestral (pre-farming) and modern human diets, and the extent to which natural selection has acted on genes involved in the digestion and metabolism of dietary components. This interdisciplinary study examines the health consequences of adapting, or failing to adapt, to prehistoric dietary shifts. This two-part study first applies a quantitative approach to compare macronutrients and micronutrients in modern hunter-gatherer diets...
as a proxy for ancient diets) and reconstructed Pa-
laeolithic and Neolithic diets (from archaeobotanical
data) with the nutrient profiles of modern diets. Sec-
don, it investigates signatures of natural selection in
genes involved in the digestion and metabolism of
nutrients enriched in modern diets. It has been sug-
gested that many complex and chronic diseases
today (including obesity, type II diabetes, some can-
cers and coronary heart disease) may be caused in
part by a mismatch between our ancestral and mod-
ern diets, and by a failure to adapt to those changes.
Few studies have addressed this question quantita-
tively, and none has integrated genetic tests of natu-
ral selection. By understanding how dietary shifts
and selective pressures have shaped our genome,
we can provide improved treatment, management
and avoidance strategies for our most prevalent
human diseases.
Session Block 2

Discourse and Perceptions of Landscape: views from antiquity

Abstracts Session 2

Different perceptions of Landscapes throughout Classical Antiquity and beyond

The theoretical Landscape: Reflections on current and future theoretical approaches in archaeology

The discursive Structure of Landscape. Classical and Non-classical Concepts

Into the Wild: Mirror Landscapes in Late Antiquity

Jan Reinhold Stenger (University of Glasgow, Classics)

Greek literature in late antiquity contains a wealth of depictions of and references to landscapes of diverse character. Literary representations of landscapes permeate the entire spectrum of genres, from rhetorical exercises to biographical texts to Christian homilies. Athanasius in his seminal hagiography, the Life of Anthony, describes the saint’s withdrawal from human civilisation into the desert, where he is exposed to diabolic temptations and assaults. The pagan orator-cum-philosopher Themistius praises his father’s running of a farm in the countryside and extols the benefits of rural life. At the same time, the Church Father Basil the Great in his Homilies on the Hexaemeron invites his audience to contemplate, and enjoy, nature so that they become aware of the Creator. Interestingly, most of these texts display little genuine interest in specific features or the individuality of landscapes. Instead, by focussing on human perception the authors discuss what landscapes and nature mean to the viewer; they lay great stress on the human experience of the environment, while the landscape itself remains sketchy. This paper addresses the question of what literary representations of landscapes in late antiquity reveal about the ideologies, beliefs and preoccupations of their authors and the intended audiences. For what reasons did Greek writers when they reflected on religious, philosophical or social issues turn to the literary construction of rural space? To answer these questions, the talk will investigate a variety of literary techniques such as idealisation, imagination, the control of perception and intertextuality. The examination of these devices can illuminate how textual landscapes are created and employed as a persuasive force. It can be argued that, despite their diverse perspectives and objectives, the authors make use of landscape, as perceived by humans, as a mirror in order to stimulate reflection and self-awareness.

The perception of “barbarians” and landscape in the work of Sidonius Apollinaris

Veronika Egetenmeyr (Graduate School Human Development in Landscapes, Kiel University)

The end of Late Antiquity and the Migration Period is a turning point in the history of Europe; it is the transition from Antiquity to the Middle Ages. Between the 4th and the 6th century in France, especially in the former Augustan province of Aquitania, groups from different horizons tried to live next to each other. On a regional scale, the barbarian settlements, which had been established during this period, had an immense impact on many aspects of daily life. The literary sources mention conflicts and fights, changes in society as well as changes in landscape. Mainly in the epistolography and inside the chronicles of the Migration Period, the reader receives the impression that this contact between “barbarians” and Gallo-Romans was traceable in various social spheres (e.g. in cities, in religion, in official careers, in laws and in private life). The Gallo-Roman society did not only have to find a way to live among and with those “barbaric” cultures, but at the same time, they had to accept the changes that their own world was going through. Therefore, ancient authors often blame the “barbarians” for the decadence of their society and the miserable situation of the state. Moreover, for those writers who continued to support the Roman way of life, the environment changed for the worse: they describe the landscape of Gallia in a transformation process, a landscape that had become wild, even “barbaric”. One of these authors is Sidonius Apollinaris, a Gallo-Roman aristocrat and later bishop of Clermont-Ferrand who was born in the 5th century AD in Lyon. He lived during this period of breakup and reorientation and, as a first-hand witness, he provided an
The salamander – From legitimization of power on the threshold to early modern times to touristic re-enactment-marketing of today’s cityscapes

Maren C. Biederbick (Graduate School Human Development In Landscapes, Kiel University)

In 1504, Francis I. de Valois (1494–1547) was honoured by the release of a medal for his tenth birthday. His mother, Louise de Savoie, had ordered it, because this sort of medal played an important role in the process of constructing identity as well as in communication during the early modern age, showing on the adverse the portrait of the individual and on the reverse this person’s device in a fashion of the tradition set by Roman emperors in antiquity. Like coats of arms, yet highly individualized, devices were applied on personal belongings and they became a European phenomenon during the 15th and 16th centuries. These combinations of texts and images indulged the courtly lust for riddles and games of de- and encoding during which the proper humanistic education of the court members could be demonstrated, as the single devices often referred to a specific quotation of either contemporary authors or those from Greek and Roman antiquity. Kings and Popes, cardinals and dukes as well as humanists and marshals needed to have their own device with which to adorn their own flags, shields, and garnishes as well as those of their pageants, to become noticeable in this courtly culture. The widow Louise de Savoie, aware of these effects of pictorial power, chose for her son the sign of the almost beneficiated Jean de Valois. To his salamander in flames she also added symbols of her own ancestry within this new device to reinforce – by the automatic transfer of people’s respect for her father-in-law as well as by the noble provenience on both sides of the family – the legitimacy of her son as the heir to the French throne. Francis kept this device for his lifetime and after his coronation he decorated every building in his possession with it. Indeed, the idiom and picture of the salamander became a synonym for this king. The (obsessive) accumulation of visual representation is still directed to royal stays and may have served as a substitute during the king’s local absence. In fact, the perception of the salamander in landscape is of two natures: on the one hand, it illustrates social hierarchy in a pictorial landscape – applying the term here in Cosgrove’s metaphorical use as “system”; on the other hand, it marks a geographic landscape – the royal territory. The material presence of this device as well as of others establishes the link between the several coexisting powers that were in play in 16th century Europe. By studying these devices, one can obtain a clear idea of how these powers interacted with one another. The significance of the research on these devices lies precisely in linking the historical records with the empirical ‘artistic’ record, thus providing a multidimensional view of 16th century power politics. Yet the salamander lives beyond this: a touristic path recently was set up with modern simplified salamanders as pavement-applications to guide to the sights in the town of Beauvais. Among the pointed out attractions, only a few refer to Francis I. By this city’s example, the historical genuine “salamander-landscape” will be further contrasted with modern marketing. I would like to put up for discussion, if the two different perceptions of landscape mentioned above – their use as a metaphoric system and as markers of a geographical territory – have found their re-enactment in this formation of a cityscape.
The perception of landscapes in Lycia: Lycian tombs
Alice Landskron (University of Vienna)
This conference paper focuses on the perception of landscapes in Lycia in visual art and in the context of the physical environment of the tombs. Some of the Lycian tombs are decorated with reliefs featuring landscapes and architecture. The provenance of role models will be discussed as well as examples in the art of the ancient Near Eastern reliefs and Greek vases and the "transfer" of Greek culture and images. A special emphasis is on the monumental tombs, e.g. the Heroon from Trysa, the Nereid Monument from Xanthos and the Heroon in Limyra and the significance of architecture and physical landscape.

Theseus abroad: On the depiction of the cycle of deeds performed by Theseus on the reliefs of the Heroon at Trysa
Jessica Susanne Krause (Graduate School Human Development in Landscapes, Kiel University)
The Heroon at Trysa is a grave monument situated in Central Lycia (modern Turkey) that was unknown until the mid-19th century as was the settlement of Trysa itself. The "Heroon", as it has been called by scholars, featured not only a tomb but also three-meter high walls that enclosed the precinct. These walls were decorated with friezes of a combined length of 211 meters, which feature different mythological scenes. So far, scholarship has been concentrated to a wide extent on the portions of the frieze that might depict scenes from the Iliad. An aspect that has yet to be examined thoroughly regards the depiction of a seemingly complete cycle of the deeds of Theseus, which is also the only depiction of the deeds of Theseus in Lycian official art as a whole. The only idea put forward to date is that there must have been a direct connection to Athens, whether it is through craftsmen who came from Athens or through the unknown high-ranking deceased who upheld strong relations to this Greek polis. One of the reasons for this interpretation is that depictions of the cyclic deeds of Theseus were only known from Attic art so far. Nevertheless, Lycia was clearly not a part of the Greek world at that time, but a cultural society in its own right even though Greek influence was admittedly high. The Lycian political landscape was deeply influenced by the country's physical landscape in which a great number of different grave monuments were set. Of these monuments, some were clearly created to make political statements, but in a very specific way as part of the Lycian burial traditions. In this paper I intend to argue for a new interpretation of the presence of Theseus at Trysa prior to its Lycian cultural as well its political history background as mentioned before. As a result, in this case Theseus is clearly not to be seen as the "Athenian Demos-Heros", as he has been understood before, but as a unique feature of this very monument, which is strongly connected with its probable political background.

Suburban nature as a sacred landscape
Florian Schimpf (GRK 1876 Frühe Konzepte von Mensch und Natur, Johannes Gutenberg-Universität Mainz)
As part of the Research Training Group 1876 "Early Concepts of Man and Nature" at the University of Mainz, my PhD project „Man – Nature – Religion: A study concerning development, form and perception of sacred landscapes in Asia Minor” (http://www.grk-konzepte-mensch-natur.uni-mainz.de/florian-schimpf/) is the attempt to contribute to a better understanding of sacred nature in Hellenic Asia Minor. My paper will focus on one aspect of my studies: suburban, yet natural sceneries. Such can be found throughout Ionia from Archaic times onwards and rather than being connoted as inanimate or merely functionalistic, they are landscapes full of sacred precincts, e.g. rock sanctuaries. I will therefore highlight the assumption that natural outskirts had regularly been experienced as inner-city sacred landscapes. To start with, I will show how natural landscapes emerged *intra mural*, then present some examples, e.g. Mt. Ampelos at Samos, Mt. Panayır at Ephesos, Mt. Değirmen and Mt. Altınmağara at Phokaia and the northern slope at Priene, and finally discuss the question, how such mountainous sceneries were used and occupied with natural cult sites, and why inhospitable landscapes had become a regular feature of inner-city cult practice in Eastern Greece.

Woodland modification in Bronze and Iron Age Central Anatolia: An anthropological signature of the Hittite state?
Nathan Wright (The University of Queensland)
The Bronze and the Iron Age of Central Anatolia encompass a period of significant social and political change with the collapse of the Hittite Empire at the end of the Bronze Age. In contrast to the well-documented changes in the social landscape, the environmental landscape for the region at this time is poorly understood. The limited temporal and spatial coverage from environmental records means it
is difficult to understand the finer details of environmental change, especially in relation to the archaeology of specific sites. This talk offers a complete and continuous diachronic wood charcoal assemblage of the Middle Bronze Age to the Late Iron Age from Kaman-Kalehöyük in Central Anatolia. Results show a significant decline in taxa richness from the Middle Bronze Age to the Late Iron Age, particularly during the Hittite Empire period. The decline in richness is followed by a dramatic increase in pine use from the beginning of the Iron Age. The timing and exploitation of key taxa in the Kaman-Kalehöyük assemblage do not match that indicated in the regional pollen data, but rather show a clear local signature chronologically matched to the Hittite Empire and strongly associated with avoidance of particular woodland resources.

Faces of Ai Khanum: On cultural identification and the Greek question

Milinda Hoo (Graduate School Human Development In Landscapes, Kiel University)

The ancient city of Ai Khanum in north-east Afghanistan is at present the only monumental archaeological site of Hellenistic period Bactria (4th century BCE–1st century BCE). It was discovered and unearthed in the 1960s by French archaeologists, who – despite a lack of literary evidence – coined the place as Alexandria on the Oxus, one of the many name-cities founded by Alexander the Great (356–323 BCE) during his campaigns in the Far East. Placed in the ideological context of Alexander’s conquests, which brought Greek (western) civilisation to the ‘barbaric’ East, Ai Khanum was quickly rendered as an exotic ‘outpost of Hellenism’, a paradigmatic materialisation of the ‘Alexander miracle’. The material culture of Ai Khanum includes typical Greek features, such as a gymnasium and a theatre, alongside Mesopotamian, Iranian, and Central Asian influences. Within the Hellenism paradigm, many scholars have overemphasised the Greek monumental features, identifying them as the ultimate testimony of ethnic Greek settlers and the overtly (colonial) Greek character of the city. Conversely, this paper will closely examine the city and its cultural features from a transcultural ‘globalisation’ perspective. The analysis will yield significant ‘hybrid’ examples of architecture and objects that appear to integrate different cultural motifs within a visual ensemble. This problematises straightforward cultural associations of ‘Greek’ or ‘Oriental’ objects and architecture with clear-cut ethnographic origins. Cultures and identities are not primordial entities rooted in unitary archetypical settings, but are in fact dynamic interrelated systems that are formed, produced, and reinvented through the continuous adoption, adaption, and reuse of a variety of cultural elements dispersed by diasporas of peoples, practices, ideas, and objects. By viewing the city from an alternative ‘grassroots globalisation’ perspective and placing the city in its larger cultural and ideological landscape, it will be explored how we might see cultural objects and styles differently from a view that considers active and selective appropriation and rehabilitation of cultural forms and elements.

A river runs through it: The relative localisation of Seleukeia, Ctesiphon, Vo-logesias and Veh-Ardashir

Raphael Weyland (Université de Montréal / Département d’histoire)

The area of Al-Madā‘īn, in present-day Central Iraq, is one the largest complexes of ancient settlement in the world. For close to a millennium, from the founding of Seleukeia around 300 BC to the conquest of Ctesiphon by the Muslims in AD 637, its cities served as the administrative, political and cultural heart of the Seleucid, Arsacid and Sasanian empires. Although aspects, such as the composition of its very diverse population and the relation among these various components and with the king or its role in the wars between its owners and the Romans, have been studied in the past, the question of the exact localisation of the different parts of this complex remains unanswered. In their conflicting descriptions, ancient and Muslim writers tend to apply the name of Seleukeia or Ctesiphon to the entire area, making it harder for modern historians and archaeologists to figure out what was in this 30 square kilometres of space [twice the size of ancient Rome]. Furthermore, the movements of the river through the centuries, the high water-table and the idealization of the cities [Seleukeia becoming the last stronghold of the Greek culture in the east, its position on the western bank turns in time into some sort of statement] have complicated the study of this region’s topography. In this presentation, I would therefore like to explore the different theories that have been suggested in the last centuries regarding the position of these cities and their spatial relation to each other and to show how only the use of an interdisciplinary approach, combining ancient sources from both the classical and the non-classical traditions as well as 19th century travel diaries and topographical work can help to answer these questions.

Physical, social, and imaginary landscape in Ancient Greece

Lutz Käppel (Graduate School Human Development In Landscapes, Kiel University)

This paper will start from structuring the notion of Greek landscape into three concepts: (a) The physical/natural landscape, (b) the social/human (i.e. agricultural, political, ritual) landscape and (c) the imagined (i.e. mythological/literary) landscape (cf. Cole 2004). First, the three concepts will be characterized paradigmatically using concrete examples: The physical landscape of Stymphalos, the ritual landscape of Delphi and the imaginary landscape of the Odyssey. In the second part of the paper, this analytical approach to landscape will be confronted with a more synthetical approach like that from Tim Ingold (2000), and the pros and cons will be discussed using the examples of the first section.

The landscape of the Muses in Euripides’ Heracles

Kleoniki Rizou (Graduate School Human Development In Landscapes, Kiel University)

Different landscapes are an essential element of Euripides’ imagery, as pointed out by S. Barlow (The Imagery of Euripides. A study in the dramatic use of pictorial language, London 1971); they occur in choral odes as well as lyric passages and iambic monologues and dialogues. By their respective design and connotations, they serve to feed and illustrate various moods, patterns and structures of the plays. This is also the case in the Heracles, a work provided with an extraordinarily dense web of descriptive and metaphorical imagery. This presentation aims at introducing these landscapes in their contexts and at offering a close examination and interpretation. There is, for example, the landscape of Heracles’ labours as if emerging from a fairytale in the chorus’ first stasimon [348–50]; the landscape of escape, manifesting itself in the island of Delos in the second stasimon [687–90]; the landscapes of exuberance in the third stasimon [781–88] and the landscape of Heracles’ madness in the messenger’s speech [943–1000]. The main interest lies in the relationship of these landscapes, especially on the assumption of a superordinate landscape of the Muses, which figure as structuring elements of an implicit, subtle discourse on poetry.

Maroneia. A new urbanistic Interpretation

Maria Deoudi (Arch. Institut Universität Erlangen)

According to ancient sources, Maroneia was a colony founded in archaic times by the citizens of Chios on the Thracian coast, between Abdera and Mesembria. Contrary to the testimonia, the architectural remains of the ancient city indicate that Maroneia was founded in the Late Classical period and belongs to the type of ideal city (Idealstadt), mostly known from the cities of Asia Minor, as will be shown by the structural analysis of the architectural remains. Choice of the location: Important for the type of an Idealstadt is the choice of the location. With Maroneia, the founders chose an ideal topographical and geophysical setting to build the city. On the north the polis was protected by Mount Ismaros, while on the south there was a natural harbour, necessary for the economic growth of the city. In the 3rd century BC, Maroneia was the only transition point for pilgrimage to the Kabeirion in Samothrace. The city plan: The plan of the city, as it can be reconstructed by the results of the excavations, demonstrates that the city was surrounded by a large city wall. It has a reconstructed length of 17 km, unique for the whole Thracian coast. Parallels of such a large construction are the foundations of Alexander and Kassander at Macedonia and Chalkidike, such as Dion, Kassandra or Ouranopolis. These poleis follow the urbanistic model of Alexandria and belong to the type denoted as Flächensiedlung [surface settlement], a type to which Maroneia must also be added. It is remarkable that the city-wall in the north part of the city encloses the relics of earlier habitation at the site, a small acropolis. The areas of the city: The inner city was separated in three different, but nearly equally sized areas, forming an assemblage of public, private and commercial space. All the elements of the city were oriented to the alignment of the urbanistic plan. In the south we have the harbour and the economic centre of the city. Above, in the middle sector, we observe the area of habitation, as it is evidenced by the remains of a number of Peristyle houses. The public buildings were located in the northern part of the city [theater,
Hieron of Dionysos, Stoa and Bouleû, comprising the Agora of Maroneia. All the official inscriptions from Maroneia were found in this area. The fact that the public buildings were not placed in the centre of the city, as was the canon of newly founded cities, is a special characteristic of Maroneia. In this paper, I will argue that the public centre was intentionally placed near the relics of early habitation on the acropolis, dating back to the Late Bronze Age. Parallels are known from Perge. These archaeological remains, most probably the relics of an indigenous population, are interpreted as visual memoranda, used for the formation of the local identity of the new city. Whether it was just a monument or a place of cult is not known yet. All archaeological evidence from the city of Maroneia requires new detailed interpretation. Some questions remain unanswered, such as who were the city founders, and what was the reason for the foundation of a new city. In any case, it seems that the ancient testimonium Μαρώνεια τόπος ἦσσε τῆς Αττικῆς Ἑστίν μὲν τοῖς καὶ πόλις τῶν Θρακῶν should be reviewed.

Different concepts of the visualization of luxury in Roman landscape art

Nadine Krüttgen (Graduate School Human Development in Landscapes, Kiel University)

This paper deals with one of the chapters of my PhD concerning the research topic "Villa Landscapes in Paintings and Mosaics in the Roman Empire". In the presentation I will discuss the changes of landscape perception in villa depictions from wall paintings of the third and fourth Pompeian style and mosaics in Late Antiquity. Similarities and differences in formal design and motives of the images will be analyzed to show different emphasis and various associations, which the depicted villa and its landscape impart during this period. In this context, the social status and economic background of the ancient viewer plays a major role in the 'reading' of art. It must be asked what kind of emotional status is associated with a villa and its surroundings in reality, bearing in mind the historical circumstances. Whether this emotional status is shown in the images has to be examined. And, if that is the case, in which way were ciphers and signets implemented? In connection with this, the demonstration of power and wealth as well as the imitation of a luxury good to symbolize membership to the elite shall be considered. In addition, it is conspicuous that in addition to the architecture landscape and nature, luxury sources and luxury symbols are subjected to the modes of the different ancient epochs.

Spatial materialisations of discourse

Thomas Meier (Universität Heidelberg, Institut für Ur- und Frühgeschichte und Vorderasiatische Archäologie)

It is a frequent misreading of Foucault’s theory of discourse that it only deals with the world of words. Even if – what is rare enough – Foucault is applied to geographical topics, mostly verbal or sometimes pictorial representations of space are under scrutiny. Such a narrow reading of Foucault not only omits his important writings on architecture as dispositifs of discourse especially in “Surveiller et punir: naissance de la prison” (1975), but it blinds out that power is not only exerted by verbal means, but has a material side as well. This neglect coincides with a tendency of “domesticating” Foucault, i.e. reducing his theory of discourse to an increasingly elaborated analytical method and losing sight of the brutal question of power, which seems to be the driving force behind Foucault’s work. In this paper, I will draw on a classical Foucauldian approach by putting the question of power center stage and asking for spatial materialisations of such powerful discourses. On the one hand and more obviously, architecture can be such a materialisation of power: Walls of cities and buildings, orders of rooms (as e.g. visualised by space syntax analysis) and architectural arrangements like the layout of streets or visual axes or are not only symbolic representations of power but materially limit, allow and guide movements, they impose control and deny access, they physically decide on what can be done and what cannot be done and by their materiality naturalise and sublimate ways and restrictions of spatial movements. As the tracks of movements preconditions specific ways of perceiving the world, their architectural guidances and restrictions are much more than a control of pathways, but these architectural settings enforce the corporeal and multisensual internalisation of a specific world view and its power relations. On the other hand, “natural” features can be regarded as materialised discourses as well: discourses on the reality of the world and the proper place of humans in this world create convictions about physical properties of things and their spatial order. These discursive convictions constitute the perception of natural features (geomorphology, geography, resources, climate, etc.). Depending on their specific cultural contexts, such features can be regarded as determinants or possibilities. As with architectural settings, the powers of current discourses materialise in “natural” settings which reproduce these discourses and enforce their power structures on the subjects. But while architecture is obviously human-made and thus potentially raises suspicion to be a means of discursive
suppression, the discursive structure of “natural”
physical settings are much more camouflaged and
thus harder to discern as dispositifs of discursive
powers.

Putting things into practice: Exploring the
consequences of pragmatic theory
for archaeology
Martin Fürholt (presenting author), Martin Hinz
(both Institute of Pre- and Protohistoric Archae-
ology at Kiel University)

In the context of the material turn, or the turn to
things in archaeology, the whole philosophical tradi-
tion of pragmatism is still curiously underrepre-
sented and undervalued. We believe that an ap-
proach to social phenomena that highlights the
creation of meanings and concepts in the course of
real-world confrontations with material objects and
their involvement in pragmatic situations provides a
theoretical avenue well-suited to the characteristics
of the archaeological record of prehistoric societies.
Using this pragmatic approach, things are not
viewed in isolation from their historically practical
effects, but are seen in relation to their immanent
practical impacts. In contrast to most post-
processual approaches, primacy is taken away from
concepts, thoughts and human intentions, which are
seen as emergent phenomena, constantly shaped and
re-shaped in the course of practical actions. We
thus argue for a theoretical approach that puts for-
tward the empirical quality of the archaeological
record without slipping into mere empiricism. In-
stead, the pragmatic approach creates a much
stronger, theoretically founded link from the physi-
cal remains and their spatio/temporal arrangement
in the archaeological record to a reconstruction of
concepts, meanings, and social relations, using a
perspective that starts out from individual, socially
interactive practices. We will use a case study from
the Northern German Neolithic to illustrate how
such a pragmatic approach can help us understand
social phenomena, and shed light on the dynamic
interdependence of practices, things, and concepts.

A Question of Means and Ends. The Need
to integrate multiple biographical Approaches
Gustav Wollentz (Graduate School Human Develop-
ment in Landscapes, Kiel University)

What would the consequence be of “freeing” the
material culture from the human beings who are
producing and using it, or “freeing” it from the land-
scape where the resources to manufacture it has
been gathered? Bjørnar Olsen has recently (2012)
been arguing for a “return to things themselves”
and a “farewell to interpretation”. In this approach,
objects are not necessarily interesting as a means to
reach the human beings, who manufactured and
used them, but are interesting enough in themselves
and even carry voices that communicate immedi-
ately to us as long as we trust our perceptions as
human beings. Alfredo González-Ruibal (2014) has
stated that the archaeologist is a specialist on time
and material culture, and that it is within those two
spheres that he or she can contribute to the aca-
demic debate and the society in general. In this pa-
per, I will argue for the need to integrate multiple
biographical approaches that take the biography of
"material culture" as well as that of "individuals"
and "landscapes" into consideration. I suggest that
at the meeting point between these very different
biographies, archaeologists can unveil the layers
and complexities of the relationship between "time"
and "material culture", and ultimately between "mi-
cro" and "macro". If we want archaeology to turn to
things themselves, we also need to turn to the biog-
raphy of the humans who used things in different
phases of their lives, as well as the biography of the
landscapes where the material of the things was
gathered. The material culture is just as “mute” in
isolation as human beings are incapable to act with-
out a world filled with landscapes and objects
stemming from the landscape. Finally, I argue that
archaeology, as part of humanities, cannot study the
material culture as a goal in which the human being
is transformed into a means to reach this goal, but
should, using the terms of Immanuel Kant, see the
human being as an end in itself.

Minimal ontology and archaeological theorizing
Artur Ribeiro (Graduate School Human Develop-
ment In Landscapes, Kiel University)

Archaeology and anthropology have in recent years
adopted a series of postulates from philosophy and
other human sciences regarding the role that ontol-
ogy plays in understanding human societies. This
shift of interest, also known as the ontological turn,
has consequently de-emphasized the role that epis-
temology plays in the human sciences. This presen-
tation suggests that ontology has not overcome the
issues brought up by epistemology, issues such as
culture-nature dichotomy, cultural relativism, the
conceptual definition of object, the ontological status
of relations, etc. Furthermore, this presentation also
argues that continental ontology has also not man-
aged to overcome metaphysical issues associated
with traditional ontology, like the mereological prob-
lem and the universal-particular debate. The alternative is an anti-ontology type of ontology, or in other words, a minimal ontology. A minimal ontology argues that no object exists except the universe itself, yet the universe is nonetheless varied and dynamic. Based on this minimal ontology, it will be argued that humans socially construct the categories of being that are required for their understanding of the state of affairs of the world. Finally, it will be argued how a minimal ontology can effectively overcome the problems raised by postmodern theory and the ontological turn in archaeology and anthropology – and pave the way for a truly plural type of scientific archaeological research.
Fortifying Bronze Age Landscapes

Landscapes of fortification in the Late Bronze Age Banat

Anthony Harding (University of Exeter, Department of Archaeology)

The site of Cornegi in the Romanian Banat, the subject of intensive survey and excavation over the last six years, represents an extraordinary manifestation of the phenomenon of enclosing space with massive banks and ditches, i.e. fortification. Because of its enormous size – over 17 km long – and its estimated 16 km-long outer fortification ditch – it stands apart from any other Bronze Age fortified site currently known from either the local area or indeed Europe as a whole. Fieldwork has revealed a small number of structures in the interior of the innermost ring, including one well-preserved house, but in general it is unclear to what extent the site was occupied, whether permanently or temporarily. It is known that a considerable number of other fortified enclosures of the same date lie in the Banat although all of them are much smaller. This paper will consider how a dynamic picture of landscape development might have taken place in terms of enclosed space, and what that picture might tell us about social developments in the early phases of the Late Bronze Age in Europe.

Dividing space, time and society: Fortified settlements in the Carpathian Basin (ca. 2800–1500 BC)

Gabriella Kulcsár [presenting author], János Dani, Klára P. Fischl, Viktória Kiss, Vajk Szeverényi [1 Institute of Archaeology Research Centre for the Humanities Budapest, Hungary; 2 Déri Museum, Debrecen, Hungary; 3 University of Miskolc, Hungary]

Similar to other areas of Europe, fortified settlements enclosed by a ditch (and presumably with earthen ramparts with or without palisades) are a characteristic element of the Early and Middle Bronze Ages in the Carpathian Basin. It is, however, a fundamental question what can be considered a fortified settlement in the classic, defensive meaning of the term. During the last decade, works reviewing certain periods and regions in this respect have become more numerous, and we have increasing information on settlement networks as well. The complex research of the latter, covering multiple levels from the smallest units to the largest settlements, enables us to investigate the questions of social organization in these periods. One of the questions concerns the equality vs. subordination of these various settlements, leading us to questions of hierarchy vs. heterarchy. Enclosed or fortified settlements are usually those that are distinguished from the others by their size, complex internal structure and strategic location. Their position within the landscape, their function and symbolic meaning remain important questions for the research on the given period and society. Their size and (simple or complex) structure can also reflect several aspects of Bronze Age societies. The aim of our paper is to examine the fortified settlements of a longer period, ca. 1000 years in the central part of the Carpathian Basin, paying special attention to (1) their function and position in the landscape, (2) their role within the settlement or economic units of the period (tell, horizontal site, satellite settlement, smaller or larger autonomous settlement), and (3) their role in the cognitive and symbolic systems of the period to decide whether their foundation was accidental or the result of a premeditated decision. We will follow the changes of fortified settlements that appear at the beginning of the Bronze Age and examine how the mapping of settlement networks helps us understand the social, economic, ritual and cognitive processes of the period. Can we establish general rules and tendencies for the entire Carpathian Basin for each period, or do we observe different regional or even microregional patterns? How can we interpret the separation of the eastern and western parts of the Carpathian Basin in the Bronze Age, observable since the Neolithic, e.g. through the appearance of tells in the east and the Danube basin, and the appearance of other types of settlements to the west (e.g. Somogyvár-Vinkovci fortified settlements, Kisapostag circular ditches, unfortified settlements, single-layer fortified sites)? To what extent do the distributions of settlement types and pottery styles coincide, are there overlaps and differences? Does this separation suggest the existence of different social structures? How can we fill the concept of “landscapes of complexity” with content? Can we write history based on the fortified settlements as defences against foreign intruders and traces of warlike conflicts? We expect that there
will be no simple solutions, single “prime movers” for the explanation of the emergence of these sites in the entire Carpathian Basin. However, the review of this settlement type might shed light on the temporal and spatial changes of the main causes in the background, and in some cases can provide a valuable interpretation for the root motifs of their creation.

**Fortifications In the landscape: Preferences of location of Early Bronze Age settlement from Bruszczewo**

Mateusz Strój (Poznań Archaeological Museum)

Since the dawn of mankind, defense against the enemy has been one of the major stimuli of culture and civilization growth. Bruszczewo is a unique example of Early Bronze settlement in Greater Poland. What makes this site stand out from others is its defensive character. Granted, we know of other examples of defensive settlements in the context of the Early Bronze Age in Poland, but they have not revealed as elaborate and advanced fortifications as those of Bruszczewo. But were the structures, such as ditch and palisade, that were recorded during the excavations the only form of defense? Or was the position in the landscape some kind of manifestation of defense? The paper is intended to present the results of spatial analysis on the mentioned site with respect to different elements of the landscape. It will also show the results of the viewshed analysis and interpretation based on the defense potential of the Bruszczewo settlement. For this purpose, a digital terrain model and thematic maps were generated. The acquired data will be analyzed in a GIS environment. The last element presented in the paper will be the result of the analysis of the spatial pattern of fortification founded on the site. Based on the mentioned results, it will be possible to interpret the phenomenon of the formation of the spatial layouts to create the surrounding environment. This information will allow the isolation of landscape preferences that might have made Early Bronze Age communities choose specific settings for their settlement. Furthermore, this data will provide the opportunity to define the role of environmental factors in the location of the Bruszczewo settlement in a prehistoric landscape.

**On the problems of fortifications of the Early Bronze Age in the region of the middle Danube**

Jozef Batora, Peter Toth (Department of Archaeology, Faculty of Arts, Comenius University in Bratislava; presenting author), Knut Rassmann

Recently, there has been unprecedented progress of archaeological research on the fortified settlements from the Early Bronze Age in Slovakia. Due to the intensive usage of non-destructive methods in archaeology, particularly aerial prospection, fieldwalking and geophysical measurements, the number of newly discovered sites is constantly rising. However, an archaeological excavation was carried out only on a small number of them. At present, the fortified settlements in Rybník, Santovka and Vráble belong to the best researched sites in this region. Each of them is situated in a different natural environment, which influenced their function and importance within its closer and farther surroundings. Such a combination of favourable circumstances raises many research questions. In our paper, we focus on some of them. In the first part of the presentation, we zoom in on the level of particular sites. Our attention is drawn to the relation of fortification system to the architecture and urbanism of the settlement, fortification technique and usage of building materials. In the second part of the paper, the gained knowledge is evaluated in a broader cultural-historical context. Fortification, its relation to the inner part of the settlement as well as to the outside space is compared with contemporary sites in the wider middle Danubian area. Fortification techniques and used building materials are mainly observed. A very important aspect is a precise dating of a settlement with regards to the beginning of construction and abandonment/destruction of fortification. The causes of a collapse of a fortified area are studied in a context of possible historical events. Last but not least, we deal with questions on the beginning of fortifications in the middle Danubian region and we observe the development of fortification techniques in space and time. The results of this comparative study show that the earliest fortifications with the respective size and construction techniques similar to those from the Early Bronze Age were already built in the Late Eneolithic (late Baden and Bošáca culture). In the building of the Early Bronze Age fortifications, two main chronological horizons can be seen which are also reflected in the cultural-historical orientation of the investigated territory.
Bronze Age landscapes along the Danube – Benta project and Kakucs Archaeological Expedition

Nicole Taylor (Institute for Pre- and Protohistory and Graduate School Human Development in Landscapes, Kiel University; presenting author), Gabriella Kulcsár (co-presenting author), Timothy K. Earle, Mateusz Jaeger (co-presenting author), Viktória Kiss, Gábor Mármus, Johannes Müller, Gábor Serlegi, Vajk Szeverényi

Bronze Age research has already confirmed that the complexity and stratification of past societies can be correlated with settlement hierarchy. Consequently, one of the main directions in social archaeology focuses on settlements, with a scope ranging from the level of individual households to entire micro-regions. The network and pattern of settlements fairly faithfully reflects the complexity of the social and political organization of the period under study. Research on the network of Bronze Age settlements and their burial grounds has always been a priority for archaeological fieldwork in Central Europe. Researchers of the past century tended to focus on large central, usually fortified or defensive, settlements such as tells and hill forts. The past decade has seen a shift in research perspectives: while the study of central settlements has lost none of its importance, interest has grown in micro-regional research and the investigation of settlements with differing function and layout. Only complex research projects can address broad issues of Bronze Age land use. The Bronze Age Research group of the Institute of Archaeology of the Research Centre for the Humanities at the Hungarian Academy of Sciences has for years been conducting investigations on the Danube Valley south of Budapest – in the Benta Valley, the Körös River and its affluent the Tisza, the Börzsöny, the Váralja region near Vráble), Hungary (Benta Valley, Körös Regional Archaeological Project, Kakucs area, Borsod Plain and the foothills of the Bükk Mountains etc.), Romania (Sântana, Ier Valley and the Carei Plain, „Living in the Bronze Age Tell Settlements. A Study of Settlement Archaeology at the Eastern Frontier of the Carpathian Basin”), and from Southern Poland (Maszkowice, Dunajec Valley etc.). More recently, as a result of the data collected on field, new interpretations have been put forth regarding the social, economic, and political functions that the fortified settlements must have had at micro-regional or macro-regional levels. The hypothesis regarding them as „central” places, sustained until now by most of the scholars, began to be increasingly questioned, while new interpretations were sought. The research concerning the emergence and development of these types of settlements focused on the importance of the environmental agent, on the relationship between humans and their surroundings. A significant number of fortifications are concentrated in the Lower Mureș Valley, starting from the Early Bronze Age (ca. 2100–2000 BC) and extending until the end of the Bronze Age (ca. 1000 BC). We are referring to those fortified tells from the Early and Middle Bronze Age (Semlac, Pecica, Munar, Periam etc.), but also to the immense earthen ramparts characteristic for the Late Bronze Age, enclosing tens of hectares (Sântana, Cornegi, Munar etc.). In 2014, the research at these sites focused on gathering aerial photographs, and carrying out geophysical investigations, AMS analysis as well as systematic field investigations. The obtained results will be presented within the discussion concerning the chronology of these fortifications, the characteristics of their defensive elements, their placement in the landscape, their possible interactions with contemporary fortifications, and, naturally, the status these fortification might have had in the era.

Building power without power? Bronze Age fortified settlements in the Lower Mureș Valley

Florin Gogăltan (Romanian Academy, Institute of Archaeology and Art History, Cluj Napoca, Romania)

The research of Bronze Age fortifications in the Carpathian Basin and the Western Carpathians has made important advances in the last few years. Among the projects that were carried out, we note here those from Slovakia (Rybní, Santovka, and Fidvár near Vráble), Hungary (Benta Valley, Körös Regional Archaeological Project, Kakucs area, Borsod Plain and the foothills of the Bükk Mountains etc.), Romania (Sântana, Ier Valley and the Carei Plain, „Living in the Bronze Age Tell Settlements. A Study of Settlement Archaeology at the Eastern Frontier of the Carpathian Basin”), and from Southern Poland (Maszkowice, Dunajec Valley etc.). More recently, as a result of the data collected on field, new interpretations have been put forth regarding the social, economic, and political functions that the fortified settlements must have had at micro-regional or macro-regional levels. The hypothesis regarding them as „central” places, sustained until now by most of the scholars, began to be increasingly questioned, while new interpretations were sought. The research concerning the emergence and development of these types of settlements focused on the importance of the environmental agent, on the relationship between humans and their surroundings. A significant number of fortifications are concentrated in the Lower Mureș area, starting from the Early Bronze Age (ca. 2100–2000 BC) and extending until the end of the Bronze Age (ca. 1000 BC). We are referring to those fortified tells from the Early and Middle Bronze Age (Semlac, Pecica, Munar, Periam etc.), but also to the immense earthen ramparts characteristic for the Late Bronze Age, enclosing tens of hectares (Sântana, Cornegi, Munar etc.). In 2014, the research at these sites focused on gathering aerial photographs, and carrying out geophysical investigations, AMS analysis as well as systematic field investigations. The obtained results will be presented within the discussion concerning the chronology of these fortifications, the characteristics of their defensive elements, their placement in the landscape, their possible interactions with contemporary fortifications, and, naturally, the status these fortification might have had in the era.
Bronze Age fortifications from the Romanian Banat Plain: A status of research

Leonard Dorogostaisky [presenting author], Micle, Dorelă, Stavila, Andrei [1 ArheoVest NGO, Timisoara, Romania; 2 Department of History, West University of Timisoara, Faculty of Letters, History and Theology, Timisoara, Romania]

The presence in this region of the most impressive fortified structure dated within the LBA, Cornești-"larcuri", talks, on the one hand, about the importance of this region in the epoch and, on the other hand, about the existence of a civilization for which research knowledge still lacks. In the last seven years, our field survey on a not so wide area between the Timiș and Mureș Rivers revealed a large number of MBA and LBA fortified settlements. The purpose of our paper is to gather, as much as possible, the information about the presence of Bronze Age fortified structures in the North Banat and to discuss the evolution of terminology regarding the description of fortified areas. The geomorphologic and morphometric analyses, followed by the creation of a database including all the structures we found, represent aims that we also want to highlight. In this respect, our research identified about twenty one new fortifications from 2006 until present. Other twenty three were already mentioned by different researchers. Of the total number spread over 5400 km2, twelve were dated in the MBA, seventeen belong to LBA, seven were dated large in the Bronze Age and the dating for eight fortifications is uncertain because of only few elements which demonstrated human activity. Certainly, this kind of research does not allow for discourses about the functionality, absolute dating, constructions steps and cultural relations between inhabitants from the mentioned fortifications; all of these issues being a future desideratum.

Bronze Age salt production landscapes in the eastern part of the Carpathian Basin

Valeriu Cavruș (State University of Moldova; presenting author), Maria Magdalena Ștefan, Dan Ștefan

Six salt production sites dating between ca. 1630 and 800 cal BC are known in the eastern part of the Carpathian Basin – in Transylvania and Maramureș. The richness of the evidence, the technological complexity and the scale of production show the industrial type of exploitation (Harding/Kavruk 2013). All these sites are situated in the valleys of the major navigable rivers Tisza, Someș, and Mureș. In spite of the abundance of salt deposits in the area, only those deposits show evidence for industrial exploitation which were naturally linked to the navigable rivers. The high concentration of the Middle and Late Bronze Age fortifications, hoards and exotic goods along the Tisza, Someș and Mureș Rivers suggests that they served as the major trade routes between Transylvania and Maramureș with the Great Hungarian Plain. Moreover, direct evidence for Bronze Age salt exchange is known, for example, the piece of rock salt found in the Late Bronze Age Lębény site in trans-Danubian Hungary (Németh, 2013). The most ample research of the Bronze Age salt production sites was undertaken in northeastern Transylvania: at Bâile Figa, Sâsarm and Caila (Harding/Kavruk 2013). These sites are spread very compactly, the distance between them ranging from 6 to 15 km. All of them are naturally connected to the Someșul Mare River. Downstream from these sites, at the high bank of the Someșul Mare River ca. 4 km from the Bâile Figa site, the Middle and Late Bronze Coldău fortified site is located. This fortification was presumed to have been one of the key points of salt trade on the Someș River. The emblematic and eponymous hoard Uriu (Uriu-Domânești-Opaly series) was found a few km west of this fortification. It is interesting that another emblematic and eponymous hoard of the Opály series was found close to the joining point of the Someș-Samos with the Middle Tisza. From 2013–2014, a landscape study using unmanned aerial vehicles and various pre-existing maps was performed in the Someșul Mare Basin. Its results highly suggest that the salt production sites in the area were linked to the Coldău fortification trough of Someșul Mare and its tributaries. On the other hand, the landscape characteristics of the Coldău fortification suggest that it could have played the role of a “trade station” in the westward movement of salt towards the salt-poor zones of the Middle Tisza Basin.

Late Bronze Age fortifications in the southern Carpathian Basin: ritual, memory and politics

Vajk Szeverényi (Hungarian Academy of Sciences; presenting author), Péter Czukor, Anna Priskin

Recent research has shown that Southeastern Hungary and Northwestern Romania are characterized by the emergence of a series of smaller and larger fortified settlements during the Late Bronze Age, ca. 1300–1100 BC. The size and character of these sites seem to vary considerably throughout the region concerned, with settlement sizes ranging from 1700 hectares to 1, and fortifications ranging from a simple single ditch to a system of multiple ditches and ramparts enclosing huge areas. The “function” of these sites is often controversial. While many auto-
matically assume a defensive function, this can be questioned on numerous grounds. Based on our recent work at a ca. 400 hectare large fortified settlement near Csanádpalota in SE Hungary, we would like to review the available evidence on the character of occupation, the nature of depositions and the “defensive functionality” of the system of ditches and ramparts surrounding the settlement. We suggest that beyond the possible defensive function of the central enclosure of the settlement, much evidence suggests that the area provided space for various ritual activities identifiable through structured depositions and that the role of the enclosures was at least partly the invention of tradition through monumentality. It can also be shown that many of these sites are associated with clearly visible earlier prehistoric remains (kurgans, tells, etc.), indicating that they may have played an important role in the formation of the relationship of these LBA communities with the prehistoric past.

Inheritance, social network or local adaptation? Bronze and Early Iron Age societies in western Matopolska

Marcin S. Przybyła (Jagiellonian University; presenting author), Jan Chochorowski, Karol Dziegielewski, Anna Gawlik, Tobias L. Kientin, Marta Korczyńska, Michał Mazur

The aim of our talk is to present main assumptions and very preliminary results of the project that has been carried out since 2014 at Jagiellonian University, Cracow. The basic objective of the project is to attempt to formulate an answer to the questions when, and in what circumstances the culture of past societies was determined by such factors as vertical and horizontal transmission of cultural attributes, and when the decisive role was played by the adaptation to local environment. The dynamics of cultural change in four thoroughly investigated settlement regions (test areas) in western Matopolska (southern Poland), intensively occupied for a long time and representing various ecological zones, will be compared to achieve this goal. Our research will not be limited to tracing selected attributes and verifying single hypotheses, but we will instead attempt to formulate a comprehensive answer to the question on which of the attributes were purely adaptive, which reflected the inter-generational transfer of tradition, and which were the derivatives of events occurring within the network of inter-population contact. One of the studied aspects is the emergence and functioning of the fortifying settlements, which are unequally distributed throughout investigated test areas (in both temporal and spatial dimensions).

Bronze Age “Fortified Settlements”: Tradition and present of Hill Fort Research in the eastern Baltic

Uwe Sperling (presenting author), Valter Lang (both Tartu University, Institute of History and Archaeology)

Emergence of so-called fortified settlements in the eastern Baltic region is considered as important evidence of the changes in settlement and economy structures taking place in the Late Bronze Age (1100–500 BC). Demographic developments, advancements in agriculture, increasing diversification in subsistence strategies and last not least the importance of local metalwork production are considered as main impulses behind centralisation and territorial division under emerging elites or local authorities. This also led to the accentuation of the symbolic and psychological nature and meaning of hillforts (in the sense of privilege and power) in archaeological research. For the Late Bronze Age in the eastern Baltic, fortification and defence are perceived as general and integral features of settlement sites characterized as central places or as the top of a regional settlement hierarchy – and particularly of those with archaeological evidence of metalwork production. The current paper wants to promote a slightly differentiated view of the eastern Baltic hillfort phenomenon that discusses the nature and the predisposition of sites categorised as (fortified) enclosures. The Estonian settlement sites (Asva, Ridala, Kaali, Iru, Narva and Kõivuküla) are of significance in this context due to their heterogeneous appearance not only in regard to their defensive structures (stone walls, fences, palisades) but also to their setting in the Bronze Age landscapes. The paper will discuss whether or to what extent the labelling of such structures as “fortified settlements” is reasoned and how local traditions and external influences in hillfort research history (e.g. Burgbergforschung in the 1920s) led to this perception that dominates previous research. In addition, the Estonian sites will be compared with those in neighbouring countries (Latvia, Lithuania, NW Russia, SW Finland, eastern Sweden) in terms of chronology and nature of fortifications, location in the landscape, and social, economic and cultural background. In any case, present hillfort research in the eastern Baltic is still in search of a better understanding of the functions and causes behind the formation of the many types of Late Bronze Age enclosures (forts, fortified settlements, hill-sites).
Thunau am Kamp – A fortified hilltop settlement of the Urnfield Culture

Michaela Lochner (Institut für Orientalische und Europäische Archäologie, Österreichische Akademie der Wissenschaften)

From the beginning of the younger Urnfield culture until the beginning of the Hallstatt culture, a settlement existed above the village of Thunau in Lower Austria. Situated on a largely naturally protected mountain ridge, it was secured by a rampart on its unprotected side. Over a period of several years scientific excavations have determined the extent of this ca. 20 hectare site. During its main occupation phase, the area was densely settled; there were working platforms sunk into the rock, storage cells and houses constructed on terraces. In this presentation, we attempt to outline the main characteristics of this site, which are important for a discussion and comparison with other settlements of the Urnfield period.

The Late Bronze Age fortification of the Rocher des Aures (Drôme, France)

Stephan G. Schmid (Humboldt-Universität zu Berlin)

The Rocher des Aures in the southern part of the French department Drôme is a hilltop settlement of the "éperon barré" type. Situated at a topographical and climatic border zone and occupying an important strategic location, the settlement also became an important point for controlling the landscape around it. With the emergence of tribal structures (of which later accounts by Greek and Roman writers may provide a certain ideal), it will also become important to ask to which social group or unity the settlement belonged. Recent archaeological research by the "Projet archéologique du Rocher des Aures" (www.auac.ch/para) resulted in a better understanding of the settlement's extension and chronology, indicating an occupation starting in the Late Bronze age and ending only during the later Medieval period. For the time being, it is not clear whether there is continuity or whether the site shows a hiatus in the Early Iron Age, as do many comparable settlements. During recent excavations, it turned out that a first built fortification was constructed at the end of the Bronze Age (Bronze final 3b in the local terminology, 900–700 BCE), resulting in a massive wall built in dry stone technique. The present contribution intends to briefly present the available data on the settlement and especially on the fortification wall. Further reflections shall look at the wider area, inquiring about comparable structures and how the landscape of the final Bronze Age was used and eventually fortified. Using elements of the "Zentralortforschung" combined with view shed analyses and connectivity studies, the function of these settlements as well as eventual clusters will be investigated, possibly being the result of a political shaping of the landscape.

Fortifying seascapes: Bronze Age fortified sites of the north-eastern Adriatic Sea

Zoran Čučković (UMR 6249 Chrono-environnement, Université de Franche-Comté, Besançon)

The north-eastern Adriatic archipelago (Kvarner, Croatia) has been famously labelled as the "Amber Islands" by ancient Greek sources, testifying to its crucial position on the so-called Amber Route during later prehistory. An intense network of maritime connections had already been established by the Early Neolithic, and developed particularly during the Bronze Age under the influence of Aegean contacts. However, the organisation of this network on local scale remains unclear, as well as the real importance of seafaring for local cultures which developed as intermediaries along the Adriatic coast. What is perceived as a far-reaching interregional maritime exchange network, most probably consisted of a series of "small worlds" characterised by different intensities of local connections, as demonstrated by T. Tartaron (2013) for the Aegean. The seascapes, culturally meaningful and socially constructed aquatic (or amphibious) space, emerges on the intersection of these local-global relations and tensions. When considering indices of integration of the north-eastern Adriatic into large scale Mediterranean networks, it is vital to distinguish three different phenomena: import of foreign goods, stylistic dis/similarities, and finally the organisation of local settlement systems. The order in which these phenomena are listed corresponds to their increasing importance in the studied area. Aegean or other imports are very sparse, there are some stylistic connections reaching deeper into the Mediterranean, but it is essentially the settlement pattern that provides the clearest evidence of maritime character of local cultures. On the peninsula of Istria, a series of fortified Bronze Age sites situated on isolated promontories of islets is well-known, while the overall settlement pattern can be shown to gravitate towards the coast. The highest ranking sites, such as Monkodonja (Teržan et al. 1999) are often placed at a safe distance of several kilometres inland from the coast. Taking these observations together, it would seem that in spite of some far-reaching exchange, interregional or even local contacts gave the basic shape to the Adriatic Bronze Age maritime
Beyond fortification: Interactions between settlement and cemetery in the Late Bronze Age of the Southern Carpathian Basin

Hrvoje Kalafatić (Institute of Archaeology, Zagreb, Croatia)

In the past decade, extensive archaeological excavations were conducted on several Late Bronze Age sites in the eastern part of Croatia. On the basis of the results of these excavations, it is possible to speculate on settlement patterns, customs and rites characteristic for Late Bronze Age populations of this region. This paper will be focused on the archaeological site of Čepinski Martinci, situated in the lower River Drava Basin. Rescue excavations conducted on that site revealed a Late Bronze Age fortified settlement. The excavated area revealed a raster of the settlement, which gave exquisite insight into the organization of a Late Bronze Age settlement. It can be divided into a central part encircled with a fortification system and an area outside of the fortifications (suburb). Settlement was organized in several living and service areas interconnected with communications. A cemetery in the southern suburb was also discovered. It is important to note that at the northern part of the fortifications a central gate was additionally fortified with wooden palisades. Stratigraphy of the settlement can be divided in two main phases. The first is characterized by the elements of the Late Tumulus Culture and the second is characterized by elements of the Belegiš II/Cruceni culture. A typological-chronological study of the material and radiocarbon dating confirmed that in the first phase of development a broad suburb existed in the area south of the fortifications, while the suburb was abandoned in the second phase due to a contraction of settlement within the fortifications. The former suburb was then used as a burial area. This paper will also problematize the cemetery and its relation to the settlement. The cemetery at Čepinski Martinci covers a large area and it is characterised by an unusually scarce dispersion of graves, especially compared to a much denser cemetery excavated on the site of Mačkovac in the central Sava River Basin. It is important to note that not a single element of Belegiš II/Cruceni Culture was found in furnishings of the excavated graves, which is not in accordance with finds in the settlement features. The same pattern is also established for other Late Bronze Age settlements excavated in that area.

Late Bronze Age settlements in western Syrmia

Daria Ložnjak Dizdar (Institute of Archaeology, Zagreb, Croatia)

Late Bronze Age settlements in western Syrmia were situated on the elevated right bank of the Danube or in the lowlands near the rivers in its hinterland. Even though the excavations at several settlements on the Danube bank yielded elements of fortifying structures, such as ditches, there is at present insufficient evidence to prove this defensive role with certainty. The Late Bronze Age in Western Syrmia was marked by the Belegiš II culture, which belonged to the koine of channelled pottery. Two different types of fortified settlements have been identified in the landscape – those occupying the high bank of the Danube, and those situated in the valley of the Bosut River. The settlements on the Danube were, naturally, fortified by their position near the river and secured by a ditch at the most accessible side (Sotin, Ilok). The Late Bronze Age settlements in the Bosut Valley were located on tells surrounded by circular ditches. In both areas, unfortified smaller settlements were also observed. The material culture has provided no evidence that during the Late Bronze Age this area was a borderland to another community. What was the purpose of fortified settlements and their hinterland, and what was the relationship between the Late Bronze Age settlements in the Danube region and its hinterland – the Bosut region? How did this settlement pattern fit into a wider communication network? The current state of research does not offer sufficient data for an
explanation. The cemeteries of these settlements have not been discovered yet. In some opinions, these settlements have been interpreted as temporary places of pastoral nomads, but big cemeteries in the eastern part of Syrmia cast doubts on such theories. The Late Bronze Age settlements in the Danube region and its hinterland were connected in a local communication network, according to their position and the strategic use of landscapes.
Abstracts Session 3-2

Abrupt environmental and cultural changes in southwest Europe around 4.2 ka BP

Connecting the Regions and Cultures through Crises: The Inter-regional Comparisons of Climate Change and Human Adaptive Responses to Environmental Stress around the Mediterranean

Bülent Arikian (Istanbul Technical University)

The Mediterranean Basin is arguably one of the most important regions in the world in terms of the length of largely uninterrupted sequences of development of human societies since the beginning of the Holocene. From the Iberian Peninsula to the Jordan Rift Valley, from the Alps in Central Europe to the Atlas Mountains along the North African coast, the region represents immense climatic, environmental, and cultural diversity. Against this backdrop, the Mediterranean offers a multitude of clues in understanding how human societies adapted to changes in different environments due to natural and anthropogenic changes at varying spatial and temporal scales. Consequently, the study of these transformations and a deeper understanding of processes involved are necessary to contextualize social, economic, and political evolution of humanity.

The Bronze Age in the Mediterranean, albeit chronological differences, represents a significant time period mainly due to the emergence of social complexity. As social systems evolved and imperial systems appeared for the first time in the history of humanity, the dynamic and complex relationship between humans and the environment also changed. Climate and landscape are important variables in this relationship where changes in one required adaptation to the new set of conditions. In my talk, I will emphasize the necessity of adapting a long-term perspective and an ecosystemic approach in assessing the changes in climate-landscape-social systems across the Mediterranean. This perspective will reveal a wide range of adaptive behaviours to stressors such as climate change / phases of unstable climate (Unkel), environmental degradation, and anthropogenic impacts. While expressing the patchiness of the 4.2 Kyr BP event in the archaeological and paleoenvironmental records from the Mediterranean, I will also provide examples from the Near East that illustrate the diversity of climatic and socio-economic patterns. Expectedly, such differences are found in West Europe as suggested by Weinelt. Examining the paleoenvironmental, archaeological, economic, and technological changes across the Mediterranean requires establishing a research network and publicly accessible data sets as discussed by Schwab. My talk will reiterate the need for such databases. Only after such data sets are built will it be possible to conduct interdisciplinary research that focuses on coupled socio-ecosystems. Testing hypotheses using multivariate data is only possible through numeric models with local, regional, and supra-regional foci, as discussed by Lemmen.

Regional and subcontinental demographic change around the 4.2 BP event

Carsten Lemmen (C.L. Science Consult and Helmholtz-Zentrum Geesthacht)

The 4.2 BP event is one of the most prominent climatic excursions seen in many, albeit not all, climatic records in Western Eurasia. Its relevance for society has been argued from the temporal correlation of the climatic event with social disruptions, seen in the “fall of Akkad” or the “Indus Deurbanization”. Clearly, this correlation is not proof of causation, but demands mechanistic explanations and testing with more socioenvironmental systems. One way to test the complex interplay of society and climate is to employ a numerical model of prehistoric adaptive societies and to analyse their reaction to a multitude of palaeoclimatologically defined “bad” events and their mitigation and adaptation strategies. This, I do with the Global Land Use and Technological Evolution Simulator (GLUES) for the period from 8000–1000 BC and for the entire world. Hindcasts of demography and technological evolutions reveal that GLUES-simulated populations react to deterioration of their subsistence base by migration and population decline. Recovery of local populations after a local event is fast, and long-term social systems appear rather resilient. I will highlight selected regional population trajectories and discuss how differently located climate signals in time and space shape the response in populations around the Mediterranean. This analysis shows the importance of considering both the spatial and the temporal context when investigating single climate events.

climate variability: Analyses of proxy data in the frequency domain, Palaeo3 298 (2010) 189–200

The impact of climate changes on the Bronze Age societies in Greece
Ingmar Unkel1,2, Christian Heymann1,2, Sturt W. Manning1, John L. Binliff4, Walter Dörfler1,3, Oliver Nelle1,3, Helen Zagana1 [1 Graduate School Human Development In Landscapes, Kiel University, Germany; 2 Institute for Ecosystem Research, Kiel University, Germany; 3 Malcolm and Carolyn Wiener Laboratory for Aegean and Near Eastern Dendrochronology, Department of Classics, Cornell University, Ithaca NY, USA; 4 Department of Archaeology, Edinburgh University, United Kingdom; 5 Institute for Pre- and Proto-history, Kiel University, Germany; 6 Department of Geology, University of Patras, Greece]

The Mycenaean civilization of southern Greece flourished from the 17th-12th centuries BC, but, in common with several other major east Mediterranean civilizations, collapsed in the period at ~1200 BC. Climate change (droughts) has often been suggested as a cause. However, Late Holocene climate reconstructions for southern Greece are still very limited. We here report the first continuous decadal-scale XRF records from Lake Stymphalia (Peloponnesse, Greece), which we use as proxies for changes in precipitation patterns over southern Greece. We find evidence for a cooler, drier (especially from ~1200–1100 cal BC), and also unstable climate period from ~1300–900 cal BC, with multi-decadal drier conditions alternating with periods of enhanced precipitation. The addition of a substantial negative climate change would have increased the stress on the Mycenaean society, which at the same time showed signs of social unrest and other immediate, human-caused, destruction. Parallels with ecological stress attested during the Little Ice Age (LIA, 14th–17th centuries AD) in the Eastern Mediterranean illustrate the social impacts of similar negative climatic indicators. After 900 BC, we observe a change to warmer, wetter and more stable climate conditions and the archaeological record shows an Iron Age 'Renaissance' after 800 BC. Our evidence indicates that Aegean climate from ~3000–900 cal BC is characterized by the influence of a generally negative NAO and strong SH with relatively cool and dry (l[ing] atmospheric conditions – albeit with a mild warming trend to the late 3rd millennium BC and some likely favourable short warming intervals in the mid-late 2nd millennium BC. The 4.2ka/2200 cal BC climate episode is not clearly represented in the XRF data – but we argue that it is probably represented in the core’s sedimentation record where a substantive change occurs around this time.

Socio-cultural transformation/crises and environmental alteration in the circum-Mediterranean realm 2200 BC
Mara Weinelt (presenting author), Christian Schwab, Martin Hinz, Jutta Kneisel [all Graduate School Human Development In Landscapes, Kiel University]

Predicted future climate change is expected to threaten human societies in terms of food and water shortages, poverty, health crises, and riots/wars. Within this context, the archaeological retrospective on past surmounted crisis may help to tease out the complex interactions of societies and environment. Here we attempt to evaluate the impact of partly abrupt and profound environmental changes on ancient societies in the Mediterranean region around 2200 BC. Although an environmentally triggered crisis is well known from the Near East at 2200 BC, its western extent in terms of environmental and socio-cultural changes is largely unknown. To derive a comprehensive picture of past environmental (climatic) changes in the Mediterranean region, we compiled an extensive dataset from existing literature on past environmental (climatic) changes. A preliminary evaluation of the dataset shows that the drought recorded in the eastern part of the Mediterranean and responsible for the collapse of Near Eastern societies around 2200 BC also extended to the western Mediterranean, but probably with a much lesser amplitude. The observed climatic pattern hints at a large-scale reorganization of the atmospheric circulation, resembling a change towards a configuration found during a modern positive North Atlantic Oscillation mode. It can be hypothesized that in addition to an abrupt climate change, the gradual climate change in the Mediterranean from a humid middle Holocene to a dry late Holocene probably reached a critical threshold for previously flourishing societies. To trace socio-cultural changes in the western Mediterranean area, sites that underwent distinct transformations were mapped, and regional summer radiocarbon calibrations based on the extended RADON and RADON-B databases were performed. Although distinct socio-cultural changes are recorded in southwest Europe around 2200 BC, marked differences between southern France and southwestern Spain exist. Based on the summed 14C calibrations, populations declined in southern France and southeastern Spain around 2200 BC, whereas in southwestern Spain, concomitant to the transition from El Argar to Los Millares cultures, population size rapidly increased.
Based on our preliminary results and since quantitative estimates of environmental changes from the western Mediterranean (Iberian Peninsula) are rare, it is still questionable if the observed environmental changes were sufficient to trigger, or at least to influence the observed cultural transformations in the western Mediterranean region.

Spatial and temporal distribution patterns of archaeological sites in the Lake District Region, Southwest Turkey
Asli Oflaz [presenting author], Mara Weinelt [both Graduate School Human Development in Landscapes, Kiel University]
This study presents spatial and temporal distribution patterns of archaeological sites in the Lake District of Anatolia as an exploratory data analysis of past archaeological landscape through the Late Chalcolithic to the end of Early Bronze Age. This dynamic period includes the transition from "sedentary communities" to the earliest "complex state-level societies", higher population densities than in earlier periods, and the development of metallurgy and long-distance trade networks. Previous archaeological studies that aim to elucidate these changes in the EBA settlement systems usually exclude or underestimate its interaction, incorporation and interrelation with the climate change around 4200 cal BP. Recent paleoenvironmental research (Dalfes et al. 1997; De Menocal 2001; Grosjean et al. 2005; Kuzucuoglu and Marro 2007; Roberts et al. 2011; Weiss 2013) suggest strong parallelism between climate and cultural evolution in the period of transition from the Early to the Middle Bronze Age that is the subject of debate with various interpretations, ranging from socio-economic crisis and ruralization to nomadic invasions, pastoralism, etc. The most archaeological studies about the 4.2 ka event concentrated on either current arid or humid zones that belong to different climate zones. Therefore, there is no complete agreement on the proxy records for the temporal/spatial range and magnitude of this climate change. Being a transition zone between two climatic zones (the temperate and the sub-tropical), and having a number of lakes and tectonic depression plains between mountain ranges in contrast to the neighboring arid steppe region of the Konya Plain, the study area will provide an opportunity to show a more complete picture of the event by investigating and comparing differences of responses from heterogeneous environments. By now, there are few studies that consider the maximum use of a regional approach. In this study, a better understanding of settlement systems in the EBA will be provided by giving greater emphasis to regional scale analysis and describing the environment around the settlements with respect to terrain, economic production potential and land use patterns. In order to maximize the potential of limited available archaeological data, a GIS-based landscape approach will be used for the reconstruction of settlement patterns in addition to a multiple proxy approach in order to reveal paleoenvironmental conditions and past climate change.

Synoptic view on environmental (climatic) changes in the Mediterranean region around 2200 BC
Christian Schwab [presenting author], Mara Weinelt, Martin Hinz, Jutta Kneisel [all Graduate School Human Development in Landscapes, Kiel University]
Given the social consequences of the expected climate change, past crises and crises that were overcome in human history are of current interest. In addition to the well-known and most probably environmentally influenced crises during medieval times (Medieval Climate Anomaly, Little Ice Age), the socio-cultural crisis around 2200 BC is in the focus of current research. Although the collapse of Near Eastern societies at that time is well-known, and a climate anomaly has been verified for nearly all around the globe, the causes of this anomaly and the western extent of the socio-cultural crises is largely unknown. In order to gain insights on the underlying causes and western extent of the so-called 4.2 ka BP climate anomaly in the Mediterranean region, we compiled an extensive dataset based on published climate and environmental records. Up to now, this dataset is comprised of approximately 150 records from 107 sites distributed in and around the Mediterranean Sea. This dataset is examined to deduce the regional environmental and climatic changes around 2200 BC and to deduce the timing and amplitude of the changes if possible. Although the robustness of the dataset in terms of dating accuracy and sample resolution of the individual records has not been evaluated in detail yet, a striking pattern of climatic changes emerges: 1) The drought responsible for the collapse of Near Eastern societies probably extended into the western Mediterranean, even to the Iberian Peninsula, 2) Although many records register a warm and/or dry period around 2200 BC in the western Mediterranean, the amplitude of this change was probably much lower than in the eastern Mediterranean, and 3) The overall pattern in the Mediterranean at 2200 BC hints at a general reorganization of the atmospheric circulation, resembling conditions found during a modern positive North Atlantic Oscillation Mode. Further investiga-
tions are needed to validate the results, especially in the most western part of the Mediterranean (on the Iberian Peninsula), where some contradictory data exist.

Paleoprecipitation reconstruction from oxygen isotope data: A case study from Upper Mesopotamia

Tuna Kalayci (Inst. for Mediterranean Studies)

The temporal and spatial variability of precipitation levels accounts for large production fluctuations in rain-fed agricultural systems. Under ever-changing climatic conditions, agricultural production requires risk minimization, which also implies settling for lower, but more stable agricultural yields. However, when the need for stability is accompanied by the need for high yields, the total vulnerability of a productive system becomes more pronounced. Under such conditions, modelling precipitation levels becomes necessary in order to establish a measure for the vulnerability of the system. During the Early Bronze Age, Upper Mesopotamian staples production was based on rain-fed agriculture where rapid urbanization and increased politico-economic relations must have asserted considerable pressure on food economies and agriculture must have been intensified in response to those social changes. Furthermore, some scholars suggest a collapse of the system at around 4.2 BP due to environmental degradation – a claim that still waits to be empirically tested. Therefore, there is a need to well establish the relationship between precipitation and social changes during the Early Bronze Age. This study explores an oxygen isotope data series obtained from Soreq Cave and proposes a reconstruction of precipitation levels in Upper Mesopotamia, using modern-day meteorological conditions and correlates between the Eastern Mediterranean and inland Middle East. In return, the study suggests it was not environmental deterioration, but the complexity of the economic system which caused the dissolution of urbanite life during the Early Bronze Age.
Abstracts Session 3-3

Modes of change – Inhumation versus cremation in Bronze Age burial rites

Switching from Inhumation to cremation: event or process

Oliver Nakoinz (presenting author), Jutta Kneisel, Martin Hinz (all Institute for Pre- and Protohistory and Graduate School Human Development in Landscapes, Kiel University)

The transition from the Middle Bronze Age to the Late Bronze Age is connected with fundamental changes in cultural, social and economical conditions. We aim to investigate the spatio-temporal shape of the emergence of the Late Bronze Age using radiocarbon dates of cremation burials, which seem to be good proxies for the complex characteristic of late Bronze Age communities. Previous research revealed that cremations are neither an invention of the Bronze Age nor is there a continuous process of cremations becoming dominant. In most regions, cremations had been carried out occasionally since Neolithic times. Subsequently, the dominant burial rite switches in most regions from inhumations to cremations at a certain point time during the Bronze Age. The interpretation argues that cremation is not the innovation, but rather the changed meaning of the cremations. We will determine the time of change using sum calibrations of the regional radiocarbon data. On this basis we try to model a network of interregional relationships which maps areas that change to new values, beliefs and needs at the same time. We hope that this model provides deeper insights into the mode of change in the Bronze Age and the actual meaning of cremations.

Radiocarbon dates and cremated bones: The appearance of the cremation rite in protohistorical cemeteries in Belgium

Guy De Mulder (Department of Archaeology, Ghent University)

From a European perspective, the funerary ritual of cremation spread over Europe during the Late Bronze Age with the appearance of the Urnfield culture. Migrating groups from Central Europe introduced urnfield cemeteries in Belgium, which consisted of a mix of indigenous and imported funerary rites. Flat graves were dominant and replaced in most cases the former barrow tradition of the Middle Bronze Age. Inhumation was replaced by cremation of the deceased’s body. This transition was dated around 1100 BC and is based on the typochronological study of the accompanying funerary goods in the burials. Radiocarbon dates on cremated bones offered new insights on the origin of the flat graves and urnfield cemeteries. The appearance of cremations and flat graves is, according to the present information, a more complicated evolution with regional differences. This process started earlier than thus far assumed. Within the cremation ritual, different variations on the selection of cremated bones to be deposited in the grave are ascertained. Some dated cremations go already back to the 17th century cal BC. This phenomenon of cremation clearly dominates the funerary ritual from 1200 cal BC onwards. During the same period, flat graves replace the barrows as the funerary fashion of burying the deceased. But between 1500–1200 cal BC, a co-existence of both traditions of barrows and flat graves is evident. By using Bayesian analysis we want to try to refine the chronological information concerning flat graves and the introduction of the cremation ritual in Belgium.

Same old story? The cremation ritual of the Late Bronze Age urn field Müllrose (East Brandenburg)

Verena Tiedtke (Graduate School Human Development in Landscapes, Kiel University; presenting author), Susanne Storch

Like for most Late Bronze Age burial sites in Central Europe, burning plays the pivotal role in the mortuary practices of the Lusatian culture. One of such necropolises with well-documented cremation graves containing vessels for the burnt deceased, remains of the pyre wood and fire damaged personal items (e.g. jewelery and weapons), is the urn field of Müllrose in East Brandenburg (Germany). The meaning of fire in the burial ritual in Müllrose and its role for the entombing groups’ eschatology will be examined by focusing on the position of the cremated remains in the urn as well as types of burnt grave goods and results of the anthropological analysis.
An Urnfield inhumation under special circumstances in the southern Harz

Stefanie Schaefer (Institute for Pre- and Protohistory, Kiel University; presenting author), Stefan Rindt (Osterode am Harz)

The Lichtenstein cave near Osterode in the Harz is an Urnfield burial place of a group of more than 60 humans. On the basis of the remains of their bones, the largest Bronze Age family tree could be reconstructed. According to an archaeological record from 1980, deceased persons were mainly secondarily inhumated, which was contrary to the usual custom of cremation at that time. The deposition of the bones is primarily interpreted as secondary, while only a few dead were laid down as articulated bones in one cave part. The interpretation as a secondary burial site eclipsed previous victim theories. The proven clan is assigned to a social upper class. The nearby Pipinsburg is often seen as the seat of power of that family. A connection between this particular inhumation burial place and the interpretations of the Lichtenstein cave as a burial place of a ruling princely- or chief family seems to be important in the context of the debate over the burial change during the Bronze Age. This theory is supported by similar results from the Kyffhäuser region and the Franconian region (Frankenalb) and at the same time it leaves scope for discussion.

"Cremation vs. inhumation" and other indicators of diversification between burial rites of the Tumulus Culture from the areas of Bohemia and Poland

Mateusz Cwaliński (Institute of Prehistory, Adam Mickiewicz University Poznań)

For the past decades, studies devoted to the problematic of the Tumulus Culture (TC) were based on the assumption that Central Europe during the Middle Bronze Age was inhabited by societies bound by unified cultural traits. The main reason for such inferences were similarities in the sphere of a burial, seen chiefly through the prism of the eponymous barrow – a monument quite common in the European prehistory, yet chosen as an irrefutable symbol of cultural unity. In fact, many local characteristics concealed inside the mounds and testifying to the different ways of development of TC component groups were dismissed in order to keep the bigger picture intact. One of these indicators is certainly a transition from the inhumation to cremation rite, which occurred spatially on different scales and within different time scopes. More regional-scoped research shows that the TC funeral rite was a subject to constant change in time, influenced by local cultural background, as well as other generally understood social factors inherent to various groupings. The intention of the author is to answer the question whether we deal with a culturally unified society or rather communities only vaguely recognizing similar rules in the sphere of ritual behaviour? A verification of the aforementioned hypothesis will be achieved by means of comparative analysis of tumulus funeral rites characteristic for the two Middle Bronze Age cultural groupings located in southwestern Bohemia and south-western Poland, belonging to the TC. The relationship between the discussed groups was analyzed by a quantification of similarities and differences characterizing their burial practices. Our main attention was focused on the rates of inhumation towards cremation together with the construction of barrows, consisting of different stone and wooden structures, composed with each other in various ways. Changes that happened over time in the sets of construction elements, along with modifications of burial arrangements, were examined with statistical methods. Results achieved in this way show how an inhumation/cremation ratio, together with other features, helps to determine the degree of unification of both groups at the level of the funeral rite.

Inhumation and cremation in the Trzciniec cultural circle

Przemysław Makarowicz (Institute of Prehistory, Adam Mickiewicz University Poznań)

The Trzciniec Cultural Circle (TCC) was a macrospatial cultural unit, which inhabited the vast areas of East-Central Europe between 1800 and 1100 BC. During that time, its oecumene stretched from the Warta River in the west, to the Desna River in the east, and from the Nemen in the north, to the Prut in the south. The visible disproportion between the number of settlements and cemeteries suggests that not all members of the aforementioned community were buried in an archaeologically identifiable way. However, the funerary rites associated with the TCC community were exceptionally complex, characterised by a great variety of forms and a considerable dynamic of change. It is possible to observe a wide range of inter-regional similarities and regional peculiarities. Most often the deceased were buried in isolated spaces: cemeteries or single graves. Burials located within settlements, e.g., in storage pits which were re-used for funerary practices, are seldom finds. The necropolises of the TCC are characterised either by burials placed beneath mounds or flat graves. Collective graves are as common as individual burials, with corpses of the
deceased severed and intermingled or assembled in an anatomical order, inhumated or cremated. Biritual graves are also identified within this complex. Cremated remains were placed in pits, infrequently in urns, and incidentally spread outside funeral structures. The incineration process was undertaken outside the burial pit or carried out within wooden constructions, such as burials chambers and mortuary houses. The distribution analysis of burial sites of the TCC provides an insight into tendencies and regularities on a macrospatial level. Barrow cemeteries, both of inhumation and cremation funerary rites, are mainly identified in the southern, upland zone. Flat-grave cemeteries are located in the lowland zone. In general, cemeteries and singular graves with cremation or biritual funerary rites are more ‘northern’ in origin, rather than similar inhumation burials. Cremation dominates in the Dnieper drainage, where flat graves are almost exclusive. Smaller accumulations are found in the Desna and Seym drainages. The upper Dniester region is dominated by cremation barrow-graves, a situation also observed on the northern border of the Podolian Upland, in the southern part of the Lublin Polesia and the western part of the Lublin Upland, where both barrows and flat-graves are identified. The dead were also cremated to the West of the Vistula, despite inhumation as the dominant funerary rite. Such features were recorded in the upper Neman and middle Pripyat drainages as well, although sepolchral sites are not well-researched in the area. In different regions inhabited by the TCC societies with both burial rites existed nearly simultaneously. The analysis of radiocarbon dates suggests that burning down mortuary houses/burial chambers, which resulted in the cremation or partial burning of corpses (bones), was carried out already in the early period of the TCC. However, it did not oust the tradition of collective burials. Archaeological data and radiocarbon chronometry have provided ground for distinguishing two horizons of cremation: an early one, identified in the first half of the second millennium BC (barrow graves and scarce single flat graves) and a late one, which is associated with the changes in the ideology and religious sphere (cosmology), especially inspired by the Urnfield Complex.

Invisible barrows, pits full of people: The issues relating to the beginning of cremation in Bronze Age Moravia (Czech Republic)

Klara Sabatova (Masaryk University, Brno; presenting author), David Parma

On the border of the inhumation burial rite in the Early Bronze Age Northwestern Carpathian Basin (2000–1600 BC)?

Eszter Melis (Gyula Forster National Centre for Cultural Heritage Management, Budapest)

The flat area between the Alps and the Carpathians in Northwestern Hungary is considered the gate of the Carpathian Basin to the western part of Central Europe. It is situated at the meeting-point of the Danubian transport line with the joining Morava Valley, the assumed forerunner of the Amber Road leading from north to south at the feet of the Alps and the communication channel following the River Rába. In the later Early Bronze Age (according to Hungarian terminology Middle Bronze Age 1–2; 2000–1600 BC), the border zone of the mainly cremation rite was located here, following Carpathian Basin Bronze Age groups and the Unětice Complex. The region is naturally divided by the River Répece/Rábca and its marshland (Hanság): to the west the area is characterized by the inhumation burial grounds of the Gáta-Wieselburg groups (e.g. Hegeshalom, Petőháza, Szakony), while populations east of the Hanság usually followed cremation burial practices. To the west of the Répece, smaller, partly disturbed cemeteries with 2–58 graves are located. In Austria, the largest burial ground of the Gáta-Wieselburg communities, Hainburg an der Teichtal with 320 graves, is for the most part unpublished in detail, except for about 20 graves unearthed in the
first half of the 20th century. Among the grave goods, common metal types and some pottery forms of the southeastern group of the Únětice Complex in the Middle Danubian Region are found. In this regard, I consider it important to compare the orientation and positioning of the deceased with the Early Bronze Age cemeteries in Western Slovakia, Moravia and Northeastern Austria (e.g. Jelšovec, Tešetice–Vinohrady, Unterhautzentral). It is not surpring that no definite border line could be identified between the two main burial rites in Northwestern Hungary. For example, east of the River Rába, in Ménföcsanak in the theoretical „territory“ of the cremation rite following the so-called late Kisapostag and the Early Transdanubian Encrusted Pottery Culture, smaller inhumation grave groups occurred with grave goods similar to Gáta-Wieselburg and Únětice metal types and ceramic style. What is the cultural meaning of the different burial rites? Is the variation of orientation and positioning related by cultural connections or social status? In this presentation, I would like to analyse this question on about 80 unpublished Gáta-Wieselburg graves from 6 sites in Northwestern Hungary, and complete them with the data from published sites (circa 50 burials). From the latest excavations, archaeobotanical and radiocarbon data are available. Future research plans include further radiocarbon measurements from human bones and the investigation of the origin of this population, primarily with stable isotope analyses (e.g. strontium) and DNA sampling.

„Show me your grave, and I tell you, who you are...“

János Dani (Déry Múzeum, Archaeological Department, Debrecen, Hungary)

Based upon this title, it seems – for the first time and at first sight – an easy thing to make a distinction between several communities of the EBA, mainly on the basis of their graves. The examination of the burial rites of the EBA in the Carpathian Basin has always been a current and important theme, but unfortunately in some cases, it has degraded to barely typological questions. We must not forget, however, that behind the graves there were real people, specific traditions and spiritual life. This paper gives a short overview of the burial costumes of the EBA in the NE part of the Carpathian Basin (e.g. the Makó, Nyírség, Szaniszló/Sanisláu, Roșia cultural groups). Now, following the intensive excavations of the last two decades, it appears not to be so easy to form an opinion – not just about the burials but also about the cultural-chronological framework of the above cultures. Nowadays, thanks to research concerning cultural connections and networks, we see a more colourful and complex picture of the EBA as an entire, complicated system. I will present a few case studies on the issue to try to illustrate the changes of the funerary rites and burial customs of certain EBA communities through time and space. Of course, beside the two main burial practices (cremation vs. inhumation) one must also take into account the symbolic graves. In each case, an interpretational framework will be given to the phenomenon of this change. Finally, I attempt to illustrate that beside or beyond the big and general interpretational frameworks ("grand narratives"), each EBA burial must be individually examined and evaluated to understand the particular background motifs.

From inhumation to cremation: Changing burial rites in Early and Middle Bronze Age Hungary

Viktória Kiss (Institute of Archaeology, Research Centre for the Humanities, Hungarian Academy of Sciences; presenting author), Szilvia Fábián, Tamás Hajdu, Kitti Köhler, István Major, Gábor Serlegi, Géza Szabó

In the western part of Hungary, inhumations and cremation burials dating between 2100 and 1900 BC were discovered. The human remains of this period are traditionally associated with the Kisapostag population, however, others connect them to the earliest Transdanubian Encrusted Pottery style. The reason for this biritual burial practice has not yet been established – chronological and social interpretations have both been suggested. Results of recent excavations support the chronological explanation. A relative chronological periodization at the Bonyhád cemetery (southeastern part of Western Hungary) indicates that the dominant burial tradition in phase 1 was inhumation, while cremation began to be employed in phase 2. Moreover, in two cases the deceased were cremated in the burial pit. Redening on the grave walls and floor was observed, and the cremated bones remained in anatomical order, lying on the back with legs pulled up on the left, similar to the inhumation burials in the same cemetery. We also present a pit burial containing multiple inhumations from a settlement of the same population excavated at Balatonkeresztür (southwestern part of Western Hungary). This burial is an important feature due to the cremation burial practice that was characteristic for the younger phases of the mentioned population, and has become a recent focus of heightened interest of irregular or “deviant” prehistoric burials. To understand the changing burial rites, we would like to present recent radiocarbon dates collected from human bones
of the mentioned inhumations and cremation graves as part of our new research project granted by the Hungarian Scientific Research Fund (Nr. 108597). We also take into consideration the sophisticated ornament style of the Transdanubian Encrusted Pottery that appears simultaneously with the dominance of cremation practices. This suggests that the introduction of cremation, which causes the destruction of the characteristic grave goods (e.g. ornamented textiles of clothes, and metal jewellery), made people place symbols of identity onto urns as containers of the fragmented body.

**The impact of wealth consumption on cultural changes: The example of Dunaujváros-Duna-dúlő and the Middle Bronze Age Carpathian Basin**

Julian Laabs (Institute for Pre- and Protohistory, Kiel University)

There is constant stylistic progress in material culture, especially in the forms and ornamentation of ceramics, but deep cultural transformations are often connected to economic changes, and those are also traceable in the funerary record.

Based on investigations of the Early to Late Bronze Age cemetery of Dunaujváros-Duna-dúlő (Vatya-Koszider), the aforementioned hypothesis was tested. From the Early to Middle Bronze Age (ca. 2400–1600 BC), bronze and prestige good consumption remained the same, while ceramic traditions constantly changed. In the late Middle to earliest Late Bronze Age (ca. 1600–1500/1450 BC), a shift in wealth consumption correlated with strong and visible cultural transformations in ceramic traditions, hoarding and settlement structure. The different intensity of Modes of Change in the funerary rite is traceable and indicates times of ‘normal’ progress and times of ‘rapid’ changes.

Based on the example of Dunaujváros-Duna-dúlő, further cemeteries in the Carpathian Basin of different ceramic-style-complexes (Otomani-Füzesabony, Encrusted Pottery) are analysed. The wealth consumption within the different funeral communities functions as the indicator for deep changes in the social organisation of groups and hints at the intensity of the Modes of Change. In addition, a chronological and regional comparison of the cemeteries, as well as information from research literature, will uncover whether the different ceramic-style-complexes underlie similar developments in the Middle Bronze Age.

**To burn or not to burn – inhumation versus cremation at the end of the Bronze Age in the southern Carpathian Basin**

Mario Gavranovic (presenting author), Daria Loznjak Dizdar (Institute of Archaeology Zagreb, Croatia)

Cremation was the usual method of burial in the Carpathian Basin during the Late Bronze Age (Urnfield culture), while in the neighbouring area of the Balkans to the south, inhumation was the common mortuary practice. In this paper we will discuss various modes of change in funeral rites at the end of the Late Bronze Age in the southern part of the Carpathian Basin, in particular in the border zone between two regions with divergent spatio-cultural contexts. The focus will be placed on the appearance of the inhumation graves within the diverse local communities with long traditions of cremation that reach back to the beginning of the Urnfields. The gradual transformation of the burial customs started around 1000 BC with irregular intensities in different communities. In some areas it was obviously a personal choice of the few society members, not always the elite, whereas in other areas inhumation became almost a rule. It is certain that a change of the mortuary practice was an ongoing process, strongly influenced by communication networks and the cultural background of each community on regional and supra-regional levels. The emphasis in this presentation will be put on a few examples from older investigations (Budinjak, Donja Dolina, Vukovar) as well as on newly discovered and excavated sites (Dolina, Sotin, Mekota). Corresponding to their intermediate position between the two “worlds” of funeral traditions, these sites are characterised by extremely uneven contemporary burial practices including grave mounds, flat inhumation graves of various forms, inhumation graves with selected body parts, cremations in urns, cremations in organic containers and scattered cremation graves. By comparing the heterogeneous cemeteries from the perspective of the different communication networks and cultural traditions, we will try to reveal the reason behind the dissimilarity of the mortuary practices. It is striking that body treatments (cremation/inhumation) are obviously variable in some communities, but grave goods are almost the same or similar, while other groups exhibit significant disparity in body treatments as well as in the composition of grave belongings. These examples clearly question any kind of general explanation model and raising doubts about the relevance of so-called “specific cultural traits” of the prehistoric societies. Can the burial rite be regarded as an equally significant “cultural trait” as characteristic...
jewellery or pottery? The complex and divergent mortuary practices at the end of the Late Bronze Age on the southern fringe of the Carpathian Basin require a bottom-up approach for each case study, considering not only geographic position and burial tradition but also communication and social networks of the particular entombing community.

Generating change: How Late Bronze Age society relates to funerary practices in the Lower Mureș Valley?
Ana Ignat [Romanian Academy, Institute of Archaeology and History of Art, Cluj-Napoca, Romania; presenting author], Victor Șava [Arad Museum Complex, Arad, Romania]
The final stage of the Bronze Age in the Lower Mureș Valley (Western Romania) is contemporaneous with the disappearance of Bronze Age tells (1600/1500 BC) [Periam „Movila Șanțului”, Pecica „Șanțul Mare”, Sântana „Tell Nordic”, Munar „Wolfsberg”) and the emergence of large fortifications (1400/1300 BC) [Sântana „Cetatea Veche”, Munar „Wolfsberg”, Cornesti „Iarcuri”), and continues during its later phases in Bz D, Ha A1 until the beginning of the Ha B1 period. The main focus of our study is the transition from inhumation to cremation burials, starting with tracing back the attitudes towards funerary practices to the Early Bronze Age in the Lower Mureș Valley. As a starting point, we will discuss the Pecica „Sit 14” cemetery, recently discovered on the section of the motorway Arad-Nădlac. The archaeological research from 2011 led to the identification of 37 burials, of which 23 were identified as inhumation burials and the remaining 14 as cremation graves. Most of the burials displayed rich funerary inventory by the means of which two phases could be distinguished, marking the chronological evolution of the graveyard. According to the newly achieved radiocarbon dates, the inhumation burials as well as some of the cremation burials belong to the chronological sequence 1600–1400 BC. The rest of the cremation burials can be attributed to a later sequence of the Late Bronze Age. This phase is more or less contemporary with a series of transformations that occurred in Late Bronze Age society. Usually these changes are proven by the emergence of large fortifications and an increasing number of bronze and gold hoards [Pecica II, Pecica IV, Sântana „Cetatea Veche”, Sâng petru German „Vii”). In connection with this, we took into account all the funerary discoveries on the Lower Mureș Valley, starting with the bi-ritual necropolis at Tápé (Hungary) and ending with the funerary discoveries from Felnac and Sântana (western Romania). Therefore, the main purpose of our research is to trace an accurate model of how these changes took place. But in addition to this objective, we have other inquiries that we will try to answer, such as the following: Would it be possible to integrate the transition from inhumation to cremation to a larger scale phenomenon? Has the remodelling of the society in the Late Bronze Age, which we perceive through the emergence of large fortified settlements, influenced the attitudes towards burial practices or is it that these attitudes belonged to a set of attributes that came together to shape a different world? Can we talk about new out coming communities or is it only a change of beliefs generated by the constant development of prehistoric communities? And, finally, is there a way to trace any connection between the funerary practices, the funerary inventory and the personal characteristics of the individual before and after the transition to cremation rites?

Incinerate the dead: Caucasian Bronze Age cremation burials and their wider context
Sabine Reinhold [Eurasia department DAI]
Cremation burials are a comparatively rare phenomenon in Bronze Age Caucasia. Nevertheless, at the turn of Middle to Late Bronze Age, i.e. the mid-2nd millennium BC, cremations suddenly increase in frequency. Particularly in the high mountain areas large vaults with cremated burials are known. In Tereze near the spa Kislovodsk, a series of cremation burials was excavated that surprisingly very closely represent ritual activities listed in the Hittite royal burial codex. Is cremation in the Caucasus thus a phenomenon at the periphery of the Hittite world? What local roots do cremations have in the Caucasus? The paper will discuss the local peculiarities of the Caucasian cremation burials and try to place them into a wider overall context.

Cremation burials in Central and Western Europe: Quantifying an adoption of innovation in the 2nd millennium BC
Giacomo Capuzzo [Universitat Autonoma de Barcelona; presenting author], Juan A. Barceló
Late Bronze Age to Iron Age transition in Prehistoric Europe represents a perfect case study to test different and competing hypotheses of social dynamics and economic changes in small-scale societies. Among the most relevant changes which took place in the 2nd millennium BC, the introduction and the development of a new burial rite, cremation, over a large territory deserves particular attention. Tradi-
tionally, the origin of the so-called "Urnenfelder Kultur" has been placed in the Charpato-Danubian area. From this region, cremation burials would have expanded across space and over time toward western and southern territories. It follows that the presence of the new rite in the north-east of the Iberian Peninsula has been explained as a consequence of such east to west movements of people. Due to the increased number of archaeological excavations, scholars currently started to assume the inner complexity, which characterizes such phenomenon, as attested by the variability in the grave type, the magnitude of the dispersal area and the social and ideological deep transformations following the adoption of such an innovation. In this paper, we want to adopt an innovative approach in order to quantify such phenomenon. Through the geostatistical analysis of radiocarbon-dated cremation burials included in the EUBAR database, we aim to model the spread of the new rite in the time-span from 1800–750 BC in Central and Western Europe. The basic assumption is the detection of a spatio-temporal gradient which is an outcome of an expansive phenomenon, i.e. a dynamic system in which every location, at some well-specified underlying space, has a distinctive behaviour through time. When a system expands through time, we can foresee a certain degree of dependence between locations, and this dependence is exactly what gives unity to the process. Obtained results show the existence of a consistent space-time gradient, which could be explained as a result of spreading movements from the North-Western Alpine region and the Swiss Plateau.

Times of change – times of battle?
Bronze finds from period III in the Tollense Valley, Mecklenburg-Western Pomerania

Anne Dombrowsky (Greifswald University)

Approximately 3200 years ago, radical changes occurred within the Bronze Age of Central Europe connected with the transition from the older/tumuli Bronze Age ("Hügelgräberbronzezeit") to the Urnenfelder Kultur ("Urnenfelderkultur"). From an archaeological point of view, these changes are most obviously documented by the change of the burial custom from inhumation to cremation burials. In northeastern Germany, this cultural change happened in period III of the Nordic Bronze Age. Did this phase come along with armed conflicts? Finds from the Tollense Valley in Western Pomerania apparently indicate this for the first time in Central Europe. Bronze Age material from the middle area of the River Tollense is comprised of a find layer with skeletal remains from humans and animals, partly with traces of violent injuries. Furthermore, the density of bronze finds in the area is very high with more than 250 pieces in sum, many of which come from period III. Specific object groups arouse special interest because of their assumed context with the battle site. So the amount of bronze weapons and weapons-tools (38 %) is quite high. The weapons include, among others, numerous bronze socketed arrowheads; meanwhile, the highest find density of such arrowheads in the southwestern Baltic area is to be found in the Tollense Valley. The PhD thesis "Unruhige Zeiten – Von der älteren zur jüngeren Bronzezeit im Gebiet zwischen Müritz und Oderhaff" deals with these topics. The thesis investigates the interesting time span between 1300 and 1100 BC and pays special attention to the metal finds in northeast Germany. In addition, trans-regional influences and impulses are considered in order to place period III in northeast Germany within a Central European context. It is closely connected with the research project "Death in the Tollense Valley", funded by the DFG (German Research Foundation) and under the direction of Dr. D. Jantzen (Schwerin), PD Dr. J. Orschiedt (Berlin), Prof. Dr. J. Piek (Rostock), and Prof. Dr. T. Terberger (Hanover). Material and preliminary results from current research on bronze artefacts from the Tollense Valley, especially Period III weapon finds, are presented here.

Inzersdorf ob der Traisen and Franzhausen-Kokoron: Burial grounds of the Middle Danubian Urnfield culture from Lower Austria

Michaela Lochner (Institut für Orientalische und Europäische Archäologie, Österreichische Akademie der Wissenschaften)

By means of a selection of burials of the older and younger Middle Danubian Urnfield culture (Inzersdorf ob der Traisen and Franzhausen-Kokoron, Lower Austria) an attempt is made to interpret the archaeological evidence in terms of conceptualisation, the course of interment as well as activities at the graves.
Cremation in Early Bronze Age of the Czech Republic

Miroslav Daňhel (Archaeological centre Olomouc, Silesian University in Opava)

This poster focuses on the question of cremation as a strange custom in the Early Bronze Age and at the beginning of the Middle Bronze Age (Re BA-BA2/BB1; ca. 2100–1600 BC) in Bohemia and Moravia, especially in comparison with the unified inhumation practice of the Únětice and Maďarovce-Věteřov cultures. From the Czech Republic, almost twenty cremation burials are noticed, unfortunately most of them are uncertain or problematic. The older tradition of Bell Beaker and Corded Ware cultures can explain the presence of sporadic cremation burials within thousands of evidenced Únětice inhumations. The successive Maďarovce-Věteřov culture in Moravia or the late Únětice culture in Bohemia brought evidence of a different approach to treating cremation as it was put into urns and deposited within the settlements. Settlement inhumations are characteristic for these cultures, where the particular burning of deceased was evidenced in several cases. In comparison to surrounding territories, cultures of the Carpathian Basin seem to inspire local populations to adopt rites of cremating the body in the ReBA2/BB1 horizon.
Abstracts Session 4

From the East to the West – Palaeoethnography of the Late Palaeolithic Tanged Point groups

Where have all the flowers gone? Vegetation and environment in the Allerød/Younger Dryas/Holocene transitions

Morten Fischer Mortensen (National Museum of Denmark, Copenhagen)

The onset of the Younger Dryas was one of most abrupt and severe climatic shifts occurring since the immigration of modern humans into Europe and brought major changes in both flora and fauna. The trees, which had spread into the northern part of NW European plain during the Allerød, disappeared as its mild climate was replaced by the extremely low precipitation of the first half of the Younger Dryas and resulted in the drying out of many wetlands. Large forested areas were replaced by open landscapes dominated by grasses and herbs and the elk and giant deer of the forest were replaced by reindeer. For the Late Palaeolithic cultures it meant a changing world where well-known resources disappeared, whilst new ones emerged. The transition to the cold GS-1 is dated in the Greenland ice cores to ca. 12.850 cal BP, but this does not necessarily date the transition from the Allerød to the Younger Dryas. Palaeobotanical research shows that this transition often occurred a few hundred years later. A similarly delayed transition in the vegetation is also seen at the shift between the Younger Dryas and Preboreal periods. The climatic and landscape conditions available to humans during the Allerød, Younger Dryas and Early Holocene are discussed with a focus on the Danish region.

Younger Dryas vegetation patterns of Central Europe

Martin Theuerkauf (Institute of Geography and Geology, University of Greifswald)

The extreme cold of the Last Glacial Maximum has rendered the European lowlands north of the Alps largely treeless. Warmer conditions of the Lateglacial, starting at 14.600 cal BP, enabled trees to expand so that by the end of the Allerød warm period, Central Europe was again largely forested. The forests were dominated by birch and pine, yet also other trees, such as poplar and willow, were present. This presentation explores whether and how these newly established forests were affected by the cooling of the Younger Dryas interglacial, starting at 12.700 cal BP. A dense network of pollen data across Northeastern Germany shows that the response to the Younger Dryas cooling differed markedly between sites north and south of ~ 53°N. At the northern sites, tree pollen deposition declines sharply to values that indicate survival of, if at all, only scattered tree stands. At the southern sites, tree pollen deposition changed limitedly with the onset of the Younger Dryas, suggesting that forests were hardly affected by the cooling. Possible responses in further areas and causes for that differential response will be discussed. The presentation will furthermore focus on the nature of the open vegetation. As the climate of the Younger Dryas has no analogues today, (open) vegetation may have also been unique and not clearly attributable to, e.g., the steppe or tundra type of vegetation. Due to their low pollen productivity, many herbs and grasses are poorly represented or absent in the pollen record, which hampers the reconstruction of open vegetation particularly when pollen percentage data is used. We thus discuss similarities between the Younger Dryas vegetation of Central Europe with modern steppe and tundra vegetation using pollen accumulation data. Finally, the climate of the Younger Dryas is considered to be non-uniform, thus rather characterised by repeated short excursions to warmer conditions, namely during its second half. Whether these excursions affected the vegetation of Central Europe will be discussed.

The Younger Dryas in North-West Europe: Deconstructing the monolith

Sonja Grimm (MONREPOS Archaeological research centre and museum for human behavioural evolution, RGZM)

The last stadial period is correlated in the North-West European terrestrial records with the Younger Dryas. This period is often considered as a monolithic event. However, the general climatic development of the more than 1000 year-long period was variable. Moreover, this variability had different effects across this wide geographic area, depending on the exact geographic and topographic position. Climatic, geographic, and environmental effects, such as strong winds, rising sea levels, coarsens accumulation, and the opening of the previous light forest landscape, forced Lateglacial hunter-gatherer communities to react and also affected the preservation conditions of their remains. This paper presents a detailed development of global and regional
climatic conditions, landscape, vegetation, and fauna in selected key areas of North-West Europe and compares these results to the archaeological record to understand the essence of what we can learn from this record about human behavioural development during the (thus far) last stadial period.

**Tanged point finds from Latvia, eastern Baltic**

Ilga Zagorska (Institute of Latvian History, LU, Latvia; presenting author), M. Winiarska-Kabacinska, Archaeological Museum in Poznan, Poland

The territory of the eastern Baltic, including Latvia, is characterised at the very end of the Late Palaeolithic as a region of Swiderian cultural traditions. The most diagnostic components of the flint assemblages are small tanged points, i.e., flint arrowheads with a clearly distinguishable, ventrally retouched tang and symmetrical shoulders, mainly made from long blades obtained from double-platform cores. Flint arrowheads have been recovered as stray finds on the banks of two major rivers – the Daugava and the Lielupe – flowing from south to north. The site richest in such arrowheads was the Late Palaeolithic settlement site of Salaspils Laukskola, located not very far from the shore of the Baltic Ice Lake. Altogether 47 flint arrowheads were found. They were present in every one of the six excavated flint concentrations, denoted in Polish terminology as "ksemenietsas", producing between three and eleven such artefacts. The tanged points vary in shape and size, in some cases also revealing slight Ahrensburgian influences. Traceological analyses of these tanged points, performed by M. Winiarska-Kabacinska, has shown that most of these artefacts were undoubtedly arrowheads, although some of them were used as knives or for drilling and engraving bone and antler. All of the tanged points were made of good-quality flint, imported from areas located to the south, even from quite remote regions (chocolate flint). These finds represent groups of very mobile people – reindeer hunters – and present-day Latvia was the northeastern limit of their habitation on the Great European Plain during the Late Palaeolithic (Younger Dryas).

**Kraków-Bieżanów site 15: The Late Palaeolithic settlement of Swiderian culture in the light of spatial, functional and comparative analysis**

Katarzyna Pyżewicz (Institute of Prehistory, Adam Mickiewicz University in Poznań; presenting author), Damian Stefański (Archaeological Museum in Kraków; Institute of Archaeology, Jagiellonian University), Kamil Serwatka (Department of Archaeology, Wrocław University)

Kraków-Bieżanów is a complex of the several Late Palaeolithic archaeological sites. It is located in Subcarpathia in Southern Poland on the southern slope of the Vistula Valley. Together with tens of other sites in the vicinity (e.g. Tyniec, Przeginia Narodowa, Zagacie, Kraków-Kurwanów, Kraków-Borek Fałęcki, Kraków-Kobierzyn, Zakrzym) it forms the Swiderian settlement complex in this region. The vast rescue excavation carried out there (1999–2008) uncovered a dense hierarchized pattern of Swiderian culture settlement. This paper focuses on the western and central part of the site where a few concentrations of lithic materials and a structured functional zone were registered. The spatial analysis of basic tool components shows that it is possible to encircle separable areas composed of tanged points or scrapers and burins within a functional zone. One of the goals of this paper is to research a relation between the spatial features to look for the possible land use pattern. Another goal is a functional analysis of individual features to prove the hypothesis of the complex activity of the Swiderian community which were performed at the site (killing, butchering, seasonal inhabitancy). The applied research method was a combination of the experimental method and use-wear analysis of selected flint artefacts. During our studies, special attention was paid to Swiderian points which were undoubtedly subordinated to specific projectile requirements which allowed them to function properly as elements of hunting weapons. Simultaneously, it is also claimed that projectile tips carry specific social information which may be embedded in their design as cultural markers or the characteristic element of chaîne opératoire. Likewise, the morphology of a projectile point can contain attributes of a specific style according to which it was crafted by an individual producer. In order to assess the stylistic variance of the studied assemblage of Swiderian points, we conducted a quantitative comparative analysis of point outline shapes based on geometric morphometrics. In this manner, the outline shapes of the points from Kraków-Bieżanów were compared each other but also with specimens from other archaeological sites in the course of principal component analysis.
Ahrensburgian and Svidarian societies – together or separate?

Iwona Sobkowiak-Tabaka (Institute of Archaeology and Ethnology Polish Academy of Sciences)

Notwithstanding the increased awareness of archaeologists regarding the deficiencies in the classical definition of archaeological culture centred on its material technical and utilitarian aspect as well as the development of archaeological theory, similarities or differences in the production or decoration of artefacts found within a defined territory still remain the main criterion for the identification of archaeological taxonomic units. The similarities between the inventories of the Ahrensburg and Svidarian cultures were recognised as early as the 1930s by several archaeologists, e.g., L. Zotz (1931) and L. Rothert (1936). The validity of distinguishing two distinct cultural entities, i.e., the Ahrensburgian and the Svidarian cultures, was challenged in the 1970s by R. Schild. The resemblance between the technologies, the typology of tools and the frequency of shared individual categories of tools prevent the establishment of a sharp boundary between them. Straddling both these units, a term ‘Pedunculated Tanged Points Technocomplex’ was therefore put forward as a way out of an impasse. The similarities in the two inventories of the two taxa stemmed from the adaptation of both groups to comparable environmental conditions, i.e., tundra, park tundra and the sparse forests of the Younger Dryas (Schild 1975). Nearly 25 years later, M. Kobusiewicz introduced the concept of the ‘Svidarian-Ahrensburg’ complex on the basis of the comparability between the technology, typology, the quantity of particular tool groups, as well as the types of harpoons and their decoration with identical ornamental motifs. A number of archaeologists believe that a method of forming a tang of a tanged point by removing a bulb using the technique noticed by W. Taute (1968, 178), i.e. the so called Zwilingskerbtechnik, is a distinct feature of the Ahrensburgian inventories. The problem of automatic cultural qualification in the use of terms such as the Svidarian point or the Ahrensburgian tanged point impelled L. Kokoń (1987) to distinguish the so-called neutral types, numbered 1-4, the name of which, unlike traditional terms, are free from all kinds of associations. The author believes that the abundance of flat retouch on the bulbar face of tanged points is the manifestation of the cultural differentiation of the Lowlands over time, conditioned by the preferences of groups inhabiting the area. This differentiation ultimately resulted in the emergence of two stylistic and instrumental centres. One of the major problems an archaeologist of the Paleolithic struggles with is the ‘cultural labelling’ of Late Palaeolithic insets with the concurrent ignorance of their symbolic significance, as comprehended by various groups living at the time. In fact, we are forced to contend that the typological diversity = cultural diversity (Schmitt 2007). Yet, it is reasonable to conjecture that it could have been otherwise...

Same same but different – Ahrensburgian and Swiderian in the area around the Middle Oder River

Katja Winkler (Graduate School Human Development in Landscapes, Kiel University)

During the Younger Dryas, the region around the middle Oder River was settled by hunter-gatherer populations of the Tanged-Point-cultures. The known groups in this area are the Ahrensburgians and the Swiderians. The major visible difference between them consists in the tanged points used for hunting without a ventrally retouched tang to the west of the Oder River (Ahrensburgian), and of points with a ventrally retouched tang (and sometimes a willow-leaf shape) to the east of the Oder River (Swiderian/Masovian). Each type occurs far into the territory of the other. Within the framework of a PhD-Thesis, the analysis will investigate the Younger-Dryas in the area of the middle Oder River, which encompasses the regions of Brandenburg and Saxony in Germany and the Greater Poland Province in Poland up to the Vistula/Wartha. One goal of the project is to examine if there are technological and / or typological attributes to distinguish these groups from each other or to detect similarities. Implementations can appear equal in their shape, but the modes of production could be very different. If the method and the type of production is transmitted within a cultural group, then research on production technologies could be very helpful to discover cultural similarities or dissimilarities of artefact assemblages. The presentation will highlight some selected sites with typical Ahrensburgian and Swiderian inventories and provide preliminary results of the analysis of the ongoing PhD-project.

The Bromme culture – fact or artefact?

Felix Riede (Aarhus University)

The Bromme culture is one of the oldest – in terms of its antiquity and its research history – Late Glacial tanged point groups in Northern Europe. It is often considered to be rather well represented in the region’s archaeological record and to be quite well understood. Most scholars place its core area in Southern Scandinavia with various geographic ex-
Evidence of Long-Blade Industries (LBI) in Scandinavia
Mikkel Sørensen (University of Copenhagen)
With a starting point in the LBI-site Nørregaard VI located in central Southern Jutland (Denmark), this paper presents an updated overview of LBI inventories found in Scandinavia. The focus is placed on excavated assemblages as well as single finds of long blades produced in a late Palaeolithic/Ahrensburgian lithic concept. From technology, armature typology and radiocarbon dating it is further argued that the LBI in Southern Scandinavia is a cultural phenomenon that is related to the late Ahrensburgian – Mesolithic transition.

The extreme end of the Upper Palaeolithic in Normandy: Example from two sites (Calleville and Alizay, France)
Miguel Biard (University of Copenhagen)
The sites of Calleville and Alizay belong to a pivotal chronological period for which the evidence becomes increasingly numerous in Haute-Normandie: the Younger Dryas. These Lateglacial occupations of the valleys of the Beak and the Seine made it possible to highlight a singular lithic production, the big tendencies of which can also be found in the contemporary cultural facies (Ahrensburgian, Beloisien, Laborien) but to which very interesting and rare elements in France are added. One of them concerns the joint presence of small projectile implements stemming from a production of small bladelets and of the classic big regular blades. The projectile implements, in particular, are of a totally unpublished type in the outfit of the lithic assemblages of the French Younger Dryas for the site of Calleville. Realized on the medial part of regular small bladelets with rectilinear profile and presenting a concave oblique truncation, they evoke certain Ahrensburgian productions of the North of Europe. At Alizay, two types of projectile implements were recognized for the first time in the west of France. The projectile implements at this site are characterized by the presence of bitruncations realized on wide and fine small bladelets and also by points with a straight and rectilinear back, the so-called points of Blanchères, realized from narrow small bladelets. As for blades, they are large-dimensional and seem to have been used raw or were sometimes transformed into tools. This report is unusual in the context of workshops and supports the hypothesis of an area of housing/domestic environment, already supposed from the presence of tools. Their obtaining by a hammerstone asks for a good management of

Blade technology in Ahrensburg culture – a comparative study of four sites
Inger Marie Berg-Hansen (Museum of Cultural History, University of Oslo)
The lithic tools of the Northwest European Ahrensburg are well known through the works of Wolfgang Taute and Alfred Rust, among others. The blade production methods have received less attention, despite their central role in the lithic technology of this group. The paper presents results from a study of these production methods. Using the chaîne opératoire concept and dynamic-technological analysis as a methodological basis, a detailed attribute analysis has been carried out to define and describe methods of blade production within four sites from Northwest Germany and Denmark. Building on this, as well as refittings of the Alt Duvenstedt LA121 assemblage, it has been possible to identify several characteristics of the blade production methods. The Alt Duvenstedt LA 121 is one of the oldest known Ahrensburg sites, and there has been a debate concerning its relation to other Ahrensburg assemblages. The recent study provides an opportunity to discuss this relationship from a technological perspective.

tensions both westwards as well as eastwards. This paper takes a source-critical perspective and argues that the prehistoric reality of this techno-complex can, in fact, be seriously questioned. A close examination of the Bromme culture’s research history and its constituent source material shows that a special ‘palaeoethnic’ identity based on its Leitfossil, the large tanged point, and separate from the larger arch-backed point complex cannot be maintained. Instead, the Bromme culture remains a spatially and temporally highly restricted archaeological phenomenon defined only by the absence of uniquely derived material culture features. Explanations for its emergence and disappearance reference the turbulent climatic and environmental conditions of the late Allerød and early Younger Dryas. In contrast to previous notions, the dating evidence currently available from both Southern Scandinavia and further afield make it unlikely that the Bromme culture played a significant role in the emergence of the techno-complexes characterized by small tanged points (Ahrensburgian/ Swiderian).
the volume and elaborate technical processes that the numerous refit complexes show. This mode of knapping reveals high technical know-how with precise objectives for the production of standardized laminar blanks. If the absence of fauna is one of the characteristics of the Norman sites, the site of Alizay breaks the rule. Indeed, associated to 4204 lithic remains are 400 faunal rests studied by C. Bemilli. The fauna, composed of aurochs associated to a unique shed reindeer antler, raises the question of the environmental conditions contemporary to the occupation. The presence of several animals and the spatial organization of the artefacts clearly indicate that the main function of this occupation of short duration concerned the acquisition and the treatment of game. Insisting on the homogeneity of the lithic assemblage and the presence of faunal rests at the site of Alizay, the paper enables answers to certain regional or even European typotechnological and environmental problems that the transition exhibits between the end of the upper Pleistocene (final upper Palaeolithic) and the beginning of the Holocene (old Mesolithic) around 10000 BC.

It’s all about volume – New observations on initialisation and progression of core reduction at the Belloisian site Donnemarie-Dontilly (Seine-et-Marn)
Mara-Julie Weber (Centre for Baltic and Scandinavian Archaeology, Foundation Schl.-Holst. Landesm. Schloss Gottorf), Boris Valentin (Université de Paris 1 & UMR 7041 ArScAn)

At the Pleistocene-Holocene transition, strong analogies exist between the lithic productions of the Long Blade Assemblages, Belloisian and Ahrensburgian in North-West Europe and even those of the geographically distant Swiderian and Laborian. Therefore, the interpretation of a "technical globalisation" has been proposed, despite regional differences in the lithic projectile implements. In order to evaluate the actual degree of relatedness between these traditions, it is necessary to carry out a comparative investigation comprising technological and economic analyses. More precisely, the technological analyses investigate the similarities and differences in the methods of core reduction as well as in the characteristics of the intended blanks. With this paper, we intend to contribute to the comparison of core reduction methods in the following ways: firstly and from a methodological point of view, we will consider the conditions for and the benefits of the analysis of initialisation and progression of core reduction and propose a new, generally applicable terminology for the description of these aspects of core reduction; secondly and focusing on the last Palaeolithic traditions, we will present new observations on the initialisation and progression of core reduction at the Belloisian site of Donnemarie-Dontilly (Seine-et-Marn, France) in the south of the Paris Basin. Primarily based on numerous refit complexes, the observations on the lithic industry from Donnemarie-Dontilly indicate that a dissymmetric progression has been chosen frequently on purpose, potentially with the aim of producing relatively large but flat blades. Preliminary comparisons with other Belloisian and related industries seem to confirm the impression that progression represents a key element for the understanding of Belloisian intentions, as we will briefly show. In terms of a hypothesis, the way of organising core reduction depending on the original raw material volume may be in many cases discriminatory of prehistoric traditions.

Picture of Swiderian core processing as viewed by “refitting calculus”
Witold Migal (State Archaeological Museum Warsaw)

Flint analysis using refittings has become a firmly established method for over 40 years. Basically, we can observe several applications of it, whereby two of them seem to be the most important – the spatial analysis of explored/examined sites and technological conclusions. However, for some time, we see more and more restrictions on the use of this method for technological comparisons. It seems that the possibilities/abilities of technological conclusions (except the obvious ones) are unfortunately limited and in recent years it has been a disincentive for many researchers – I was no exception. In my opinion, this situation is associated mainly with a human disability in spatial-temporal perception. Conjoining together broken pieces of flint we can make mental time and space shift to the original manufacturer, his movement and behaviour. In the process of making refitting, we remain in the subsequent sequence of time-space and we are not able to break out of our fourth dimension. Thus, we are not able to compare results of the two refittings made by ourselves, in terms of the processes which have taken place during the knapping of flint. As results of hard work, patience and commitment of many investigators, we get impressive examples of original cobbles. Most researchers are trying to deal with this somehow. In fact, the only way to find out is to describe the results of a scrupulous operation in the middle of doing it. Unfortunately, while reading these descriptions we imagine changes of space
Experiments with tanged arrowheads of flint: Use wear analysis as a method to improve archaeological interpretation

Peter Bye-Jensen (University of Southampton)

Use-wear analysis of prehistoric lithic tools is fundamental to understand questions about tool functionality, kinematics and general use. Many flint tools have a bias connected to their typology and morphology that can be understood by means of this interpretive analysis. The case study of my initial research has involved projectile points, tanged arrowheads from the Scandinavian Middle Neolithic Pitted Ware culture. This research has questioned the use of type A tanged arrowheads relating to the internal morphology of this type of projectile. In relation to Palaeolithic projectile points, there is much typological correspondence and, therefore, these tanged arrowheads will serve as proxies for the Late Palaeolithic projectile points. Use-wear analysis of projectile points can be used as a tool in intra-site analysis, e.g. to establish if the projectile points have been fired or not. Furthermore, there is a potential that questions about plausible activities at sites can be answered with use-wear analysis, e.g. to determine whether shafting or re-tooling was a part of a site’s function. Through this paper I will demonstrate different tentative approaches to explain these questions via the method of use-wear analysis.

Making bows and arrows in a cold environment: Greenland Thule archery as a case study

Sebastian Johannes Pfeifer

The bow and arrow is an especially challenging traditional weaponry system: During the shooting process all parts are under great mechanical stress and must be tough enough to handle tension and compression forces and to efficiently store and transmit energy. Thus, only the most resilient biological raw materials can be used. Yet, there are ecosystems where high-quality material at first glance is scarce or even absent – the arctic tundra being possibly the most prominent example. Low temperatures also make biological materials brittle and do not favour gluing. In spite of this, archery has had a long and vital tradition throughout the North American and Siberian Arctic. The Greenland Thule culture (ca. 1200–1900 AD), for example, made extensive use of the bow and arrow as a main weapon for hunting land mammals, primarily caribou and musk ox, until firearms became available in the 18th and 19th centuries. By using complex joining, backing and reinforcing techniques, conifer driftwood, caribou antler, and baleen were transformed into efficient, high-weight hunting weapons. This paper summarizes the results of raw-material, metrical and technological analyses carried out on the extensive archaeological and ethnographic archery equipment from Greenland which is archived in the collections of the National Museum of Denmark. In a technological case study, possibilities on how to make functional bows and arrows in a cold environment with limited resources can be illustrated.

Bow and arrow technology in the Ahrensburgian: Technological and experimental aspects

Harm Paulsen

The to date oldest direct evidence for the use of the bow and arrow originates from the Stelmoor kettle hole in Schleswig-Holstein (Germany), where the Ahrensburgian cultural layer yielded about 100 wooden arrow shafts and foreshafts during excavations in the 1930s. These arrows, which were destroyed in an air raid in 1944, were made of pine wood and consisted of two parts, the actual shaft and the foreshaft, which were fixed to one another by a dove-tail connection. Nocks at the basal ends of the shafts indicate their use in combination with bows, while basal fragments of Ahrensburgian tanged points that were found inserted in grooves at the apical end of a few foreshafts prove that this type
of projectile implement armed the Stellmoor arrows and illustrate the way it was hafted to them. In order to study the hafting technique as well as the dovetail connection in detail and to observe the way the arrows react in contact with prey, replicas of the Stellmoor arrows were produced and shot in experiments. The results of these experiments will be presented in this paper next to a technological description of the arrows. Based on the type of lesions, inferences on the power of the bows that were presumably used will be made, and the question of composite bows will equally be discussed.
Abstracts Session 5

The organization of social space:
Late Neolithic and Chalcolithic domestic spheres of Southeast Europe and the Ponti

Some basic units of Trypillia megasite structures
Mykhailo Videiko (Institute of Archaeology NAS of Ukraine)

In recent years, detailed plans of a few Trypillia megasites, such as Maydanetske, Nebelivka, Talianky, Dobrovody and Petreny, appeared. Overall, the plans were well visible, not only including the general planning in circles, ovals or streets but also on the level of houses. One of the common features is the grouping of 3–11 houses, placed within 0.5 –2 m and a distance between groups of 5 and more meters. Pits, related to houses, were located within a few meters from the short side, sometimes in one line. When these plans were published, the main idea was that these small groups (clusters of houses) were related with some social units. It is clear that for more detailed reconstruction we need more field explorations, as wide as possible. Now we have some excavation experience with such units, which can be helpful in the future. First time clusters of houses were investigated at Volodymyrivka by T. Passek (1946), but results of this excavation became clear only 40 years later. From 1974–91, linear clusters of houses were explored at Maydanetske by N.Shmalij – with central and second rows of houses (including few pits). A large part of similar structures were also investigated at Talianky since 2000 by V. Kruts, including the large clay-pit. So we have samples of such clusters from three different sites, dated by BII (Volodymyrivka) and CI (Maydanetske, Talianky) stages. It means that there was a long tradition of social organization – around 500 years according to C14 dating. At Maydanetske, in 1986–1996 were explored (partly or whole) remains of 26 burnt houses and 8 pits were explored (partly or whole) from 1986–1996. Additionally, 5 were unexcavated, but determined by magnetic prospection. All of them were located at the second (from center) row of houses. All pits, except two, were located under remains of houses. Two of them belonged to the previous stage of the site – one was filled with remains of burnt houses. The rest were related with some activities from the second stage, as also all the explored houses. All houses were two-storied, and some of them were connected at the level of the second floor. It was well visible that this part of the village was erected and later burnt at one moment. So we have all reason to consider the explored clusters as some units, which existed at one period. For this part, we can determine not less than 3 clusters of houses. The most visible were clusters around houses “Π” and “Ἄ”. Groups included houses of different size: from 70–90 m² (on two floors) up to 120–300 m² (the largest). The largest houses located at some distance, filled by smaller. All houses had one fireplace on the second floor (except “Π” – two). It means that only one room in each case was suitable for living. It is possible to recognize smaller houses as different households. The largest houses were different not only in size, but also according to finds: here more pottery (including ritual binocular vessels) and clay figurines were found. Under house “Π”, a pit was explored with more than 40 fragments of human figurines. In two large houses, clay loom weights were also found. So these houses possibly were economical and ritual centers of clusters of houses. Explorations of other house clusters at Maydanetske and Talianky provided a similar picture. The further explorations of such basic units must include not only houses, but all surrounding areas. Taking into account the current rate of excavation, the study of at least one such group may require significant effort and expenses.

Kilns and their distribution in Tripolje settlements: Tracing the labour division and the social organization of Copper Age communities
Knut Rassmann (Deutsches Archäologisches Institut, Römisch-Germanische Kommission; presenting author), Aleksey Korvin-Pirotovskij, Johannes Müller

The richly decorated and seemingly professionally produced Tripolje ceramics are classified as products of specialists. However, the spatial organisation of this seemingly specialist trade (within settlements) remains unknown. By understanding the location of kilns in the context of other significant structural elements, the spatial and social organisation of giant settlements can be reconstructed. Essential for this research is high-resolution geomagnetic data. Its potential can be seen in the recent geomagnetic prospection of Talianki and Maydanetskoe, where characteristic circular anomalies were classified as potential kilns. The first excavation of these features in Talianki by V. Kruts and A. Korvin-
Piotrovskij confirmed this assumption, as well as recent excavations in Maydenetskoe and Nebelievka. The combination of large-scale geomagnetic surveys and excavations creates a data set that helps to understand not only "kilns" but also the organization of pottery production in a more complex technological, economic and cultural dimension. The authors of this presentation will therefore discuss and compare different data sets from Talianki, Maydanetskoe and Petreni in order to socially and spatially understand Copper Age pottery production.

Defining social space inside Tripolian megasites: An architecture-sociological approach
René Ohrtrau (Graduate School Human Development In Landscapes, Kiel University)

The renewed survey of large chalcolithic settlements in Ukraine produced methodological opportunities for advanced spatial analysis of social space, which are presented in this talk. With up to 2000 buildings, their exact locations, sizes as well as a structural overlap of only 1% of the settlements of the Tomashovskaya local group represent an exceptionally high quality dataset which is hard to find in prehistoric Eurasia. Now it is possible to use methods developed for urban planning processes, namely space syntax analysis in combination with radiocarbon dating and demographic estimates to construct cognition-based social space for these settlements. With significant differences in building size, it is also possible to pose questions on inequality and access control over these social spaces. Based on these results, a social structure model of these sites is proposed.

Socio-political landscape of the Western Tripolye populations in the Southern Bug and Dnieper interfluve
Aleksandr Diachenko (Institute of Archaeology of the NAS of Ukraine), Francesco Menotti

Trajectories of development of socio-political and economic organization, along with the transition from chiefdoms to states and/or from rural agglomerations to early cities, are always ardently debated topics in archaeology. Our presentation focuses on the socio-political landscape of the Western Tripolye culture (hereinafter, WTC) populations in the Southern Bug and Dnieper interfluve, a region well-known for some of the largest Eneolithic/Chalcolithic settlements in Europe. Numerous studies have shown that the "state" is not an uncontested result of the evolution from the "chiefdom" [Clastres 1989; Flood 1990; Masson 1990; Semenov 1993; Yoffee et al. 2005]. However, territorial expansion that leads to the dominance of chiefdoms over their neighbours could be one of the possible ways to turn "chiefdoms" into "states" [Marcus/Flannery 1996; Spencer 1998]. Thanks to the application of models that were developed in analytical geography and spatial archaeology, it has been possible to reconstruct a socio-political landscape of the WTC in the Southern Bug and Dnieper interfluve. Interestingly enough, it can be shown that the socio-political development of the WTC chiefdoms in this area was not directed to state formation.

Cucuteni-Trypillia culture and the innovation of the wagon?
Nataliia Chub (Freie Universität Berlin/ BerGSAS)

From the distribution area of the Copper Age Cucuteni-Trypillia culture, clay models of sledges as well as models which are interpreted as wheel and wagon models are known. In my doctoral thesis, which I would like to present in the poster, I deal with these types of finds. A detailed investigation on these objects, compared with other kinds of analyses, such as chronological studies, landscape analyses and the analyses of intercultural contacts, should shed light on the question if the area of the Cucuteni-Trypillia culture could have played a significant role in the invention and distribution of the innovation of the wagon. In particular, the so-called mega-settlements in the interfluve of the Dnipro and the Pivdennyi Buh are notable. The major amount of sledge models was found in Talianky. For this settlement, two chronological stages could be worked out on the basis of the available radiocarbon dates. New data will be gained in the next excavation. Thus, this settlement offers very good opportunities for further investigations on the settlement dynamics. Such investigations are currently being carried out by different researchers and research groups. These investigations and the detailed analysis of the clay models, embedded into the domestic sphere of the settlements, will surely enrich one another and contribute to resolving the questions about the organization of social space in the settlements of the Cucuteni-Trypillia culture.

The sacred component in the interpretation of remains of buildings of Trypillia-Cucuteni
Nataliia Burdo (Institute of Archaeology NAS of Ukraine)
Remains of dwellings at Trypillia-Cucuteni sites are represented mainly by rectangular clusters of burnt daub, which included different things, especially pottery. Such objects were named "ploschadki" (by V. Khvoika) or "platforms". "Ploschadka" is a complicated archaeological item, which reflects different events related to the history and life of the ancient population. For a long time, archaeologists mainly focused on excavations of these objects, which provided rich and impressive finds. Also for a long time, data from these investigations was used for economical and social reconstructions of Cucuteni-Trypillia without any proviso. Archaeologists also focused on the question of the reconstruction of the ancient houses. At this moment, they recognized that "ploschadki" are not only remains of dwellings, but some kind of sacred objects. There are three main specific features which characterized this kind of remains of dwellings: 1) One–two (or more) layers of burnt clay with remains of interior items (ovens, fireplaces, bins, altars, etc.) mixed with complete or broken pots, different tools, and figurines. 2) Recorded strong firing (sometimes more than 1000 °C) of clay building and interior elements. The same situation is relevant for the above mentioned finds. In all, it means that houses were burnt with their inventories which were inside the structures. 3) Finds inside the burnt houses are numerous (especially pottery). The character, the number and the nature of these finds, such as complete vessels of different forms and types, clay figurines, tools (including copper items), has led some researchers to conclude that they unearthed ancient tombs. More than 3000 of the Precucuteni-Cucuteni-Trypillia sites (dated from the V-IV millennia BC) are represented by such kinds of remains, which eliminates the assumption of the destruction of the explored houses as a result of accidental fires or military activities. On the one hand, it is well visible that all the "platforms" are remains of houses (differing in size and construction) that were built using timber and clay. Some of the elements, such as fireplaces, ovens and altars, were burnt during processes of use. But the burning of a whole construction was connected with some special event. The placing of numerous inventory items was associated with such events. The main reason for such placing, from our point of view, was some ritual, which included the burning of single houses or entire villages, including megaliths. It is well visible that as archaeological objects "ploschadki" have dual natures: everyday and ritual. So, if we want to study/reconstruct some economical activities, social features etc., based on explorations of these kinds of house remains, we need to separate features related to the everyday life of the houses from ritual deposition. From this point of view, we need not study only "platforms" now, but as much as possible areas around such objects, such as different pits or "working places", not only to make the difference between ritual and everyday activities clear, but to expand our knowledge in both areas.

The Werteba Cave In Bilcze Ztote: A subterranean sanctuary of the Cucuteni-Trypillya culture in Western Ukraine
Sławomir Kadow (Institute of Archaeology and Ethnology, Polish Academy of Sciences, Kraków, Poland), Dalia Pokutta (Gothenburg University, Sweden)

The idea that caves held ritual significance in later prehistoric landscapes has long been noted, and, in the case of western Ukraine, has been driven by the dedicated interests of few archaeologists in the nineteenth century, such as Włodzimierz Deme-trykiewicz and Gotfryd Ossowski, first explorers of the Werteba Cave. In this paper, we discuss the function of this cave as a subterranean sanctuary of the Cucuteni-Trypillya culture in Ukraine. The Werteba as a sacred place was governed primarily by religion and ritual, but it shows that in global terms the complexity of the system of mortuary differentiation increases with the complexity of the society at large. The discovery of disarticulated human skeletal remains in the Werteba cave affords a unique opportunity to study the lives, deaths and cultural practices of the Trypillya culture communities. This paper targets the role and character of some ritual activities in the cave and the questions of how and for what reason this particular cave was modified from natural space into sacred place. The underground sanctuary of Werteba was without a doubt a rallying point of both religious and social significance. We seek to clarify the research potential of the Werteba cave in relation to some sociological theories with direct implications for the Cucuteni-Trypillya social structure.

Geomagnetic prospection on Tripillian sites in Central Ukraine
Thomas Saile (presenting author), Maciej Dębiec, Martin Posselt (all Universität Regensburg, Lehr- stuhl für Vor- und Frühgeschichte)

In 2011, we started an international project focusing on the Linearbandkeramik (LBK) in its eastern area of distribution. As a part of it, we conducted extensive field walking, small scale excavations and geomagnetic prospection on several areas and sites in Volhynia, Dniester basin and Southern Bug basin. On
researched areas we also encountered Cucuteni-Tripolye materials. We would like to present a first glimpse on the obtained data regarding this Eneolithic complex. We will focus mainly on two sites where extensive geomagnetic research was carried out: Bilsziwcy and Kamyane-Zavalija. Bilsziwcy is located on the bank of the Gnila Lipa River in the Dniester Basin. The site has been excavated for several years by Taras Tkachuk. It produced LBK materials and structures and finds from different phases of the Cucuteni-Tripolye Complex, in particular of the zalishchiki local group from the BI-BII stage, of the Shipinci local group from the CI stage, and of the koshilivci local group from the beginning of the CI stage. Geomagnetic prospection covered an area measuring approximately 5 ha. We were able to distinguish at least 3–4 remains of burnt clay houses from the Cucuteni-Tripolye Complex. The second site, Kamyane-Zavalija, is located on the banks of the Southern Bug in the Savran Region. The site was discovered by V.N. Stanko in 1974. Since the beginning of the new millennium, the site has been systematically surveyed by O.S. Peresunchak and Dmytro Kiosak. It yielded lots of Cucuteni-Tripolye artefacts. Also a small test trench was excavated. All the materials allowed a dating of the site to stage BI Cucuteni-Tripolye. Geomagnetic prospection was carried out there in autumn 2013, concentrating on the LBK part of the site and covering an area of about 8 ha. Unfortunately, the local geological background produced some disturbances in geomagnetic data. We were able to distinguish in a magnetogram at least two parallel ditches that belong to the Cucuteni-Tripolye Complex.

The distribution of Neolithic and Copper Age settlements in the Republic of Moldova: an overview

Stanislav Țerna ("High Anthropological School" University, Chisinau, Republic of Moldova)

On the territory of the modern Republic of Moldova, the Neolithic and the Copper Age are represented by settlement and (much more rarely) funeral sites of several archaeological cultures and cultural complexes. Criș, LBK and Bug-Dniester cultures build the Neolithic sequence, while the Copper Age is characterized by sites belonging to the Cucuteni-Tripolye cultural complex and the Bolgrad-Aldeni (Gumelnita) culture. Cucuteni-Tripolye sites refer to all of the internal relative chronological stages, namely Precucuteni – Tripolye A, Cucuteni A – Tripolye B1, Cucuteni AB – Tripolye B1B2, Cucuteni B – Tripolye B2, B2-C1 and Tripolye C2. My presentation includes data on the location, topography and dimensions of several hundreds of sites of the above-mentioned cultures and cultural complexes. The analysis of the data enabled the disclosure of the main patterns of moving and settling of early agricultural tribes in the territory between the Prut and Dniester Rivers. This process happened step by step, by means of several waves of population coming from the Carpathian-Balkan region. Both the intensity of these waves and criteria of choosing a place for settling varied. A general trend is characterized by advances along the large rivers and their inflows, a natural undertaking for early agriculturalists. Nevertheless, the analysis of type of relief and absolute heights of the locations of settlements allowed certain regularities for different cultural-chronological stages to be revealed, which can be correlated with the demographic situation and some complex social processes flowing within the respective cultural groups. In addition, an analysis of variability and the dynamics of areas of settlements from the Early Neolithic to the Late Copper Age was carried out, which enabled some interesting tendencies to be traced, which reflect the demographical dynamics of early farmers as well as the increasing complexity of settling patterns, followed by the emergence of "central places" and specializations of settlements within certain microregions. It is necessary to underline that modern research on distribution of Neolithic and Copper Age sites from the territory of the Republic of Moldova is at a very incipient stage. Further research needs to carry out large-scale work on a wide range with the active application of modern technologies of geographical data study and a complex analysis of spatial patterns.

Size, internal structure and hierarchical sequence of Copper Age settlements in Moldova: Insights into complex phenomena from recent geomagnetic prospections

Knut Rassmann (Deutsches Archäologisches Institut, Römisch-Germanische Kommission; presenting author), Alexandru Popa, Sergiu Musteata, Hans-Ulrich Voss

Between 2009–2011, the Romano-Germanic Commission was engaged in geomagnetic prospections in Moldova with a focus on the Copper Age settlement sites of Petreni, Singerei, Ochiul Alb, Horodca and Cobani. Our prospection was conducted by means of two systems from Sensys Gmbh. The research began 2009 with a 5-channel magnetometer on smaller sites and continued in 2010 and 2011 with a 16-channel vehicle-drawn magnetometer. The prospections disclosed settlements with a wide variation in size and internal spatial differentiation.
The geomagnetic plan of the largest settlement of Petreni revealed unique internal complexity of a hitherto unseen level of detail. Besides Petreni, other settlements appear smaller and less complex. Both phenomena, complex and less complex settlements, are strongly interrelated. Therefore, the research on the rise of large Copper Age settlement has to consider the smaller sites as well. This reasoning highlights the importance of our prospection of smaller sites in Singere, Ochiul Alb, Horodca, and Cobani.

Paths to complexity: Regional survey and excavations at the Late Chalcolithic Site of Bobata on the Avren Plateau, Bulgaria

Maria Ivanova (University of Heidelberg; presenting author), Petar Leshtakov (Institute of Archaeology, Bulgarian Academy of Sciences)

The Black Sea littoral of Bulgaria in the later 5th millennium BC plays a pivotal role in debates on the origins of social inequality in prehistory. Cemeteries, such as Varna I and Durankulak, with their dramatic accumulations of valuable objects, witness the transformation of the traditional egalitarian structures. The mechanisms leading to these changes represent a major topic of controversy. Scarcity of settlement data makes the interpretation of developments in the mortuary sphere very difficult. We present first results of a fieldwork project on the Avren plateau in the vicinity of Varna. A pilot season of excavations at Avren-Bobata in 2014 has revealed a one-period site of the later fifth millennium BC overlooking a major trade route from the lakes of Varna and Beloslav through the Balkan range to Thrace. Surveys suggest that the site at Bobata belonged to a chain of fortified settlements along the edge of the plateau, probably a regional network or alliance. The site lies on a prominent rocky protrusion and is enclosed by a massive stone fortification wall. The excavations demonstrated an exceptional preservation of Late Chalcolithic strata and features, in particular of burnt dwellings with in situ inventories, and thus the great potential of Avren-Bobata for investigation of the domestic sphere during the Varna period. In addition, with its one-period undisturbed sequence, the site is perfectly suited to anchor the controversial radiocarbon chronology of the region.

Spatial and social organization of a Chalcolithic tell site at Sarnevo (Stara Zagora, Bulgaria)

Valeska Becker1, Ralf Giesler1; Krum Bacvarov2; Nikola Tonkov2; Petar Leshtakov2; Friedrich Lüth3; Rainer Komp1 (1 Westfälische Wilhelms-Universität Münster; 2 National Institute of Archaeology and Museum of the Bulgarian Academy of Sciences; 3 Deutsches Archäologisches Institut Berlin, Arbeitsbereich Kulturgüterschutz und Site Management; 4 Referat für Informationstechnologie an der Zentrale des Deutschen Archäologischen Instituts Berlin)

In the course of large-scale infrastructural activities in Bulgaria, the motorway system is currently being developed and expanded. Fortunately, the construction works are preceded in most cases by archaeological excavations, which not only yield a wealth of new finds from all periods of pre- and protohistory but also enable archaeologists to gain new insights into the construction of social space and the organization of prehistoric societies. A site holding such potential was found close to the village of Sarnevo (Stara Zagora District), about 20 km southeast of the city of Stara Zagora at the foothills of the Sredna Gora Mountains. Surveys, geomagnetic prospections and excavations yielded a dense accumulation of sites from the Neolithic, the Chalcolithic, the Bronze and Iron Ages, and Roman and Medieval times. Particularly noteworthy is an early Neolithic site with white-painted pottery surrounded by a ditch, a late Neolithic ritual site and two large hitherto unknown Chalcolithic and Early Bronze Age tell sites, tell Kaleto and tell Sadakova Mogila, which border the microrregion in the north and in the south. During surveys and geomagnetic prospections, especially the northern tell, Kaleto, featured surrounding “satellite” sites dating to the same period. The place offers the opportunity to employ a range of methods for interpreting the ancient landscape. This includes thoughts regarding the physical structure – e.g. climate, relief, soils, water and the biosphere – as well as the landscape’s cultural structure, yielding both an explaining and an understanding approach. The spatial organization of tell Kaleto with its three “satellite” sites poses an intriguing problem. The tell is located in between two small streams and constitutes a striking mark in the landscape. The stray finds collected during surveys suggest a stratigraphy from the Neolithic to the Early Bronze Age. During the Chalcolithic, the “satellite” sites surrounding the tell and residing in the ancient river bends were also occupied. This might be due to a growth in population, a phenomenon which is typical for a phase of prosperity during the fifth millennium BC in

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all of south-east Europe and which is best seen at the Varna cemetery. Thus, social space was visibly organized in two different ways at Sarnevo: prominently on the tell itself and on the surrounding flat sites. We will have to ask for possible similarities and differences concerning the people’s activities or maybe their diverging social status. Especially this last thought is provoked by the fact that one of south-east Europe’s earliest copper mines, Aibunar, is located only 20 km away from the site. It is most likely that the people occupying the tell and the flat sites owned and maybe distributed this early copper. This is connected to the question about communication networks of copper at Sarnevo.

Domestic patterns of the Neolithic agricultural villages in Eastern Thessaly: A remote sensing approach

Tuna Kalayci (Inst. for Mediterranean Studies; presenting author), Simon, F-X; Cantoro, G.; Donati, J.; García, C.C.; Manataki, M.; Sarris, A.

Thessaly (Central Greece) is of critical importance for an understanding of the transformation to permanent agrarian societies preoccupied with animal husbandry and the cultivation of food-crops for sustenance. The region served as one of the gateways to what would become the widespread Neolithization of Europe which irreversibly altered the course of human history. The high density of Neolithic activity and tell-settlements (locally called magoules) in this fertile region, the early date of occupation and the various trajectories that it followed make Thessaly a crucial region for exploring and comprehending the pathways through which Neolithic culture emerged. This transformation was, however, by no means a uniform process. A recent research project, IGEAN – Innovative Geophysical Approaches for the Study of Early Agricultural Villages of Neolithic Thessaly – provides significant information on the organization of space during the Neolithic. Preliminary data exploration suggests significant differences in intra-site organization across the region. In particular, we observe considerable variations in: the dimensions and orientations of domestic structures, structural differences in enclosures/ditches, and distribution of open spaces within settlements. Furthermore, we clearly discern various developmental phases of settlements. As a result, we highlight the quantitative multiplicities of the Neolithic Period and push an agenda towards a diversified interpretation of settlements and landscapes.

Settlement and its place in the landscape – The example of Vinča

Kristina Penezić [Center for Digital Archaeology, Faculty of Philosphy, University of Belgrade]

The ongoing excavations of the prehistoric tell site of Vinča in Serbia provided insight into intrasite organization and house arrangements in the final occupational phases of the Neolithic period. Recently, some of the research focuses include the analysis of settlement size and layout, environmental conditions before and after several hundred years of Neolithic occupancy and the catchment of such a big site. Results feature the paleolandscape surrounding the site, the size of the settlement at its maximum extent and one small separated occupational cluster. This paper will investigate the effect of immense building history and changes of the landscape during the Neolithic occupation. The relationship of the settlement to its surrounding and the organization of space, both within the settlement as well as in the site catchment, will be the focus, setting a base for a social dynamics model. These results will be compared to available data from some other major late Neolithic Vinča sites.

Trajectories of demographic development in late prehistory

Robert Hofmann (Graduate School Human Development in Landscapes, Kiel University), Alexander Diachenko (Ukrainian Academy of Science, Kiev), Johannes Müller (Graduate School Human Development in Landscapes / Institute for Pre-and Protohistory, Kiel University)

To some extent, (neo-)evolutionist approaches addressing transformations of economy and social organization as well as demographic development in prehistoric populations are still dominated by comparisons to limited ethnographic evidence and early historic records (Yoffee 2005; Wobst 1978 et al.). Meanwhile, drawing an analogy between biological and social evolution suggests that the variety of developments in past societies should exceed the number of known ethnographic cases. This presentation focuses on possible meso- and macro-scale trajectories of demographic development in prehistory.
One site – several stages: Multi-faceted localities for social places at the Late Neolithic site of Polgár-Csőszhalom (Hungary)

Pál Raczyk (Institute of Archaeological Sciences, Eötvös Loránd University, Budapest; presenting author), Alexandra Anders, Katalin Sebők

This presentation will attempt to display material indicators – sets of marks and features – referring to different manifestations, organizations and structures of social space in the landscape of the settlement complex at Polgár-Csőszhalom. The site is special in the Late Neolithic of the Tisza Region between 4980 and 4475 cal BC for several reasons. Csőszhalom is known as the northernmost settlement mound in Southeast Europe. Previous research revealed here the presence of socially conditioned personal agents that interacted in the space/time dimension of the Polgár settlement complex, creating unique spatial configurations and different material distribution patterns. The archaeological record provided a specific structural framework for the practiced Late Neolithic social space in the Polgár microregion. Recent analytical results have supported previous observations concerning different human attitudes in the two main segments of the Csőszhalom site. It has become clear that a complex spatial system had existed on the settlement, represented by the duality between the tell mound, on the one hand, and by the surrounding horizontal settlement on the other. This duality manifested in many ways, e.g. in material culture, in consumption, in house and settlement structures, in ritual activities (deliberate burning, dealing with the deceased, feasting). Consequently, two different concepts of time may have been at work. It seems that the enclosed mound was the centre of ritual activities with special community organizations not necessarily corresponding to the domestic social groupings of the horizontal settlement. In our case study, we analyse the 79 house floor areas and the 123 graves of the horizontal settlement in a fine-grained AMS chronological scale. The variability in house sizes could indicate social differences among the households and the relevant use of physical loci. Most of the graves in the horizontal settlement were identified in the immediate vicinity of the buildings so they must have had special space/time relations with the houses/households. Various prestige items reflecting wealth and status were recovered from these burials. Scoring the value of prestige items and plotting them on the plan of the excavated section of the horizontal settlement, it is assumed that the prestige embodied in the burials would also reflect on the prestige of the associated households. The uneven representation of age/sex groups in the burials suggests the emergence of social subdivisions in the Polgár-Csőszhalom community that might have been reflected, among others, by diversity in the funerary practices. The scope of our research is extended to the stylistic and social characterization of the ceramic assemblages used in the house/household contexts of the horizontal and multi-layered settlement parts as well. The project was funded by the Hungarian Scientific Research Fund (OTKA) Grant 101024.

Multiregional relations and organization of social space in the Late Neolithic settlement of Bordoš, Vojvodina, Serbia (5000–4500 BCE)

Robert Hofmann (Graduate School Human Development in Landscapes, Kiel University; presenting author), Sabrina Autenrieth, Alexandar Medović, Lidiko Medović, Tijana Pešterac, Lidija Baća, Antonia Hofmann

The landscape of the Serbian Vojvodina and the adjacent parts of Hungary and Romania is the contact point of several major European river systems, among them the Tisza, Danube, Timiş, and Sava. In connection with excellent soils, this exceptional geographical location seems to be the crucial factor for the emergence of the unique multi-cultural conglomerate which characterises human societies of the region until today. Ongoing research on the site and the microregion of Bordoš near Novi Bečej close to the river Tisza reveals a comparable situation already for late Neolithic times: Settlement layout, domestic architecture, material culture, organisation of social space and the occurrence of numerous exchange goods show multiregional relations with intensive inner- and partly far-reaching inter-regional contacts and mobility.

Demographic trends in the Chalcolithic in Southeast Europe

Heiko Tiede (Graduate School Human Development in Landscapes, Kiel University)

Research in Southeast Europe on population structures and sizes can be described as a white spot on a map. Although it is clear that from 3500 cal BC Neolithic tell settlements no longer existed, we know much less about Chalcolithic settlements and their social structures. What we do know is that there are little settlements, probably in the form of villages. There are also cemeteries, but so far in questionable context to the settlements. But we also
observe burials in settlements. Therefore, published knowledge can be seen as very incomplete. Consequently, there are missing comprehensive representations of the population and their life in the Chalcolithic. Recent excavations and analyses of settlements and cemeteries in the Carpathian basin and the Balkans are now providing an opportunity to fill this gap. This lecture will discuss preliminary results on settlement and burial numbers. In addition, their densities will be presented and discussed. Furthermore, initial thinking on possible population trends will be shown.
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The Holocene history of European Mountain Landscapes – Dynamics of the environment, and settlement, resources and subsistence strategies

Highland Neolithic: The case of a different archaeology
Pawel Valde-Nowak (Jagiellonian University, Institute of Archaeology)

Through research on the quondam highland settlement, special hardships concern Neolithic colonization. There are still sonorous questions in this matter: * Did a farmer or breeder of the younger era also have to or want to operate in the highland areas? * Why did he leave strict frames of his old farm, classic enclaves? * Did his culture or his household behaviour alter while in those areas? * How can the settlement-geographical preference of the Neolithic man be defined in the highland areas? * What is the reality of researching the Neolithic settlement in the mountains? Taking up a discussion on the role of highland areas for prehistoric settlement, in respect to such early colonization of those lands, we first need to gather the hypotheses of negative tint. These include such assertions as a notion of the domination of infertile soils, climate harshness, while including comments on the reduced time of vegetation and postulating the existence of a raw-material-deserted in the mountains. Such a negative attitude inevitably ruled out a meaningfulness of the search for Neolithic traces in the mountains, and often for prehistoric ones in general. A distinct position takes some counter-hypotheses with positive connotations. They emphasize wealth and diversity of the biotope and the occurrence of raw materials that do not protrude elsewhere. Stating whether the highland positions were put at risk by the devastating power of erosion, or that it was otherwise and the positions (particularly during the Neolithic) were naturally protected from the erosion for a long time, is of fundamental significance. Special meaning for the research on the quondam settlement in the mountains is a determination of the scale, form and dynamics of the pastoral activity. As we know from geography and ethnology, this field of farming takes miscellaneous forms in the highlands. Its reflection in the archaeological materials is so dim that for many researchers it constitutes an impassable impediment. Nevertheless, archaeology still delivers continually more evidence of the activity of the Neolithic man, which nevertheless can be hardly compared to that we know from lowland and upland centers of Neolithic settlement. A combination of this information and the outcomes of the palynological analyses of mountainous peat-bogs draw a unique picture of the behaviour code of Neolithic humans. It deviates entirely from the commonly adopted view on the everyday life in Neolithic centers from beyond the mountains.

Forest cover changes and trajectories in an ancient mining area of the Pyrenees from Antiquity to the 19th century (Aulus-les-Bains, France)
Vanessa Py-Saragaglia (CNRS GEODE UMR 5602; presenting author), Jean-Paul Métailié, Bruno Ancel, Sandrine Baron, Raquel Cunill i Artigas, Didier Galop, Hugues Barcet, Sandrine Paradis-Grenouillet

This paper aims to present the preliminary results and discussions from the interdisciplinary project FODYNA, performed within the Observatory Human-Environment (OHM) Haut-Vicdessos. It focuses on past mining and ore processing cycles, and their impact on the changes to and the trajectories of woodland cover in a Pyrenean mining area from Antiquity to the 19th century. The chronology of activities is based on new archaeological and geochemical approaches, as well as several radiocarbon dates. These new approaches and dates concern mining and charcoal kiln evidence. All the archaeological remains, staggered between 1400 and 1700 m a.s.l., were spatialized and included in GIS. The archaeological observations were compared with data from historical archives, which document medieval times and the reactivation of mining activities during the 18th and 19th centuries. The past forests and their management for charcoal production were explored through historical ecology, anthracological and pedoanthracological studies that were both undertaken in the same area (Les Argentières-Lacore). These investigations also contribute to studies on the impact of charcoal burning and mining activities on soil wood charcoal assemblages. Furthermore, linking all this data with a palynological record from the peaty zone located close to the mining works, enables the woodland cover evolution to be reconstructed.
Anthemountas Valley (Northern Greece) archaeological project: Gold extraction, settlement and natural processes in a mountainous hidden landscape

Jakub Niebieszczański¹, Ivona Hildebrandt-Radke², Janusz Czebreszuk¹, Stelios Andreou³, Maria Pappa⁴ (¹ Institute of Prehistory, Adam Mickiewicz University; ² Institute of Geocology and Geoinformation, Adam Mickiewicz University; ³ Department of Archaeology, Aristotle University in Thessaloniki; ⁴ EFORA, Thessaloniki)

The following presentation provides the partial evaluation of two projects: AVAP (Anthemountas Valley Archaeological Project) and AVPP (Anthemountas Valley Paleogeographical Project) that deals with prehistoric settlement processes and their environmental conditions in a part of Central Macedonia. It is a combined Polish-Greek interdisciplinary mission towards archaeological survey recognition throughout Northern Greece. The preliminary results and project experiences in the aforementioned region show that the prehistoric societies were nearly fully self-sufficient regarding raw material reservoirs due to the valleys geological structure. An abundance of stones and minerals, such as serpentinites, cherts, peridotites or gold, shows a variety of available resources. Prehistoric settlement sequences of each site recorded in the lower parts of the valley represent direct or indirect evidence of Neolithic occupation, followed by further periods. An opposite situation is observed on the mountainous slopes, where gold mining probably brought people at the beginning of the Early Bronze Age. Visible in many outcrops, the occurrence of metamorphic and deep crust stone types, such as quartzites veins and heavy minerals, proves the existence of gold in that region. For the needs of the project, this area is named Amalara after a pasture village. It is a hidden landscape beneath the middle slopes of mountainous conditions and is characterized by Bronze Age occupation that was held on toumba, Iron Age trapeza and plateau settled up to the Ottoman period. The traces of prehistoric gold mining processes are visible in vast areas overlapping present industrial mining landscape deformations. There are several types of landform remains that suggest interest in the elite material sourcing in the past. Separate, but not unrelated, is the issue of geomorphic processes that occurred in the area throughout prehistory and modern times. The natural processes in the microregion show indeed very dynamic morphological transformations, which are proven by the geomorphological survey of profiles and observations of present processes. Hydrological influence on land relief was observable even during the few seasons of the project, changing the landscape dramatically in a very short time during seasonal downfalls. That implies the need of taking into consideration that vast areas and evidence of human influence were torn apart from their deposition places. This presentation is also concerned with the settlement processes and land preferences that vary throughout prehistory and historical times. GIS survey that was held during the AVAP mission generated information about differentiated occupation strategies across time in the mountainous landscape of Amalara.

European open landscapes – The comparison of human land use strategies of three Mediterranean mountains: Mont Lozère (France), the Sierra de Gredos (Spain) and the Monte Cimone (Italy) since the Neolithic

Marie Bal-Serin¹, Allée Philippe¹, Garcia Alvarez Salvia¹, Benatti Alessandra¹, Rubiales Juan Manuel², Mercuri Anna Maria², Garcia Amorena Ignacio², Bosi Giovanna³ (¹ Laboratoire Géolab UMR/CNRS 6042, Université de Limoges, France; ² Instituto politecnico de Madrid, Spain; ³ Laboratorio di palinologia e paleobotanica, Università degli Studi di Modena e Reggio Emilia, Italy)

This presentation aims to compare the origin of the open landscapes of pastoral mountain systems located in the Mediterranean Basin (France: Mont Lozère; Spain: Sierra de Gredos, Italy: Tosco-Emilian Apennines) since the Neolithic period. Even if the three selected mountains show several differences linked to the climate, vegetation types, and altitude, they are characterized by the change from an intense agro-pastoral and industrial exploitation to a gradual abandonment which leads to an open landscape as part of the heritage identity. In order to increase knowledge on these open landscapes and to obtain new data at a high spatial scale (the scale of the slope), pedoanthracology was applied according to an altitudinal transect and compared with preliminary data (pollen, subfossil wood, historical sources, pastoral archaeology) concerning each area. Even if these mountains shared some similarities in the use of the environmental resources, the construction and the management of the open spaces reveal some dissimilarities. The Nardus stricta grassland of the Mont Lozère, located above 1400 m altitude, is not natural and corresponds to the mountain belt recovered by an ancient beech forest that has been used and transformed by societies since the Neolithic period. At the Sierra de Gredos, the data reveal an ancient Pinus treeline, lo-
cated at around 1700 m a.s.l., and above 1700 m a.s.l., a natural open space dominated by Fabaceae since the last 9000 years BP. The open landscape of the Monte Cimone, for which analyses are in progress, seems to be the result of a long agro-pastoral transformation of the beech forest.

History of land cover change of the Harz Mountains (Central Germany) as inferred from soil charcoal analysis

Vincent Robin (Dept. TESAF, Padova University, Italy; presenting author), Hans-Rudolf Bork (Institute for Ecosystem Research, Kiel University, Germany), Oliver Nelle (Tree-ring Lab, Baden-Wuerttemberg State Historic Preservation Office, Germany)

The history of land cover change on a long time scale still appears to be poorly documented on a local scale for some areas of the Central European low mountain ranges. Indeed, due to their location at mid-altitude, the continental climate, the local topography and substratum type, these areas present hardly any wetlands necessary for long-term pollen preservation. Thus, paleoecological investigations were limited. However, improving our knowledge at infra-regional levels is important when considering that since the Mesolithic, human populations of Central European low mountain ranges were subject to important developments, having progressively more influence on the environment, and such human influences might have occurred first locally, following human development. Therefore, to improve our knowledge about human-environment interactions on Central European low mountain ranges we conducted paleoecological investigations at local scale using soil charcoal analyses. These analyses were carried out for the eastern part of the low mountain ranges of the Harz (Germany). Soil charcoal analyses enable investigations on the event-based fire and forest history in high spatial-resolution, related to evidence of soil history. 15 sequences of soil/sediment were excavated at three investigation sites within a distance of about 20 km. They were described in field and sampled, according to their stratigraphy. The samples were treated in lab to complete the soil sediment description and to extract the charcoal assemblages for quantification and taxonomical identification. The taxonomic analysis of the extracted charcoal assemblages shows Holocene woodland composition changes, from post-glacial pioneer woodland, dominated by pine, to broad-leaf closed forests, dominated by oak and succeeded by beech. The temporal distribution of AMS-radiocarbon dating of 31 single charcoal pieces indicates that synchronous fire events occurred regionally, mainly in the Late Pleistocene/Early Holocene and Late Holocene periods. Only on the site at the lowest altitude is mid-Holocene fire activity indicated by radiocarbon dating and charcoal assemblages. The radiocarbon dating is supported by the description of the sampled soil sequences, which permits the identification of Late Pleistocene/Early Holocene in situ formed soil horizons, as well as evidence of Late Holocene erosion-sedimentation processes. Finally, we postulate that climate seems to have triggered Late Pleistocene/Early Holocene fire events in pioneer woodland, while the increase of fire frequency at both local and regional scales during the Late Holocene in low flammable broad-leaf forests is interpreted as related to human activities, with an altitude chronological gradient.

Land-use in the mountainous Southern Black Forest: archaeological and palynological research

Thomas Knopf (Institut für Ur- und Frühgeschichte und Archäologie des Mittelalters, Universität Tübingen; presenting author), Manfred Rösch, Elske Fischer, Andrea Bräuning, Lucas Kämpf, Karl-Heinz Feger

The landscape of the higher Black Forest in Southwest-Germany has so far not been explored by systematic archaeological or natural scientific research. The central parts of this mountainous area with summits between 1000 and nearly 1500 m are thought to have not been settled before the High Middle-Ages. But soils on gneiss and a lower precipitation than in the Northern Black forest seem to offer better conditions for agricultural use. Some finds from the Paleolithic and the Neolithic indicate use, e.g. by hunting and transhumance. Finds of a dug-out canoe and stone coffins near the lakes Titisee and Schluchsee are dated to the 7th/8th century AD and could indicate an earlier settlement than the establishment of monasteries. A research-project financed by the German Research Foundation (DFG) analyses cores from the sediments of several lakes by archaeobotanical and geochemical methods. Additional archaeological research focuses on surveys but also small-scale excavations and GIS-analyses. Questions, approaches and first insights associated with this project shall be presented in this lecture. The first cores which were taken from Titisee and Feldsee with a base dated to around 2100 and 450 BC showed pollen of cultivated plants and indicators of settlement even in their oldest parts. Meanwhile, much longer cores have been taken from these lakes and also from the Schluchsee and the Bergsee. First archaeological
surveys in the field and analyses of LIDAR-data showed an unexpected amount of field terraces up to 1050 m and also old field soils at this altitude. A hitherto mysterious archaeological source is represented by ca. 300 stone mounds, which are found on top of the summits and ridges. As stone mounds found outside of the Black Forest have been identified as burial mounds of the Bronze Age, the Iron Age and the Early Medieval Age, the question about their function in the Black Forest remains unanswered until first excavations in 2015.

The mind in the mountain: resources and the development of marginal areas

Jan J. Ahlrichs (Collaborative Research Centre 1070; presenting author), Jessica Henkner, Thomas Knopf, Peter Kühn, Thomas Scholten

Low mountain ranges are usually referred to as 'marginal' spaces. It often seems that pre- and early historic farmers residing on fertile soils on loess avoided them as long as possible. This dichotomy is expressed in antithetic terms like 'inland/outland' or 'Altsiedelland' and 'Jungsiedelland'. However, there is no clear definition of what 'marginal' means exactly. In literature it is rather used as a vague concept for an area which is – often implicitly – perceived as (agriculturally) disfavoured. The main questions on how can we define 'marginal' or 'favoured' and how these areas were developed and settled are currently being investigated by archaeological and archaeopedological methods in the research project "Favour – Disfavour? Development of resources in marginal areas" as part of the CRC 1070 "Resource Cultures" in Tübingen. The research area is located in SW-Germany and divided into three parts: the eastern slopes of the Black Forest, the Baar and the south-western part of the Swabian Alb. A database was set up in 2014 to investigate the settlement-history of this area. It contains ca. 2000 sites dating from the early Holocene to 1000 AD. The archaeological data as well as the spatial information from the sites will be compared with studies on similar regions. In addition, ethnographic analogies are taken into account. These results indicate that the sites in disfavoured areas are more often characterized by a ritual character; e.g. the density of burial mounds on the plateau of the Swabian Alb is remarkably high. In addition, "offering sites" are known from both low mountain range areas. Our investigations will provide the possibility to identify the main resources involved in the movements and to provide models for settlement dynamics between favoured and disfavoured regions. Archaeopedological studies are performed on colluvial deposits in the research area. Since colluvial deposits are attributable to deforestation and agricultural use, valuable information on the intensity and duration of land use can be obtained from their distribution and layering. In addition, colluvia as soil archives provide information on climate history. Investigations at the fringe of the Black Forest recently proved the existence of Neolithic and Bronze Age land use and man-made colluvia dating from the 9th–11th century, which were not a matter of debate so far. These first results challenge traditional narratives of prehistoric settlement patterns in low mountain ranges, which have been influenced by an agricultural-geographical point of view. The results also indicate that each resource is embedded in a resource complex. Therefore, the valuation of soil as a resource depended on other resources such as religious belief systems or trade priorities. This point of view allows us to overcome monicausal explanations like climate change as a trigger for movements. It is also necessary to explore the theoretical concepts of such landscapes, e.g. to what extent is the research influenced by modern concepts of marginality? It is argued that the settlement of low mountain ranges has to be considered in a context of natural and cultural space; i.e. that environmental conditions have to be seen in relation to the perception of 'marginal landscapes' as a culturally defined space, where social and political reasons, especially the perception of resources, play a major role in developing and using these landscapes.

Economic frontiers: Comparing settlement dynamics, economic development and historical background of the Medieval Harz Mountains and the Erzgebirge

Johann Friedrich Tolksdorf (presenting author), Hannes Knapp¹, Rengert Eiburg¹ (1 Landesamt für Archäologie Sachsen; 2 Institut für Ur- und Frühgeschichte / Graduate School Human Development in Landscapes, Universität Kiel)

Although the mining districts of the Harz Mountains and the Erzgebirge are known to have played a decisive role in the establishment of these territories as major political powers in Central Europe and influenced the balance of power within the Holy German Empire, knowledge about the settlement history and economic development of these mountain ranges has been limited to the sparse historical record for a long time. During the last decade, intensive archaeological and palaeoenvironmental research in the Harz Mountains and the Erzgebirge have provided new insights into the economic structure and the transformation of the landscape. Here, we compile archaeological, historical and palaeoenviron-
mental data for both regions to provide a model of historical land-use strategies and economic cycles. Based on the regional models, we compare both areas to detect the characteristics trends of development and aim to identify the factors that led to the intensified settlement and landscape transformation. Besides scarce indications for prehistoric activities, evidence for the onset of mining and smelting in the Harz Mountains becomes more frequent during the 10th century both from archaeological and historical sources. Based on spectra from charcoal kilns and palynological sequences, a massive destruction of the forest vegetation is inferred which is supported by proof of increasing soil erosion. In contrast, the settlement of the Erzgebirge area is assumed to have started in the form of a rural colonization phase around the mid-12th century that was followed by a boom in silver mining economy during the later 12th century, commonly referred to as the ‘erstes Berggeschrey’ (first silver rush). This restructuring of settlement patterns and economy had also considerable impact on the landscape. Although a serious decline has been assumed for both areas during the 15th century, careful assessment of the data indicates that this process differed significantly on a local level and has to be explained on the backdrop of a combination of economic and political reasons. At the turn of the 16th century, technological innovations led to the explorations of new ore deposits and with it partial reactivation of older mines. In order to meet the increased demand for energy in this process, early strategies of woodland management were developed in both areas. Our results indicate that in both areas carefully controlled land-use strategies were used to maximise the efficiency of resource exploitation by mining, charcoal production as well as the subsequent processing. This makes it very likely that the development was much less a result of self-regulating economic processes than purposeful political organization which enabled the allocation of investments and technology. With regard to the later onset of mining in the Erzgebirge area, the possibility of a technology transfer and the recruitment of specialists from the Harz are discussed.

Man and the mountain landscapes: Recent research in the Bieszczady Mountains (eastern part of the Polish Carpathians)

Andrzej Pelisiak (Institute of Archaeology, University of Rzeszów)

This paper focuses on the exploitation of mountain landscapes in the eastern part of the Polish Carpathians (Bieszczady Mountains). All pollen diagrams indicate the presence of man in this area from about 3200 BC. Their analysis enabled the distinction of several stages of human activity. The first anthropomorphic changes of vegetation, dated to the period from 3200–1500 BC, are related to animal herding, and the later changes, up to ca. 400 AD, are connected with permanent occupation of some parts of this area. The last stage is dated to historic times and began in the 15th century. Until present, the activities of prehistoric people in this part of the Carpathians have not been confirmed by archaeological finds. This paper presents the results of archaeological work started in 2013 in the eastern part of the Polish Bieszczady Mountains as well as the questions which appeared after analysing the palynological and archaeological data. Surface surveys and LIDAR-based prospection resulted in the discovery of numerous sites located on high altitude mountain landscapes between 700 and 1200 m a.s.l. These include various finds and structures. 1. Single finds of lithic artefacts dated to the Late Neolithic (blades, blade end-scraper, heart-shaped arrow head) and the Early Bronze Age (e.g. flake cores) are located in different landscape zones at altitudes between 700 and 1200 m a.s.l. Some on them were found above the natural forest line, e.g. arrow head and blade end-scraper. 2. Stone structures, rectangular and circular in shape, and up to 120 m2 in size are located between 1000 and 1100 m a.s.l. They are the first structures of this type discovered in the Polish Carpathians. 3. Zones of circular stone mounds up to 15 m in diameter and up to 1.7 m in height are located at an altitude between 900 and 1000 m a.s.l. They are the first structures of this type discovered in the Polish Carpathians in such a high mountain zone. 4. Corded Ware culture camp-site located at the altitude of 1150 m a.s.l. is placed above the natural forest line. This is the highest location of a Corded Ware culture camp-site in Polish Carpathians. 5. An Early Bronze Age settlement-site is located at an altitude of about 700 m a.s.l. 6. The hill-fort with a semi-rectangular wall ca. 80 x 40 m in size is located at an altitude of 700 m a.s.l. All of the sites are located in the clear context of salt springs and/or near the longitudinally oriented natural routes crossing the main ridge of the Carpathians which were also used in historical times. In my presentation, I would like to discuss several important questions, e.g. the function of different stone structures, the reasons which motivated people to enter the Bieszczady Mountains (the role of salt, the role of climatic changes and natural routes), the use of different kinds of mountain landscapes (transhumance in the Late Neolithic and Early Bronze Age, and permanent occupations in later prehistoric peri-
ods], and the mutual relationships between people and their environments. In the concluding parts of the present paper, our fieldwork methodology and perspectives for future investigations will also be discussed.

A sample of ice and fire: Holocene frost in Neolithic deposits promotes ash cementation and podzolization in the Estrela Mountains, Portugal

Carlos Duarte (International Institute for Prehistoric Research of Cantabria, University of Cantabria, Spain; presenting author), António Fauscino Carvalho [University of Algarve, Portugal], Catarina Tente (Nova University of Lisbon, Portugal)

The deposit of Penedo dos Mouros, dated to the V-IV milénio cal BC, is located in the mountainous range of Serra da Estrela, Portugal, and was formed in a massive granitic block. The artefactual assemblage includes animal bones and plant remains, an extremely rare occurrence in the prehistoric record in the region, due to the major acidity of the geological environment that promotes the rapid dissolution of such components at most archaeological sites. Sedimentologically, it is composed of very coarse granitic sand and horizontally crossed by a dark, hard pan. Micromorphological analyses were carried out in order to identify the material forming the dark pan and to know what particular conditions allowed the preservation of organic materials. In the present contribution, we present the results of this analysis. Micromorphology is the study of thin sections of resin-impregnated block samples of oriented and undisturbed sediment, under the petrographic microscope. In thin-section, the reason for the good preservation of organic archaeological material quickly became clear: the granitic sand is cemented by calcium carbonate that compensates the original acidity. The problem derived from this is that there are no natural sources of calcium in the local environment. However, as an anthropogenically induced element, it is quite common in archaeological sites, specially derived from ashes. Although the very coarse grain size and hardness of the deposit made it impossible to identify the dispersed ashes in the field, they are visible microscopically. Calcium carbonate cementation along with some redox features indicate stagnation of water during a certain period of time, which is unlikely to occur in this site, given the well-draining coarse grain-size and its setting on the top of a slope. The possibility proposed is that the water was initially in solid state, most likely snow or frost. The morphology of textural features and microstructure patterns also point to this hypothesis. Another important observation made in thin-section concerns the dark pan crossing the deposit: it is actually composed of fine organic matter as a main component, making it a spodic horizon. It accumulated right over the cemented layer that apparently functioned as an impermeable barrier in the sediment and the fine organic matter/mineral colloids lost its ability to percolate. The archaeological record of Penedo dos Mouros provided evidence that occasional, logistical Neolithic human activities had an impact on the evolution of this mountainous landscape, leading to the development of a pedostratigraphic spodic profile, in an area of very incipient saprolic soils. The micromorphological analysis of this sedimentary record also suggests that local-scale cold climatic events in the Holocene, like seasonal frost soil, are susceptible to be preserved in the archaeological record and micromorphology is a useful tool for its identification. It is also important to highlight that the post-depositional processes affecting the site were largely controlled by the presence of ash, an important anthropogenic input, which would not be identified without the application of this technique.

The anthracological reconstruction of the vegetation in the Neolithic mining areas at the Jizera Mountains

Jan Novák [Laboratory of Archaeobotany and Palaeoecology, Faculty of Science, University of South Bohemia; presenting author], Pokorný P., Šída P., Prostředník J.

Archaeological investigations of the Neolithic quarrying areas at the Jizera Mountains have been conducted since 2002. The present study has focused on the reconstruction of the vegetation in two important Neolithic mining areas – Jistebsko and Velké Hamry II. The raw material (metabasit) is of very good quality and tools made from this material have been found throughout Central Europe. The raw material was not quarried out during Neolithic times. The base of the quarrying pit was dated by the radiocarbon method to the period of the Linear Pottery culture. The enormous amount of flakes of stone raw materials and semi-finished manufactured tools has been supplemented by an assemblage of wood charcoal. The anthracological analysis of the charcoal assemblage has provided an impression of the composition of the arboreal vegetation and has enabled consistent radiocarbon dating. The result of the anthracological analysis has been correlated with the creation dynamic of the defunct layers. Our results show the presence of the Neolithic quarrying in a primarily wooded landscape. The charcoal records
reconstructed the vegetation with a high abundance of ash \((Fraxinus)\), hazel \((Corylus)\), and other demanding broadleaf species \((Tilia, Ulmus, Acer)\). The abundant presence of hazel and common spread willow/poplar (aspen?) charcoal could indicate habitats affected by mining activities. The upper part of the quarrying pit has been infilled during the medieval colonization of the site.

**From the Alpenvorland Into the Alps – Mesolithic and Neolithic sites in Western Bavaria**

Werner Schön\(^1\) (presenting author), Birgit Gehlen\(^1\), Doris Mischka\(^2\) \((1\thinspace Universität zu Köln, Institut für Ur- und Frühgeschichte; 2\thinspace Friedrich Alexander Universität Erlangen-Nürnberg, Institut für Ur- und Frühgeschichte)\)

The Allgäu in Western Bavaria is culturally situated between several spheres of influence from the west, the Donau catchment area in the north and northeast and the alpine regions to the south. Geographically, the sites are found on the Iller-Lech-Plateau, the prealpine mountains and the Alps. After decades of research, we are able to reconstruct settlement patterns of different Holocene Stone Age groups and phases: The Allgäuer Alps were a settlement area and bridge between north and south from the middle Praeboreal onwards. The Younger Mesolithic in particular is often documented. Early and Middle Neolithic sites are sparse in the mountainous regions, but are more frequent only a few kilometers further north. Later Neolithic finds stem from the Alpenvorland and the Alps and show a far stretched communication network.
Abstracts Session 8

Method development to reveal past plant-people interactions

Researching people-plant Interactions: Potential of ethnoarchaeology and experimentation to interpret enigmatic traces of harvesting and threshing
Patricia C. Anderson (CNRS, CEPAM, Nice, France)

We have found ethnoarchaeology and field experiments to be particularly precious tools for researching people/plant interactions, and we have used them together over the years to fine-tune our interpretations of harvesting and threshing techniques, using phytoliths and microwear data from Neolithic and Bronze Age sites in the Middle East. Ethnoarchaeology was used to study harvesting, threshing and storage of cereals, other wild grasses and pulses in Syria and Tunisia and to a lesser extent in Spain and Turkey, from the mid-1990s to the present day, complemented by field experiments from the mid-1980s to the present. The ethnological observations provided precious information on sequences of techniques, what was produced, and by whom, shedding light on the specific nature of human-plant interactions in a subsistence-based agricultural cycle. Experiments, informed by ethological observation of techniques, were carried out for particular uses, using specific tools we reconstructed from archaeological data. As usually these tools were somewhat different from those observed in present-day ethnological contexts, experiments tested whether they functioned more or less like their ethnographic counterparts, with the activity producing traces and other results more directly comparable to the archaeological remains. We looked at instances where plants were pulled up by hand as opposed to harvested using sickles, by cutting or stripping off, with particular attention focused on the latter when used for hulled cereals. Cutting vs. pulling up was more particularly to the use of the straw/stems afterwards. We attempted to evaluate traces on tools and on the harvested material. Similarly, threshing techniques for cereals and pulses were recorded, and special attention given to trampling, degraining (stripping hulled wheats), and use of the threshing sledge by farmers today or in the recent past in Tunisia and Syria, also in light of the use of the straw and grain afterwards. Cuts or breaks in the straw as seen by phytolith analysis were observed using optical microscopy and the SEM, for both ethnographic and experimentally reconstructed archaeological sledge forms. This included an extensive experimental program using a reconstruction of the Middle Eastern Bronze Age threshing sledge armed with flint blades, reconstruction with Tunisians of the flint bladed threshing sledge used there until the 1980s. Flint or obsidian blades mounted in threshing sledges tend to develop characteristic microwear traces, and these as well as elements of sharp metal tend to score the epidermal tissue of the culms, which can then separate with a clean break, which on the level of phytolith analysis shows specific smooth curved or straight profiles. Animal trampling, whether part of the process of pulling instruments or used alone, produces breakage patterns, but not the straw scoring which occurs from contact with blades. Interestingly, the movement of the straw on the threshing floors was essential to the special phytolith profiles, and sickle blades did not produce these traces. More data is needed, but archaeological observations made thus far suggest a preliminary distribution of occurrence of techniques, which, with consideration of factors which might influence particular choices, along with ethnographic data, may provide a diachronic view of the introduction, transmission and extinction of certain implements and methods.

Morphometric analysis of Zea mays cob phytoliths as a proxy for genetic analysis and movement of people across the landscape
Linda Scott Cummings (PaleoResearch Institute)

Agriculture has transformed the landscape in many areas of the world. Beginning many millennia ago in the Old World and several millennia ago in the New World, agriculture has changed the face of landscape, nutrition, relationships between people, societal stratification, and more.

Large-scale data sets provide an ideal mechanism to examine the movement of peoples (across space), particularly on a continental scale. This example utilizes morphometric analysis of phytoliths obtained directly from reference cobs of ancient varieties of Zea mays, from reference cobs of ethnographic collections of maize (those being grown today by First Nations or Native American peoples), and from archaeological maize cobs.

Methods under development since 1990 using phytoliths extracted from Zea mays cobs are being tested at PaleoResearch Institute to answer questions of population movement in North America. One hun-
dried phytoliths are photographed and measured using an imaging program. This part of the method has benefitted from advances in technology over the past 15 years. High-quality imaging programs, such as ImageJ, are now available for free. Early experimentation with imaging and measuring indicates that shape measurements are under close genetic control, while size measurements are good measures of environmental conditions.

Questions concerning peopling of various parts of the arid Southwest of North America may be addressed through the examination of this proxy record. In fact, population migration in response to severe climatic stress is well-known in this part of North America. The question on where the Anasazi, who lived in the northern periphery of the American Southwest, went after the severe 25 year drought at the end of the 13th century has driven much research. Questions regarding the trade of maize between Puebloan groups living at the eastern edge of the American Southwest for bison hunted by peoples living farther east on the Plains also is an important research question today. Questions of trade and human relations may be addressed throughout the continent. For example, linguistic evidence in Louisiana suggests a relationship, perhaps through trade or migration, with people in east-central Mexico prehistorically. This question may be tested with this phytolith technique. In fact, the spread of maize, itself, may be tracked throughout North America for places yielded charred maize cobs.

Morphometric analysis of phytoliths obtained directly from archaeological cobs and reference cobs of ancient maize varieties exhibit close relationships when subjected to statistical analysis. Retention of primitive popcorn traits in archaeological varieties is suggested, pointing to likely derivation of maize farmed in antiquity from Chapalote, Reventador, and Teosinte.

Principal components analysis and cluster analysis provide two mechanisms for examining relatedness of archaeological cobs. Plotting closeness of fit of archaeological cob populations on the landscape allows for examination of potential trade and movement of people since ownership of seed is known to be closely controlled. Comparison with aDNA from archaeological cobs, as well as DNA from modern cobs holds the key to unraveling the past. Ultimately, morphometric analysis of phytoliths derived from archaeological cobs is designed to address questions of social relatedness and movement of peoples and it might ultimately be able to assist in defining social lineages. Use of this or a similar technique for remains from other domesticated plants, particularly cereals, is possible in other parts of the world.

Multiproxy application of geochemical (phosphate analysis and LOI) and geophysical (magnetic susceptibility) methods to grasp plant-human interactions on prehistoric settlements in Northern Europe

Radoslaw Grabowski (Environmental Archaeology Laboratory, Umeå Univ. Dept. of Hist. Religious and Philosophical Studies)

A large portion of the plant material from Northern European prehistory derives from settlement sites where it has become preserved by carbonisation. The composition of carbonised assemblages in settlement contexts is almost always the result of both non-human formational/taphonomic processes and human and animal behaviour within the settlement space and beyond. An understanding of these processes and their interactions is thus vital for achieving well-founded interpretations of the archaeobotanical material. The archaeobotanical method in its basic form – i.e. plant macrofossil analysis by visual inspection and identification – is often insufficient to elucidate formational and site functional dynamics in detail. This necessitates the integration of plant macrofossil analysis with other methods in order to achieve substantiated formational, operational and preservation contexts for plant assemblages. During this workshop, I will present how macrofossil analysis of carbonised plants from settlements can be combined with geochemical (phosphate analysis of organic and inorganic phosphates and Loss-on-ignition) and geophysical (magnetic susceptibility) methods in order to better interpret plant assemblages. I will also discuss how the archaeobotanical method is not only helped by comparison to datasets from other analyses, but also, under some circumstances, can be a key component in the final interpretation of settlement spaces. The integrated botanical-geochemical-geophysical approach will be illustrated by case examples from Iron Age sites in Denmark.

Reconstructing the landscape in central coastal Etruria: Defining agro-sylvo-pastoral practices through pollen analysis and the archaeological record

Edoardo Vanni (University of Foggia, Italy)

From the perspective of historical ecology, landscape is understood as the historical result of com-
Tracks across landscape and time: Creating habitats from occasional occupations

Linda Scott Cummings (presenting author), Peter Kovacik (both PaleoResearch Institute)

Decades of recording individual sites and features had produced little evidence to interpret landscape use in the western Permian Basin of SE New Mexico. Intensive petroleum exploration created opportunity for a new strategy. The US Bureau of Land Management decided to stop testing individual features when they were discovered and instead sample all features noted on the larger landscape over a few years. These samples were stored while they developed a plan for investigation with the goal to create large data sets of radiocarbon dates, macrofloral and charcoal, phytoliths, and starch from 500 thermal features. The final step was to visualize the resulting data by plotting selected resources on the landscape using GIS. Our work provided the first synthetic examination of human resource use across the western portion of the Permian Basin. We provided a record of resources available on the landscape, documented the choices people made from those available resources, and created an image of people and their impact on this landscape through time. We built a local chronology from dates on charcoal from the shortest-lived materials available. Finally, we modeled the climate, including the monthly distribution of precipitation, over the past 16,000 years to better understand the environment. Our conclusions integrated these data sets into a single, synthetic story of landscape and people. This large data set included 550 AMS radiocarbon dates on 500 thermal features spanning the past 5800 years.

The charcoal and macrofloral records provide evidence that dead Yucca were collected and likely used as “fire starters”. Yucca apparently were abundant on the landscape and widely available for collection. Some Yucca are noted to live for only about 20–25 years before dying off, creating a ready population of ready fuel or starter fuel on a relatively barren landscape. Our experiments indicate that dry
Yucca starts to burn quickly, creating a hot fire capable of easily catching other wood on fire.

Phytolith analysis identified *Commelina erecta* seed phytoliths in 69% of features. *Commelina,* previously interpreted to be associated with agricultural disturbance, is not abundant on the landscape today. Also, this landscape was not capable of sustaining agriculture. Therefore, a new paradigm was sought to explain its abundance. A relationship between land disturbance created by human mobility/use of thermal features and probable bird nesting/populations emerged. If this vegetation, sustained by land disturbance created by human impact and use of the landscape, attracted and provided habitat for quail, a favored game bird, then more intensive use of the landscape would have intensified this relationship. Recovery of *Commelina* seed phytoliths in feature fill samples is mapped on the landscape by time period to display this relationship.

This unusual approach abandoned traditional site examination and sample collection practices in favor of building a large data set from a landscape to better evaluate human activity and the human-landscape relationship through time. Our synthetic review of the data and interpretation of the record expanded to include not only vegetation and landscape, but human transit, hunting, and fire-building practices. Even ephemeral human presence on the landscape has far-reaching effects for plant communities, animal populations, and human interactions with their environment.

**Landscape use and dietary practice in the northern Aegean Bronze Age Inferred through stable isotope analysis**

Erika Nitsch (School of Archaeology, University of Oxford; presenting author), Armelle Gardeisen, Paul Halstead, Valasia Isaakidou, Angeliki Karathanou, Daphne Nikolaidou, Chryssa Petridou, Sevi Trianthropyllou, Soutzana Valamoti, Anastasia Vasileiadou, Stelios Andreou, Aikaterini Papanthimou, Amy Bogaard

Measurement of stable carbon and nitrogen isotopes of plants provides the opportunity to investigate crop growing conditions, and hence agricultural practices, directly. By refining isotopic palaeodiets models, these measurements also help to reveal the relative importance of crops in human diet. Here, we use stable isotope analysis of preserved crop remains from the northern Aegean Bronze Age sites, Archontiko and Toumba Thessalonikis, to infer the growing conditions of a variety of crop species, and to understand the role that human agency played in the observed agricultural practices. During the Early Bronze Age in the Aegean, scholars have argued for the development of social complexity based on evidence such as tiered settlement organisation, appearance of communal buildings associated perhaps with administrative practices, craft specialisation and settlement nucleation. It has been suggested that the latter phenomenon, which culminated in the creation of fairly large conurbations, will have both necessitated and enabled extensive land use regimes. It is possible that in the southern mainland and on Crete it developed alongside, or even replaced, the intensive ‘garden’ farming practices of the Neolithic, whereas in the north, where larger settlements and complexity can be safely documented only from the Late Bronze Age onwards, intensive forms of cultivation could have persisted. Moreover, in the north the variety of species recovered (both plant and animal) attests to ‘diversification’ as a deliberate strategy to mitigate risk, but this practice has been investigated only in terms of crop species numbers, not in terms of the ecological diversity of growing conditions. This study tested these hypotheses about human-plant relationships in the northern Aegean using stable carbon and nitrogen isotope analysis at Archontiko and Toumba Thessalonikis. The results show significant isotopic differences between different crop species, reflecting deliberate differences in management practices. The results also document a range of crop management intensity within each settlement, a range which shifts towards low-labour management for some cereal crops by the Late Bronze Age at Archontiko.

**Integration of N and C stable isotope analysis with grain weight analysis to understand the impact of climate change on agricultural production**

Meltem Cemre Ustunkaya (The University of Queensland; presenting author), Andrew Fairbairn

Major climatic changes have been the focus of archaeological studies since the realisation of links between climate and social change. This paper aims to understand the relationship between local climate patterns and changes in the occupation of Central Anatolia in the Bronze and Iron Age periods. Specifically, carbon and nitrogen stable isotope analyses are used in conjunction with grain weight analysis to understand the effect of micro climate events on long term agricultural production. Direct remains of agricultural production – crop cereals – from Kaman-Kalehöyük are analysed with stable isotope and grain weight techniques. Studies show that δ13C and
precipitation are directly linked to each other. 15N isotope analysis shows that manuring of fields is correlated with the values of 15N in plant materials. Grain weight analysis shows that grain weight depends on water availability during the growth period of the cereal crops. Thus, via the integration of these techniques this paper demonstrates that the integration of stable isotopes into climate studies brings a clearer understanding of the local climate patterns of the past. Results indicate that changes in water availability and soil enrichment occurred during the Bronze and Iron Age occupation at the site.

Multiple proxies, single story: Wood charcoal, seeds and isotopes at Kaman-Kalehoyuk, Turkey
Nathan Wright (presenting author), Meltem Cemre Ustunkaya (both The University of Queensland)

Meltem Cemre Ustunkaya This study outlines the results of detailed stable isotope and macrobotanical analyses from the site of Kaman-Kalehöyük, Central Anatolia, Turkey. Generalised and multi-episodic contexts, such as pits, as well as single episode/event contexts, such as hearths, have been utilised in conjunction with multiple proxies, such as pollen data, plant macrofossil assemblages, geomorphological data, ethnobotanical, ethnohistorical, and ecological analogues, to reconstruct the ancient woodland landscape surrounding the site. This diachronic study encompasses occupation at the site from the Transitional Early Bronze Age (ca. 2000 BC) to the Late Iron Age (ca. 300 BC). However, emphasis is placed upon the Middle to Late Bronze Age periods, which encompass the Hittite occupation of the site, with the aim of determining the extent of woodland vegetation prior to Hittite arrival and then further investigating whether deforestation or modification of woodland vegetation occurred during or after the Hittite occupation phase. Special focus is centred on the role of agriculture and climate at the site and whether these factors influenced woodland management and/or land use. The results of the wood charcoal analysis and stable isotope analysis are coupled with previous and ongoing research on agricultural practices at the site. The results indicate that the Hittite occupation coincided with both dramatic and more subtle and nuanced changes in the local woodland vegetation.

ArchWood – A database as a tool to record, manage and interpret archaeobotanical uncharred wooden remains
Filipe Costa Vaz² (presenting author), M. Martín-Seijo¹, J.P. Tereso² [1 Universidade de Santiago de Compostela, Dep. Historia I, Facultade de Xeografía e Historia, Santiago de Compostela; GEPN-Grupo de Estudios para a Prehistoria do Noroeste Ibérico; 2 CIBIO – Research Center In Biodiversity and Genetic Resources, Universidade do Porto, Facultade de Ciências, Departamento de Biologia, Portugal]

The study of uncharred wooden remains recovered in archaeological sites offers an invaluable opportunity to understand how populations interacted with one of the most important resources in the history of mankind. The fact that this type of preservation is very rare, especially in Southern Europe – given the lack of hypoxic environments – further emphasizes the importance of such materials in the archaeological record. Thus, it is of utmost importance to apply a method of study capable of providing insights on human daily life activities but also technological capabilities and even aesthetic preferences of a given past population. With this presentation, we propose a new method of recording and managing retrieved data from preserved wooden remains. ArchWood is a database that comprises four main sections: 1) Inventory – wooden object/piece ID number, inventory number and storage information; 2) Archaeological Context – campaign name, code of the excavation area, stratigraphic units, structures number, etc.; 3) Object Description – the most important and developed area of the database as it comprises all the descriptors related to five main categories: species identification, dendrological/anatomical characteristics, typological/technological features, morphometry and overall description; 4) Preservation – preservation state and features of the wood, namely its preservation type, presence of cracks, deformations, fractures, etc. Each of these sections contains several description fields such as checkboxes, dropdown menus and free writing fields where is possible to insert any type of information. Given its integrated architecture, one of the main advantages of this database resides in its user-friendly interface and in the possibility of creating easy query actions and statistical treatment of this information together with the archaeological data. Correlations between the wood typology and species in relation to its technical characteristics are just a few simple examples of queries that can greatly enhance the interpretation of this type of archaeobotanical remains.
A method to recognize woodland management in archaeology: new developments
Caroline Vermeereen (BIAX Consult, presenting author), Kirsti Hänninen, Welmoed A. Out

In Northwest European archaeology, woodland management in prehistory is often discussed. However, conclusions are often based on assumptions and (too) small samples. To recognize management in archaeological wood remains, a new, easily applicable method has been developed. It is based on the principle that managed trees tend to produce long, straight branches in a short time. This should result in fewer annual rings for a given diameter, when compared to branches from unmanaged trees. Based on this assumption, a model was developed that was tested on managed and unmanaged trees of modern willow, alder and ash, the species most used for wicker work in the Netherlands. The results seem to confirm the model. The research on modern-day trees started with straightforward examples of clearly managed and unmanaged trees. Further research, focusing on variation in growth conditions and on some extra species, revealed anomalies of the model. Fast growth into long, straight branches also occurs naturally, for example, in hazel and in some willow species, or in trees that have fallen over in a storm. In addition, fast growth can occur in unmanaged trees growing under extremely favorable circumstances. Moreover, the good growing conditions of newly managed trees diminish in time, which results in a more ‘natural’ appearance of the diameter/annual ring ratio. These factors lead to an adjustment of the model. More research is needed to increase the amount of data to establish the patterns of managed and unmanaged growth, especially for branches of larger diameters.

General perception of wetland landscapes: getting a specialist message across
Mans Schepers (Groningen University)

In archaeobotany as well as in archaeology as a whole, the world is classically divided into two types of landscapes: wetland and drylands. This division is generally accepted. Wetland archaeology has drawn particular interest of bio-archaeologists, because the hydrological conditions in wetland landscapes often allow for the preservation of waterlogged organic remains. The perception of Northwest European wetlands is dominated by two characteristics classically associated with this type of landscape, namely water and high nutrient availability (with the exception of bogs). In coastal marshes, salinity can be added as a third major characteristic. Salinity, nutrient availability, and the frequency and duration of flooding in wetland landscapes do indeed play a major role in the appearance of the landscapes. In fresh water wetlands, vegetation has long been known to (possibly) progress via a more or less standard vegetation succession, the hydrosere. In coastal regions, where salinity becomes a major factor, the halosere is the equivalent of the hydrosere. The hydrosere is frequently taken as the starting point for vegetation description. A number of plant communities from the hydrosere have successfully been a focus of interest in the framework of non-specialist archaeologists, including the reed swamp, the sedge swamp, and the alder carr. That these plant communities have found their way to archaeologists without specialist ecological training (or interest) is to some extent caused by the fact that they are, not necessarily correctly, linked to specific peat types, respectively reed-sedge peat and wood peat. Northwest European halosere plant communities are generally not peat-forming, so no peat types can be associated with them. Most general descriptions of salt marsh environments are formulated in terms of relative altitude, e.g. low marsh, middle marsh etc. As a consequence, fewer plant communities sound familiar to non-specialists, whereby the saltmarsh rush community (Juncetum gerardi) is the only possible exception. Saltmarsh rush vegetation is the only vegetation type to frequently occur in non-specialist archaeologists landscape descriptions. More often however, the landscape [and vegetation] is described in more general terms, as being dominated by saline grasslands (DE: Salzwiesen, NL: zilte graslanden). In many types of wetlands, intensive palaeo- and archaeobotanical studies have resulted in vegetation reconstructions with a high diversity. Nonetheless, the general perception of these wetlands amongst many non-specialists, let alone the general public, is still dominated by rather simplistic and uniform descriptions. This matters, because this will also impact the [supposed] exploitation possibilities of these landscapes. In salt marshes, for example, as a result of too much emphasis on salinity and flooding, crop cultivation is still being perceived as being considerably more problematic than archaeobotanical data show. In a session devoted to new methods, some reflection is appropriate as well. This archaeobotanical session is titled ‘Method development to reveal plant-people interaction’. In this paper, I will focus on plant-people interaction indeed, but with a different interpretation: has the interaction between archaeobotanists, being plant-people, and non-
specialists been good enough? To what extent do we manage to get our message across?

How forager (plant) food transforms into a charred archaeobotanical assemblage
Santeri Vanhanen (University of Helsinki, Archaeology)

It has been difficult for archaeobotanists to know if the wild plants found in charred forager assemblages were gathered or accidentally charred and have they been utilized or not. Plants can be used for various purposes. I'll concentrate on the food use of wild plants. Nuts, like hazel (Corylus avellana) and water chestnut (Trapa natans), have been long considered as intentionally gathered and processed. Many other plants in the charred assemblages are difficult to interpret and the gathered/not gathered or utilized/not utilized status of a certain plant can differ between publications. Find contexts and other archaeobotanical data should be considered, but there should also be some means to interpret how and why plant remains have been transformed into the charred assemblage from the operational environment. A three point criteria scale for considering the utilization of a plant remain has been proposed by Regnell (2011). He suggests that 1) remains must be found in large quantities, 2) outside their natural habitat and/or 3) contain obvious signs of processing. Criteria 1) and 2) are understandable, though plants which are found only in small numbers are left out, even if they might have been used. When compared to cultivated assemblages, often only small amounts of certain plants (e.g. Pisum sativum, Papaver somniferum) are considered as clear signs for utilization. Criterion 3) can be difficult to meet, because obvious signs of processing cannot be found for all plants. It could be argued that all charred assemblages are processed (burned) by humans. Clearly, this could have happened by accident, but often this is not the case. It is thus important to find out why and how the plants became charred (also Hillman 1981 for cultivated crops). This can be achieved by studying ethnographical and historical sources, and also by the means of experimental archaeology and detailed studies of the archaeological record, e.g. chemical analyses of potsherds. It is fruitful to combine a model for food culture signals with Regnell’s criteria that then provides a more nuanced tool for interpreting the archaeobotanical and other types of archaeological signals of food (Isaksson 2010). It seems that in this model, charred archaeobotanical assemblages are mainly residues created in production or preparation of food. My aim in this paper is to combine these two models and elucidate their use with possible scenarios how charred assemblages of Nuphar lutea, Empetrum nigrum and Rubus idaeus form.


Towards a refined understanding of Mesolithic coastal landscapes – new investigations on human-environment interactions in Telemark, Norway
Steinar Solheim (presenting author), Almut Schülke (both Museum of Cultural History, University of Oslo), Magdalena Wieckowska-Lüth, Walter Dörfler, Wiebke Kirleis (all Institute of Pre- and Protohistoric Archaeology, Kiel University)

During the last fifteen years, big rescue-excauation projects conducted by the Museum of Cultural History, University of Oslo, have shed new light on Stone Age settlement in the Oslofjord-region, Norway. Excavated sites span from shortly visited places to more permanent hunting and fishing stations. However, preservation conditions are bad and organic material is rarely recovered. Pollen analysis thus provides an excellent tool to help investigate human-environment interactions. The ongoing E18-project Rugvæt-Derdal, Telemark (2013–2016) focuses on the analysis of coastal landscapes on a micro- and macro-scale. Along a 16.8 km long marked-out route, 31 Stone Age sites are being excavated, most of them former coastal sites dating from the Late Early Mesolithic to the Late Mesolithic (ca. 8500–4000 BC). In the Mesolithic, the environment shifted rapidly due to land-rising, leading to changing coastal areas with differing natural conditions and habitats. Within this project, the Mesolithic part of a sediment core from Lake Skogtjern, Telemark, was analyzed by the Archaeobotanical Department of the Institute of Pre- and Protohistory, University of Kiel. This interdisciplinary approach aims at a better understanding of the development of Mesolithic woodlands with regard to climatic development and available plant resources, but also concerning the until now rather sparsely discussed question of human impact. In order to pinpoint the potential role of hunter-gatherers in influencing
their environment more tangibly, pollen analytical investigations with a high temporal resolution were carried out together with complementary techniques of non-pollen palynomorphs- and microscopic charcoal analysis. Loss-on-ignition and the determination of geochemical element distribution were also employed. While the lake was still connected to the sea in the Late Glacial and the Early Holocene, first evidence of close by human activity emerges roughly synchronous with its isolation around 8000 BC. Woodland disturbances, visible by the reduction in arboreal pollen, the increase in taxa of open ground, and coincident microscopic charcoal peaks suggest small-scale openings of the forests by the assistance of fire. Around 6200 BC, there is an abrupt switch marked by a change in the ecological status of the lake, and a distinct increase in the input of terrigenous mineral material in the lake sediment, indicating significant catchment disturbances. The amount of arboreal pollen increases contemporaneously, showing the regeneration of the woodland. Since ca. 5500 BC, the pollen record displays a visible increase in palynological diversity among herbaceous taxa, pointing to frequent small-scale open locations on the lake shore and may be interpreted as human-made. However, significant traces of anthropogenic fire activities diminish distinctly at ca. 5000 BC simultaneously with a further increase in the erosional input to the lake and another change within the aquatic system. Our talk will present the palynological results and discuss them in light of the preliminary results from the E18-project Rugvedt-Dørdal.
Abstracts Session 9

Lining the monuments – creating landscapes?

Straight Talking In Prehistory: linearity, history and truth in the 4th and 3rd millennia BC
Paul Garwood (University of Birmingham)

There is nothing special about straight lines as such, except for the striking physical structures that humans create that encompass linearity and the fabulous meanings humans may attach to them. European Neolithic and Bronze Age prehistory abounds with architectural edifices arrayed in linear formations, built as linear structures or aligned explicitly on points in the land/skyscape. These range from long houses, tomb passages, avenues, and ceremonial enclosures to funerary tombs, land boundaries and field systems. It is doubtful whether these share anything in common in terms of specific cultural meanings, other than a desire to assert unambiguous, unchanging and ‘true’ relationships of orientation, correspondence and sequence across space/time. Indeed, it seems most sensible to understand the similarities we see in the materiality of architectural and spacing in terms of an ontology of linearity, directional and temporality: a common ‘point of departure’ deeply embedded in human cognition that helps to guide our perceptions and physical engagement with the environment, and helps to mediate relationships between past and future, history and mythology, and time and cosmos. From this perspective, the challenge is not only to account for similarities, but also to look through these to explain the diverse and unique kinds of social practice, cultural expression and meaning realised in linear representations in the past. This paper will explore these themes in relation to the constitution of linearity in the 4th and 3rd millennia BC, focusing on north-west European evidence as counterpoint to the central European and Eurasian focus of the session.

The transformation of Neolithic landscapes in Europe
Martin Furholt (Institute of Pre- and Protohistoric Archaeology at Kiel University)

The third millennium in Europe is traditionally seen as a period showing unprecedented connectivity and mobility, resulting in extremely large archaeological phenomena known as Corded Ware and Bell Beakers. At the same time, the emergence of linear arrangements of grave monuments indicates new modes of landscape perception. It seems obvious to make a connection between rising mobility and this transformation of landscapes. In addition, the link to technological innovations from the late fourth millennium, such as animal traction, wheel and wagon, have been made and causal connections claimed. However, there is still no convincing model that associates these technological innovations, the developments of human practices and a changing landscape perception. In this presentation, I want to explore the question whether and under which circumstances it is plausibly possible to link the impact of technological change to structural changes of social practices and relations, a rising mobility and the transformation of the spatial extent of archaeological classification units. This attempt will be based on pragmatic theory.

The Sacred and the Profane – A landscape image analysis
Carlos Didelet (Nova University of Lisbon)

A landscape appears as a link between sacred belief and daily life. Intrinsic elements of human cognition, the attribution of specific powers, and meanings are assigned to certain places. If this is inherent to humanity in general, it becomes even more evident in cultures mainly from recent prehistory onwards that assign special significance to a specific rock, a forest, a river, or a cliff. That means that a specific need is closely linked to the necessity that humans have that must assign special meanings to certain features of nature in order to make it intelligible to themselves and their mental processes. It is directly connected to the process that humans give to interpretations of natural phenomena and make them intelligible to their mental processes. That renders a completely true full reconstruction of the human past impossible. Not having enough cultural material, it is helpful to create mental bridges through cognitive archaeology. We propose a fusion between panoramic photography and cognitive behaviour. Our aim is to comprehend this photography through the latter. Questions about the reason for occupation of certain places can be understood, and also the interaction between humans and the environment, that is the interior (auto/social conscience) and exterior spatial conscience (locally/inter-locally). It is intended to comprehend the spatial distribution of places, whereas that is (perhaps) a form of how art and landscape appears in a close connection as a fruit of the same wish, the wish of a human being to
The landscape from Southern Portugal is rich in megalithic places and other features. But its investigation as a whole is still in the beginning. We know that there are already several works about many of the monuments and their places, but a study that puts the whole picture in place is lacking and could give us a vision of why they had chosen that particular region and its features to mark the land with their constructions and monuments. So, we propose the use of landscape photography as a tool to interpret the land that envelopes the archaeological sites, as a means to understand the reasons for the choice of that particular region. In light of this, places like the Cromlechs, the Menhir alignments, dolmens and open-air sanctuaries are just there waiting for the right reading of their emplacement in the whole context of the landscape. There is a range of the most significant places of the period in question that can provide us with good insight and the respective comprehension of the Late Neolithic way of thinking. The landscape is an entity. It is something that is constantly in mutation. It has a temporal diachronic of centuries that is progressively being modelled over time not only by action of its own elements but also by anthropic action. It is a tool to provide an approach for the comprehension of prehistoric geography. This is why we propose this technique as a means to look the surroundings as whole (i.e. human vision can apprehend what it sees). This approach to the understanding of the prehistoric landscape can be used and applied in most of the places of megalithic period of ancient Europe.

The power of the line: Metaphor, mathematics and material culture in prehistoric Europe
Alekzander Dzbynski (Zurich University)

Classical ontology was spherology, it concentrated on "what is regular, circular, spinning-in-itself", it was a logic, esthetics and an ethic of round things, as Peter Sloterdijk recently summarized this mental development. According to him, the circular shape could have worked as a "cosmic immune system", a metaphor of man's unity with the cosmos as well as a universal communication language with the creator. And what about the prehistoric linear arrangements of domestic and funeral space? Linearity requires more thought, from its simple manifestations in the monumental form to its complex use in later megalithic structures. In the course of this we can assume the following. The line can be easily manipulated as it is dynamic and de facto highly abstract. It may manifest itself first of all as meta-

phor: an axis mundi, a long monumental tomb, a linear measure, a human body or the infinity idea. It can be all the things together at the same time. Such a broad spectrum of possible uses and meanings of this metaphor makes its change, as well as its sublimation accompanied by a rise of abstraction, much easier. Thus, it can separate itself from the narrative sphere without effort and fulfill more and more specialized communication tasks. The element, which earlier was inseparably linked with the wheel, spiral or squiggle as an embodiment of cosmic connections, could be set to use as part of individualized communication acts, for example, as a linear measure – the measuring stick. To put the issues discussed here in the form of a metaphor and analogy, I would say that if the domus idea was a revolutionary doctrine in the Neolithic period, then the measuring stick was its executive act.

Lining the ancestors – ordering the world: Horizontal and vertical spatiality of Early Bronze Age burials in the North Caucasus and beyond
Sabine Reinhold (DAI Eurasia department)

Linearity of cemeteries built with burial mounds is an ubiquitous phenomenon in Eurasia. Several tens of kilometre-long lines – mound by mound – cross the wide open landscapes especially in the steppe zone. A topographic background, e.g. a higher visibility on watershed, cannot always explain this spatial configuration. Linearity obviously belongs to the very first cases, when monuments for deceased were erected at all. For a long time, the incorporation of a deceased community member into a community of ancestors was spatially organised in a horizontal manner. These lines of ancestors ordered territories, structured movement and communication, and functioned as landmarks, perhaps not only in a geographic perspective. Parallel, vertical configurations of succeeding burials and additions to existing mounds are frequent. Like the horizontal lining, the vertical lining demonstrated an affiliation to an existing community of ancestors. Based on case studies from the North Caucasus piedmonts and steppe zone, this paper will explore the origin of the concept to line ancestors horizontally or vertically. When and why was such a configuration developed? Did the line order of the world of ancestors guide the world of the living and perceiving communities? What role did the terrain play in this process?
Spatial organization of Eneolithic and Early Bronze Age in the North Pontic steppe

Marina Daragan (DAI Eurasia department)

One of the best investigated micro-regions of the North Pontic Region, the interflux of the rivers Bazluk, Solenaja and Chertomlyk, illustrates in an outstanding way the principles governing spatiality and formation of burial mound cemeteries during the Eneolithic (4th millennium BC) and Early Bronze Age (3rd millennium BC). The area of this micro-region measures about 267.4 km². Here, not less than 470 barrows (kurgans) are known, of which 247 have been excavated. Excavations covered the entire area due to massive quarrying activities. In these barrows, 794 burials have been uncovered dating to the Eneolithic and Bronze Ages. Additionally, 67 Eneolithic flat graves without mounds are known. The analysis thus reflects the real arrangements of burials, barrows and barrow groups of various cultures situated in the area of the interflux. The construction of first mounds in this region started during the middle Eneolithic. Already at this early stage, complex funeral constructions, including cromlechs, ritual constructions, and ring ditches, are present. Eneolithic burials, some of them with several burials under one embankment or some in barrows side-by-side, are however not numerous. The barrows of this period are constructed in lower parts of the landscape and on watersheds at single spots. During the Pitgave- or Yamnaya culture (3rd millennium BC), the concept of space essentially changed. Barrow construction increased, as did the number of burials in one mound. Embankments become larger, and in some cases barrows are grouped in cemeteries. Thus, the “Pit-grave” populations opened up much more space for burial monuments. During this epoch, the principles of spatial organization were formed – they are dominated by long linear chains of mounds. All investigated kurgan groups with the Pit-grave barrows in our region are organized in lines. The linearity of the cemeteries is reflected not only in the lines of Pit-grave barrows, but likewise in holloways (roads?) that radiate from some mounds. Moreover, during the construction of Pit-grave barrows a specific rhythm can be noted, equally within separate groups of mounds and the general system in the area of the river interflux. For instance, the mounds in our area contain only a few shells or embankments, and groups of two or three barrows or singular mounds prevail.

Study on the location of burial rites in the landscape: Tumuli culture mounds in the Krotoszyn Forest at the Silesia-Great Poland borderland

Mateusz Stróżyk (Poznań Archaeological Museum)

The paper concerns the funeral rite of the Tumulus Culture (TC) community located on the border of Silesia and Great Poland. The matter relates to the period at approximately the mid-2nd millennium BC, i.e. the years from 1550–1300 BC. In Central Europe, the period is directly connected with the growth and predominance of the TC – a taxonomic unit identified in vast areas stretching westward to the Rhine Valley and eastward to the arc of the Carpathians, and along the south-north axis over the territories from the border of the European Lowland to the Alpine foreland. Compared with the preceding archaeological cultures covered by the common name of Central European Early Bronze Age civilisation, the TC is to be considered to exhibit a new socio-cultural quality characterised by changes in forms and ornamental patterns of bronze objects, less frequently of ceramics. Most importantly, however, we are dealing with a noticeable transformation of a worldview that was taking place throughout the TC ecumen – the barrow funerary ritual. The barrows, too, are the only TC-related category of sources that enables its deeper analysis. The region in which we are planning to carry out the research objectives is located in the Krotoszyn Forest. This is a swathe of territory of ca. 3600 ha and the largest compact concentration of oak trees in Poland. The circumstance is absolutely unique, as the introduction of machines in agrotechnology (steam ploughing in the 19th cent., combustion tractors in the 20th) led to a considerable shrinking and devastation of the cultural landscape. The degree of the preservation of the cultural substance within the ancient forest stands allows us to consider the Krotoszyn Forest as the best possible area for realising the research tasks set down in the project. The application of a whole package of modern non-invasive procedures, including spatial analyses in GIS environment of the digital elevation model (DEM) obtained during airborne laser scanning (LiDAR/ALS), magnetometric prospection, and geological and paleoenvironmental analysis, will help to make the most of the informative potential of the Krotoszyn Forest. The procedures will provide a basis for building a model presenting the formation of the spatial layout that ensued from the activities of TC communities. Accumulated information (from single objects to the whole region) will allow the isolation of landscape preferences that might have made Bronze Age communities choose specific set-
Orientations and linearity of Neolithic burial monuments on the Jutland Peninsula: Causes and consequences of monumental alignments

Niels Johannsen (Aarhus University; presenting author), Torben Egeberg (Arkæologi Vest)

In this paper we describe, compare and analyse alignments of various types of Neolithic burial monuments in the northwestern part of the Jutland Peninsula. We focus, in particular, on 1) the long barrows of the early and middle Funnel Beaker period, including those with wooden chambers as well as those with megalithic chambers, and 2) the stone heap graves of the late Funnel Beaker period. Discussing these, we also include relationships and comparisons to a number of other Neolithic monuments, contemporaneous as well as later structures. We provide a number of examples of the situation of these two types of monuments in the landscape and discuss the extent to which it is possible to identify general patterns of orientation and alignment for them. Here, we discuss various factors that potentially limit the representativity of the current record. We then compare our findings for the long barrows and for the stone heap graves, which leads to our discussion of what caused the observed patterns and the roles linear alignment is likely to have played in these respective cases. Why do we see this theme in the 4th and 3rd millennium burial record of this region, and which consequences did these monumental alignments have, short-term and long-term?

Linear space organization in Linear Pottery culture longhouses and Funnel Beaker culture Kujavian long barrows – similarities and differences

Renata Zych (Instytut Archeologii, Uniwersytet Rzeszowski, Rzeszow)

The paper shows the relations that occur between Linear Pottery longhouses and Funnel Beaker culture Kujavian long barrows in the area of Poland. The basic assumption of these structures was their durability. Their construction meant not only physical, but also mental landscape change. Linear organization of space, both the longhouses and the long barrows, can be seen. We notice similarities and differences between the two structures. Changes that have taken place in time and space, which can be observed in empirical material, may (but do not have to) reflect the changes in the perception of reality by past communities. The aim of the paper is the juxtaposition of source material and its analyses and the consideration of the significance of these linear arrangements.

Stone rows and earthen barrows – significant connection or diachrone hazard?

Reena Perschke (Museum Lichtenberg)

The famous Carnac alignments (Brittany, France) stretch for some kilometres in a rolling landscape over at least four soft-swelling foothills. They structure the landscape in a striking way, while the wooded surroundings are full of isolated menhirs, geometric menhir settings, non-megalithic barrows and megalith graves, the last of which have been hidden under tumuli in prehistoric times. It is lesser known that the alignments refer to earthen barrows in various ways: at different sites in the parish of Carnac the stone rows align over a long barrow (Manio), disappear under another long barrow (Kerlescan), are located at a right angle to the end of a barrow cone (Kerdual, Locmariager) or alternate repeatedly in the pattern: barrow – stone row – barrow – stone row, etc., for example between the five barrows of Lann Granvillarrec. The function of these barrows is sometimes unclear. Internal stone structures do not always point to a primary sepulchral function, but to a multiphase use in possible profane, ritual and sepulchral functions. The lack of artefacts results in difficulties to determine chronology and context. This intentional use, reuse, and transformation of both alignments and landscape may result from a diachronic hazard, e.g. from a decrease in the significance of the older monuments and the ensuing scenic modification through
younger constructions. Alternatively, the respective younger monuments may relate directly to the older monuments, valuing the striking distance in each case. This paper discusses the different interpretations of lining correspondences between stone rows, earthen barrows and sometimes even stone circles, attempting to clarify the confusing situation regarding the chronological sequence of construction.

Lines, groups or landscapes? Arrangements of prehistoric barrows in the upper Dniester Basin

Przemysław Makarowicz (Institute of Prehistory, Adam Mickiewicz University in Poznań, Poland; presenting author), Jakub Niebieszczański, Jan Romaniszyn, Robert Staniuk, Rafał Skrzyniecki, Mateusz Cwaliński, Hubert Lepionka, Igor Kochkin, Yuriy Boltrik, Vitaliy Rud

Recent research suggests that initially the Black Sea steppe was covered with over a half million barrows, thus marking a variety of individual necropolises. At this moment, it is impossible to make such estimations for the forest zone in the upper Dniester drainage. Undoubtedly, there were not as many barrows as in the steppe region, most likely their numbers exceeded tens of thousands tumuli. The monuments located in the upper Dniester drainage represent different chronological periods. They were erected since the beginning of the 3rd millennium BC throughout the Middle Ages, even in the Early Modern Period and in present days. This long-term tradition became a constant element of the local landscape, actively shaping its regional character. This presentation covers the preliminary results of two joint Polish-Ukrainian research projects, which are half-way finished. The main project is aimed at establishing a catalogue of tumuli cemeteries of the Komariv culture from the first half of the 2nd millennium BC, located in the upper Dniester drainage. The project required an application of contemporary technologies. The methods of the project were based on field and laboratory work with the use geodetic equipment and GIS software. The preparation and field work resulted in digitalization of all the cartographical materials in 1:10 000 scale sheets and their transformation into Digital Elevation Models with point information about each tumulus, obtained from the GPS receivers. Moreover, each cemetery was provided with its own exact digital plan by total station and RTK GPS. The analytical part of the project was conducted with the use of ESRI ArcINFO, which offers various GIS analyses, such as visibility, slope or aspect evaluation by working on a basis of the Digital Elevation Models. As a result, it became possible to gain a wider perspective on the barrow distribution in order to evaluate their spatial geometry and location principals. For certain necropolises, a Light Detection and Ranging (LiDAR) method will be applied, whereas others will be researched with the geophysical method. Archival research is being reworked with modern analytical standards. Similar to other regions of Eurasia, barrows in the upper Dniester basin are ordered in linear or linear-group structures. Their lengths stretch from a few hundred meters to few kilometers and their numbers range from more than a dozen to several dozen monuments. Within particular alignments, smaller concentrations of tumuli or even single mounds are visible. Such structures often ‘break down’ the initial order of the alignments. The barrow necropolises are located on elevated terrain, stretching along watersheds on flat hilltops or in their close vicinity, generally across mild slope descent which falls from 5–7°. The palimpsest characteristics of the studied necropolises, which create segmented barrow landscapes, is emphasized by the construction of the Komariv culture barrows in the 2nd millennium BC into already existing lines of the Corded Ware culture monuments from the 3rd millennium BC. Together they create long-lasting, funerary-sacral spaces of multidimensional symbolic value, numerous social functions and various practical meaning.

Networked landscapes-- The structure of corded ware barrow lines

Quentin Bourgeois (Leiden University)

This paper aims to reveal how the long lines of Corded Ware burial mounds, emerging in the early 3rd Millennium BC, structured space and created a vast physical network of funerary monuments. It aims to do so through a combination of network analysis and intervisibility patterns. In most of the regions where Corded Ware groups have been identified, we see the emergence of long linear arrangements of barrows, some of which can be followed over distances of several km. By constructing a new barrow at a specific position on a particular line, these Corded Ware groups affirmed their specific position within the physical network of funerary monuments. As revealed in previous research, a visual hierarchy can be observed with some monuments visible over great distances while others were unobtrusive. Some of these highly conspicuous monuments visually connected multiple barrow lines, linking one valley to the next. These visual differences, inherent in the positioning within the landscape, reveal which barrows received pride of place and which did not. In this paper I will explore these inherent differences through network-
analysis, exploring intervisibility patterns and the positioning of specific monuments. The results from this analysis will then be combined with excavation results. Which type of burial was located at what visual position? Is there a correlation between specific types of burials on highly conspicuous positions, contrasting with other – less visible – locations? In other words, can we correlate the physical landscape positioning with the social landscape?

Reconstruction of Early Iron Age pathway models in Southwest Germany and the Alsace
Franziska Faukel (Institute for Pre- and Protohistory / Graduate School Human Development in Landscapes, Kiel University)

Cultural mapping of the Early Iron Age in Southwest Germany presupposes the Upper Rhine as a main communication corridor. Precise questions on the location of routes, infrastructure and distribution remain unanswered. This presentation is limited to the modelling and reconstruction of the pathway of the Early Iron Age as a starting point for further research on infrastructure, cultural distances and cultural morphology of the study area. Basing on the location of settlements and cemeteries, an empiric pathway model will be reconstructed. This is based on the assumption that grave mounds are located near routes and are therefore more or less linearly arranged. Now this empirical model has to be compared to other theoretical models in order to determine which conditions could be fundamental for the specific location of the routes and the monuments. These theoretical models are mainly “Least-Cost-Path” analyses. Additionally, other parameters than elevation models can be integrated like “Least-Cost-Path if walking is intended” in contrast to a “Least-Cost-Path if driving is intended”, or good visibility in contrast to bad visibility, preference of high levels or routes alongside river plains. Comparing these theoretical models with the empirical model reveals which theoretical models correlated best in order to distinguish the most likely parameters. This comparison enables us to understand, which conditions influence the location of monuments. Using this data will also to facilitate an understanding on what the intention for these linear arrangements could have been.

Methods for reconstructing linear structures of monuments
Oliver Nakoinz (Institute for Pre- and Protohistory / Graduate School Human Development in Landscapes, Kiel University)

Linear arrangements of monuments emerge in the 4th and 3rd millennium BC. These lines can be interpreted as ways, borders or metaphysical axes. A multifunctional usage can not be excluded. This contribution does not discuss the different interpretations but discusses methods which can be used for the reconstruction of the linear structures. Since proper reconstruction of the linear structures, a model of the linear structures, is a precondition of a sound interpretation, careful work on the reconstruction is vital for the result. In a first step, theoretical and empirical models of linear structures are introduced. Then, the difference between exact and approximated approaches is addressed with emphasis on the significance of the different concepts for the interpretation. The main part of this contribution presents some methods for the reconstruction of linear structures. The first set of methods deals with theoretical models which serve for the comparison with empirical methods. Approaches from graph theory and least coast modelling are addressed as well as topographic considerations. In this part, graph theory is used for network development. The empirical methods also involve graph theoretical methods, but here they are used for pattern recognition. In addition, density based approaches, regression, and pattern comparison are used. Some examples from case studies serve the visualisation of the methods.

Talaiotic tower-like monuments: Construction methods and estimates of invested work
Maria Gelabert Oliver (Graduate School Human Development in Landscapes, Kiel University)

The tower-like talaiotic monuments of Mallorca (Balearic Islands) are emblematic and well-dated architectonical features of the Iron Age (between ca. 900 and 550 BCE). These buildings represent nodal structures of talaiotic settlements, having important social and economic functions. Given their size and communal character, talaiotic monuments represent shared values into which a collective and considerable amount of work was invested. The study of the invested work in the construction of talaiotic monuments offers an estimate of social value. Obtaining such estimates represents the first phase of a research programme that will define the distribu-
tion of social intensity on Mallorca during the ta-
laiotic period. The spatial distribution of social inten-
sity allows for a study of its relationship with envi-
ronmental variables and a definition of the social 
space during the talaiotic period. Already carried out 
work consisted in the study of construction methods, 
dimensions and structural characteristics of ta-
laiotic monuments. An analysis of this type of data 
provides the necessary information to estimate in-
vested work during monument construction. Imple-
mented methods, obtained results during the first 
research phase, and preliminary interpretations will 
be presented.

Bukivna: A Bronze Age elite barrow ne-
cropolis in the Dniester basin

Przemystaw Makarowicz (Institute of Prehistory, 
Adam Mickiewicz University in Poznań, Poland; 
presenting author), Siergiej D. Lysenko, Igor T. 
Kochkin, Robert Staniuk, Jan Romaniszyn, Rafał 
Skrzyniecki, Weronika Skrzyniecka, Hubert Le-
pionka

The barrow cemetery in Bukivna, Ukraine is re-
garded as one of the most important funerary sites 
of the Komariv component of the Trzciniec Cultural 
Circle (TCC). It is located on the border between the 
forest steppe and forest zones in the upper Dniester 
basin and is situated about 1.5 km from the river-
bank to the west. First excavations were conducted 
in the 1930s by archaeologists from the Jan Kazim-
ierz University in Lwów. Since 2010, the necropolis 
has been studied by a joint Polish-Ukrainian expedi-
tion, funded by the National Science Centre, Poland. 
The aim of the project is to survey the spatial distri-
bution of the cemetery using GIS tools, analyse sub-
terranean structures using geophysical prospection 
and carry out excavations on selected barrows. Ad-
ditional emphasis is made on complex analyses of 
the archaeological material with the use of both 
traditional and archeometric methods, as well as 
paleoenvironmental research of the site and its sur-
roundings (the Dniester valley and adjacent peats). 
The field prospection has revealed over 50 barrows 
(including some of the already researched mounds 
from the 1930s). They are arranged in two main lin-
ear structures, which consist of smaller clusters. 
Among the latter, single barrows were recorded as 
well. Initially, the number of barrows must have 
been greater, since today they are only found in 
beech forest areas, and scarcely in the fields and pastures. The general picture is shaped by two main 
alignments: a longer and a shorter one. The first 
structure, consisting of 32 barrows, spreads along 
the east-west axis and measures over 3.5 km in 
length (with intervals). The latter, 19 monuments in 
total, is drawn along the north-south axis, at a ca. 1 
km distance (also with intervals). Within 300 m to the 
east of this group, there are three additional bar-
rows, also situated on the north-south axis. The 
geomagnetic survey has revealed a number of 
anomalies inside and between barrows, which mark 
the presence of various constructions within the 
mounds. A total of six barrows were excavated, five 
of them were proved to belong to the Komariv cul-
ture, whilst only one to the Corded Ware culture. All 
of them were built by the use of turf bricks, which 
were cut from the surrounding area. Palynological, 
paleopedological and geochemical analyses suggest 
that the tumuli in Bukivna were constructed in a 
deforested area, on lixiviated chernozem soils, 
which developed beneath a floral coverage typical 
for meadows of a temperate climate with sufficient 
rainfall. The excavations carried out in Bukivna have 
revealed a highly complex funerary rite. It consisted 
of burnt down wooden constructions made of oak: 
mortuary houses, burial chambers, timber con-
structions and small ritual structures of non-
sepulchral function. Additional stone structures 
without burial traces (cenotaphs?) were recorded, 
along with groups of vessels deposited in various 
parts of the barrows, both in mound and on ancient 
ground. Inside the graves with wooden construc-
tions, the cremated remains of the deceased were 
found. Numerous archaeological materials (both 
metal and pottery finds) suggests inspiration from 
the Otomani-Füzesabony complex of the Carpathian 
Basin and cultural environments of its eastern sur-
roundings. The radiocarbon dating revealed that the 
cemetery had two main phases: 2400/2200 BC (the 
Corded Ware phase) and 1800–1500 BC (the Komariv 
phase).
Abstracts Session 10

Records of Neolithic transformation processes – social and/or environmental crisis?

Maximilian Schuh (Historisches Seminar, University of Heidelberg)

From 1315 to 1322 one of the worst famines of the premodern period prevailed in England. Extreme weather conditions met a society that heavily relied on good grain harvests. Heavy precipitation during the summer month in 1315 and 1316 led to double back harvest failures that caused raising prices for eatables and subsequent famines. Animal murrains worsened the situation. These natural impacts alone do not explain the extent of the famine. The paper examines in what way independent economic, political and social factors contributed to crisis. Thus a multicausal explanation for the extreme famine is brought forward. This highlights the importance of a close analysis of the entanglement of environment and society.

Records of Neolithic transformation processes – social and/or environmental crisis?

Walter Dörfler (Institute of Pre- and Protohistoric Archaeology / Graduate School Human Development in Landscapes, Kiel University)

From ca. 3500 BC onwards after a phase of ca. 500 years of growth and the establishment of the first Neolithic culture in Northern Europe (Funnel Beaker Culture), we have evidence from archaeological and palaeoecological records for societal, cultural and economic decline. Similar developments are known from Ireland and Great Britain. These changes are interpreted to relate to a period of crisis and transformation which finally led to the establishment of new archeological complexes, i.e. Corded Ware groups, in large parts of Europe.

Late Neolithic environmental change in South-west Germany according to pollen profiles in the Black Forest and pre-Alpine lowlands

Manfred Rösch (Landesamt für Denkmalpflege Baden-Württemberg; presenting author) Jutta Lechterbeck, Elske Fischer, Lucia Wick

In recent years, more than 15 limnic profiles in the Schwarzwald and Alpenvorland regions, and here especially in the Bodensee and Hegau region, as well as in Oberschwaben, were studied by pollen analysis. The sampling was done without gaps and with a sample thickness between 0.5 and 1 cm for the time period between 5000 cal BC and the upper surface, resulting in diagrams consisting of 200 to more as 1000 samples and there with a time resolution between 20 and less than 10 years. In the period between 3500 and 2800 cal BC, the archaeological record in the Alpenvorland shows settlement and land use activities of the Horgen culture, whereas from the Schwarzwald no archaeological evidence is known. In the Alpenvorland, the pollen record of this period shows only weak increase of NAP, but a strong charcoal increase, a consequence not of weak human impact, but of the specific method of land use, a kind of swidden cultivation. At the beginning and towards the end, Fagus sylvatica is dominates. In the time between, for a period of 200 to 500 years, Corylus avellana dominates and human impact indicators are more frequent. On-site data show no strong change compared with the preceding Pfyn culture, but, according to the crop weeds, a gradual change of land use with more permanent fields. In the Schwarzwald, this period is characterized by maximum values of Abies alba, which started its increase a few centuries before together with the Ulmus decline. But there is already weak evidence for human impact, and at some sites the Abies maximum is interrupted by a Betula peak shortly before cal 3000 BC. Without archaeological evidence, the location and nature of this human impact is questionable.

Land use, settlement dynamics and demography between the Western Lake Constance Area and the Hegau between 3500 and 2800 BC

Jutta Lechterbeck (presenting author), Matthias Merkl, Manfred Rösch (all Landesamt für Denkmalpflege Baden-Württemberg, Gaienhofen)

The western Lake Constance area has long since been subject to intense palynological and archaeological research. The timespan between 3500 and
2800 BC is of special interest as it covers the transition from the Young to the Late Neolithic dwellings at the lake shore. In the course of a DFG project [German Research Council], new pollen profiles from the adjacent Hegau area were made as well as an inventory of archaeological finds for the whole region in the form of a database. The archaeological record suggests a decline in population at the period. This will be contrasted with palynological data, in order to explore potential reasons for that process. First results of the pollen analyses show a reforestation phase at the beginning of the Horgen period in the profiles near Lake Constance, which is synchronous to the Pfyn/Horgen gap, a period of ca. 300 years where there are no pile dwellings at the lake shore. Pollen analysis shows, however, that the hinterland of Lake Constance is already settled again in this phase. In contrast, land use in the Hegau area declines in the Late Neolithic. The transition to the corded ware is characterized by a further decrease of land use pressure in all pollen profiles. These fluctuations in land use intensity and settlement dynamics could be correlated with a demographic proxy based on radiocarbon dates. It is thus highly probable that shifts in land use intensity in the working area are rather correlated with demography than with other factors such as climate. Though at the moment it is not clear what drives population density, the demographic development of the Hegau/Lake Constance area runs parallel to that of Eastern Switzerland and thus represents rather a regional than a local trend so that small scaled local reasons seem improbable.

Some critical remarks on interpretations concerning relations of climate and culture

Niels Bleicher (Underwater Archaeology and Dendrochronology, City of Zürich)

The extraordinary preservation conditions of prehistoric waterlogged sites in the circumalpine foreland have not only allowed detailed environmental reconstructions. These have also given rise to a number of interpretations concerning relations between climate and culture. But how well are these based on reliable climatological knowledge? And how convincing are the postulated mechanisms through which climate is thought to act on culture? How do the archaeological approaches to prehistoric climate vulnerability compare to current approaches adopted by the IPCC for future climate change? A suggestion for a systematic semiquantitative approach to address climate vulnerability is presented.

Measuring agricultural decline: Potential effects of differential sampling in archaeobotany

Meriel McClatchie¹, Amy Bogaard², Sue Colledge¹, Nicki J. Whitehouse², Rick J. Schulting², Phil Bartlett³, T. Rowan McLaughlin¹ (1 School of Archaeology, University College Dublin, Ireland; 2 School of Archaeology, University of Oxford, UK; 3 Institute of Archaeology, University College London, UK; 4 School of Geography, Earth and Environmental Sciences, UK; 5 School of Geography, Earth and Environmental Sciences, Plymouth University, UK; 6 School of Geography, Archaeology and Palaeoecology, Queen’s University Belfast, UK)

A major research project investigating agriculture in Neolithic Ireland, “Cultivating Societies”, was completed recently [Whitehouse et al. 2014]. The project examined the nature, timing and extent of Neolithic agricultural activity through collation and analysis of different strands of archaeological and environmental evidence, with a particular focus on plant macro-remains, pollen and ¹⁴C data. Investigation of plant macroremain evidence from 52 sites enabled new insights into the variety of crops recorded at different times and locations (McClatchie et al. 2014). Emmer wheat was the most important cereal, while barley (naked and hulled) was also recorded. The presence of directly-dated flax extended the known range of crops cultivated at this time. The earliest evidence for cereals was associated mainly with Early Neolithic rectangular houses (3750–3600 cal BC). Although these rectangular houses were relatively short-lived, being built and occupied for less than two centuries, agriculture persisted, continuing into the first half of the Middle Neolithic period (3600–3400 cal BC). There does appear to have been a significant shift in behaviour, however, from the second half of the Middle Neolithic period (from 3400 cal BC), when both cereals and ‘domestic’ structures become much rarer in the archaeological record. Taken at face value, this implies that cereals became less important from 3400 cal BC, and this situation may have continued into the Late Neolithic period (3000–2500 cal BC). However, there is not a clear-cut increase in gathered foods at the expense of cereals, and we cannot assume that there was a simple shift from cultivated to wild plant food strategies. Furthermore, analysis of the Irish data shows that far fewer later Neolithic sites have been excavated when compared with earlier Neolithic sites, and the later sites were subject to less intensive environmental sampling strategies. This paper will consider the potential effects of differential
Beaker Period seems to be characterised by distinct more differentiated picture. In fact, the Funnel increase in chronological resolution enable a much plausible, since interdisciplinary cooperation and an ated Funnel Beaker North Group, are no longer of a uniform cultural development within the associ-ated cultural, economic and environmental conditions which resulted in a fragile society with low resilience to internal and external disturbances, which, in turn, led to a collapse of the Funnel Beaker social system and finally resulted in the emergence of the Single Grave Complex.

**Drastic changes in the settlement-structure in the Early and Middle Neolithic of Denmark**

Tobias Torfing (Graduate School Human Development in Landscapes, Kiel University)

The onset of the Neolithic around 4000 BC evidently changed settlement patterns in the south Scandinavian region, but this was not the final and perhaps not even the most drastic change within the TRB
The sheep, the wheel and pottery assemblage: Who or what shaped the Tripolye world ca. 3500–3000/2950 BC

Małgorzata Rybicka, Aleksandr Diachenko (Institute of Archaeology of the NAS of Ukraine; presenting author), Dariusz Krol

Significant transformations of the Cucuteni-Tripolye cultural complex (CTCC) started to occur at 3600/3500 BC and led to its decline ca. 3000/2950 BC. Up to the present, experts have mainly looked for a simple explanation for this issue (e.g. Gimbutas 1961, 1991; Kruts 1989, 2012; Passek 1949; Videiko 2008). The relations between sedentary agriculturalists and pastoralists were reassessed in recent years (Anthony 2007; Di Cosmo 2002; Levine et al. 2003; Manzura 2004; Rassamakin 2004; et al.), while the concept of “archaeological culture” has encountered the alternatives of “networks” and “social fields” (Furholt 2008, 2009, 2009 (2011); Kohl 2008; Müller 2001, 2013; Nakoiz 2005; Wolf 1982, 1984). However, migrations still remain powerful and, in many cases, reasonable explanations of culture change (Anthony 1990, 2007; Dergachev 2007). Analysis of the Tripolye decline includes issues of the absolute and relative chronology of sites, data regarding climate fluctuations and archaeological evidence for socio-economic transformations. It is made possible by the combination of new research (including the relations between the “Tripolians” and...
Where were people in the Copper Age dead, alive but invisible? A multi-proxy case study from southwestern Moravia (Czech Republic)

Jan Kolář (Institute of Botany CAS / Masaryk University, Brno, Czech Republic; presenting author), Petr Kuneš, Mária Hajnálová, Helena Svitávková Svobodová, Martin Macek, Peter Ťkáč, Péter Szabó

The European archaeological record in various regions shows a rapid increase after the start of more sedentary life and agriculture at the beginning of the Neolithic. This is usually connected with population growth, which was enabled by increased food production, new technologies, etc. However, several centuries later a relatively rapid decline is often observed. Can this be also connected to population decline on a pan-European scale level? Or were there other causes? Did human communities change their behaviour in a way that makes their traces less visible for archaeology? Our study region lies around an extinct lake near Vracov in southwestern Moravia (Czech Republic). The presentation will discuss the 'Copper Age dilemma' with the help of a past human activity model based on the all known archaeological sites and finds in the area and incorporating temporal and spatial uncertainties. To reconstruct Holocene vegetation in the region, the REVEALS model was applied to a long pollen profile (10000 BC–1000 AD). Local climate was simulated by an independent Macrophysical Climate Model. The Early Neolithic with LBK communities (5500–5000 BC) forms one of the periods with the strongest archaeological evidence in the entire prehistory of the Vracov region. Nevertheless, already before 4000 BC a relatively abrupt decline in the archaeological record was recorded. This decline continued for 1500 years to 2500, when Corded Ware culture and Bell Beaker communities emerged in the region. This long-lasting decline represents a period with the weakest archaeological record, comparable only to the Mesolithic. At the same time, this period is also characterised by higher ratios of wild fauna in the archaeozoological evidence of the Lengyel culture, the beginnings of the use of fortified hilltop settlements and the almost complete absence of burial grounds. What social, economic and/or environmental processes could cause the complete change in behaviour around 2500 BC, producing a different character and much higher numbers of archaeological evidence? We acknowledge funding from the European Research Council under the European Union’s Seventh Framework Programme (FP7/2007-2013) / ERC Grant agreement no 278065 from the Czech Science Foundation (P504/12/0649) and from VEGA 1/0477/11.

Palaeoecological evidence of an abrupt climate change between 3200 and 2600 BC from Lake Skogtjern, Southern Norway

Magda Wieckowska-Lüth (presenting author), Walter Dörfler, Wiebke Kirleis (all Institute of Pre- and Protohistoric Archaeology at Kiel University)

The coring site Lake Skogtjern, Telemark, Southern Norway, offers pollen analytical investigations with a high temporal resolution, showing a detailed picture of landscape development in the course of time. Complementary techniques of non-pollen palynomorph- and microscopic charcoal analysis as well as loss-on-ignition and determination of geochemical element distribution were also employed on its sediments, allowing the consideration of the palaeoecological interactions, climate, and human influence. In the palaeoecological record, the Early Neolithic is characterised by the first evidence of animal husbandry and cereal cultivation, culminating between ca. 3600 and 3300 cal BC, even if an establishment of a farming community cannot be considered for this period compared to the other parts of Northern Europe. In any case, around 3200 to 2600 cal BC in the Middle Neolithic, there is an abrupt change in environmental conditions marked by a distinct increase in the input of terrigenous mineral material in the lake deposits, pointing to significant catchment erosion. Moreover, a lithostratigraphical switch indicates changed processes within the aquatic system between ca. 3000 and 2600 cal BC. At the same time, anthropogenic indicators disappear almost entirely from the pollen record, and the highest level of arboreal pollen is reached at ca. 2900 cal BC, demonstrating completely closed woodland. Consequently, the change in the palaeoecological conditions seems to have been solely controlled by climatic changes.
Oldenburg-Dannau LA 77 – Development of Funnel Beaker farming in eastern Holstein

Stefanie Kloß (Institute of Pre- and Protohistoric Archaeology at Kiel University)

Oldenburg-Dannau LA 77 is one out of few TRB settlement sites in the morainic landscape of eastern Holstein in Northern Germany with profound evidence of charred plant macro remains. More than 300 refuse pits and post holes, indicating about five house structures, were excavated and sampled. The chronological model, ensured by 48 radiocarbon dates, revealed three settlement phases between 3300 and 2900 cal BC during the Middle Neolithic periods I to IV, which are mirrored in the archaeobotanical assemblages. Spatial analysis enables a distinction between areas for food preparation in the centre and areas for the disposal of cereal processing waste at the edge of the settlement. An increasing use of wild plants towards the end of the occupation shows a temporal differentiation, thus the decline in the ratio of domestic versus wild plants is discussed here as a possible crisis indicator. However, for the interpretation of the plant assemblages, preservation matters. For sure, the latest settlement phase, immediately before its abandonment, provides the most representative archaeobotanical data.
Abstracts Session 11

Societal dynamics and pottery styles in southeast and East Europe during Neolithic and Chalcolithic

Culture, period or style? Re-evaluation of the Early and Middle Copper Age on the Great Hungarian Plain

Zsuzsanna Siklósi (Eötvös Loránd University, Institute of Archaeological Sciences; presenting author), Márton Szilágyi

Due to the new Bayesian modelled AMS series, the generally accepted typochronological system of the Early and Middle Copper Age on the Great Hungarian Plain has collapsed. The dating of the Tiszapolgár assemblages did not change, but the Bodrogkereszttúr and Hunyadihalom assemblages were considerably older than were formerly assumed. It seemed that these different ceramic styles existed partially contemporaneously on the Great Hungarian Plain. This has far-reaching consequences on the interpretation of the Copper Age. We started to study this complex problem from three different points of view: 1) Problems of dating: whether is it possible to maintain the typochronological dating? How can we test it with radiocarbon measurements? Were the different ceramic styles really contemporary or is it just an illusion caused by methodological problems of radiocarbon dating? 2) Problems of space: Is it possible to continue to deal with the Great Hungarian Plain as a homogenous unit? Is it possible to extrapolate the dating of a site to a wider region? 3) Problems of analytical unit: whether is it possible to maintain the homogenous, analytical unit of Tiszapolgár and Bodrogkereszttúr cultures? And their stylistic units? What is represented by these stylistic units? We use the combination of different scientific methods to answer these questions. We have performed intensive field survey in three microregions on the Great Hungarian Plain in order to reconstruct the settlement pattern. We have made new series of AMS measurements and carried out multivariate statistical-based stylistic analyses on pottery. The preliminary results of our research project clearly show that the archaeological cultures as analytical units cannot be maintained anymore. Instead of these virtual homogenous units, communities living on the Great Hungarian Plain were diverse and fluid, and they had complex social networks.

Corded Ware pottery styles in Thuringia: Chronology or chorology?

Ralph Großmann (Institute of Pre- and Protohistoric Archaeology / Graduate School Human Development in Landscapes, Kiel University)

The material culture of the Corded Ware phenomenon existed within the 3rd millennium BC. It extended from the Volga to the Rhine and from the Alps to southern Scandinavia. The Corded Ware phenomenon has been interpreted in many ways as a single cultural group with a uniform material culture. Meanwhile, the phenomenon seems to have a greater heterogeneity due to differences in local conditions (Furholt 2014). Furthermore, the pottery styles have been mainly interpreted as chronological markers. The research has assumed that the pottery styles developed from simple horizontal ornamentation to complex ornamentation and the younger phase is based on simply decorated beakers (e.g. Müller 1999). This paper overcomes the chronological interpretation of the pottery style. Based on a study area [Thuringia], it is obvious that several pottery styles show predominantly spatial character. Moreover, pottery styles have been used for a long period of time and connected several material cultures and chronological changes can be detected in the spreads of the respective styles. Furthermore, some beakers consisted of hybrid styles and were part of regional networks. The paper will discuss the meanings and the transfer of the styles and the question of mobility and exchange.

What’s melting in the pot? Cultural interaction and everyday life in the settlement of Polgár-Csőszhalom as reflected by the ceramic material

Katalin Sebők (Archaeological Institute of the Eötvös Loránd University, Budapest)

Polgár-Csőszhalom is a unique site situated in Northeast Hungary. Its life covers the Late Neolithic of the area between about 4980 and 4475 cal BC. The settlement consists of a tell-like mound surrounded by a large enclosure system, and an extended horizontal settlement covering approximately 40 hectares. The site’s archaeological material is characterized by heterogeneity with several traits of the surrounding archaeological units and their stylistic traditions (Tisza, Lengyel, Iclod–Herpály, Samborzec–Opatów cultures, etc.). Subsidized by the Hungarian Research Fund (ID NK101024), a large-scale
An assessment on the origins and variability of the Cucuteni C pottery in Eastern Romania

Florica Mateu (Alexandru Ioan Cuza University of Iasi, Romania; presenting author), Valentin Nica, Mitica Pintilei, Alexandru Stancu

The aim of this study is to investigate the origins and the degree of variability in terms of raw material provenance (clay and shell/valve used as temper) and technology used for the Cucuteni C pottery of Eastern Romania. Cucuteni C pottery was mentioned by archaeologists starting with the first half of the 20th century, being considered as a “foreign and inferior” ceramic, representative for the contacts of the Cucuteni-Trypillia communities, which developed during the 5th-4th millennia BC, with the ones coming from the steppe region. Multielement analysis of 50 pottery fragments sampled to represent the stylistic and technological diversity of the Cucuteni C shell tempered pottery sherds was done for a determination of chemical composition in order to study their provenance. The chemical analysis was carried out by X-ray fluorescence (XRF) and the data were analysed by using principal component analysis (PCA) and hierarchical cluster analysis (HCA) in order to define grouping by obtaining information about their similarity and clustering. The results of the chemical analysis provided persuasive evidence that the Cucuteni shell tempered pottery sherds from Eastern Romania are of different provenance. In order to investigate the technological characteristics of the Cucuteni C shell tempered pottery, we have investigated the mineralogical transformations caused by the firing process and the microscopical structure. The clay mineral type and the structural deformation of the clay and shell temper due to firing have been studied from their Fourier transform infrared (FT-IR) spectra. The second derivative profiles of FT-IR spectra were used to identify various functional groups by discriminating the characteristic frequency of the overlapped band contributions in the raw data. The mineralogical composition of the samples was determined by X-ray diffraction (XRD) and the mineralogical phase quantification was done by the Rietveld method. Further scanning electron microscope (SEM) studies on potsherds have been carried out to infer the microstructural transformations caused by the firing process. The results for the shell tempered pottery analysis were compared with previous results obtained on Cucuteni painted pottery in order to determine the degree of variability and spatial range and to understand the technological choices of the Cucuteni communities.

Baskets made of clay – Painted Neolithic pottery at Çatalhöyük/Turkey around 6000 BC

Ingmar Franz (Graduate School Human Development in Landscapes, Kiel University)

Around 6000 BC, an observable massive increase in the manufacture of painted pottery at Çatalhöyük West Mound is noted, which is illustrated by an estimated 50 times more pottery in these settlement remains than on Çatalhöyük East Mound. The pottery assemblage from the West Mound is dominated by light colored serving and storage vessels painted with red geometric decoration patterns resembling basketry decoration, although sometimes incised decorations and appliqués are also observable. In general, the vessels show a wider range of shapes and sizes than the vessels from the East Mound.
Regularly observable characteristics indicate that this pottery does not only imitate basket containers, but is also formed with the help of basket moulds. Looking at the developments in the overall pottery assemblage at Çatalhöyük in the time frame from 6200–6000 BC, we can see a persistence in the use of local clays for making pottery, by using the so-called “sequential slap construction” technique and basket moulds for forming the vessels. In addition, the decoration techniques and the firing temperature stay the same. The major change which could be observed is the increased manufacture of painted light colored pottery made of local calcareous clays and the simultaneous decrease of the manufacture of dark colored undecorated cooking pots made of non-local non-calcareous clays. All changes in fact start in the late East Mound pottery assemblage around 6200 BC. The West Mound pottery assemblage is in fact the final basketry-imitating and blooming stage of Neolithic pottery manufacture at Çatalhöyük. This introduction of “baskets made of clay” could also have had an impact on the manufacture of proper basketry over time, most likely they replaced them. This would perfectly explain the much larger quantities of pottery at Çatalhöyük between 6000–5800 BC. On a regional scale, this Central Anatolian painted Neolithic pottery is comparable with the painted Neolithic pottery of the Halaf-Period in Mesopotamia, which dates from ca. 6200–5300 BC. By comparing the conceptual, stylistical, and technological characteristics of the Çatalhöyük pottery with the contemporary Halafien pottery, it becomes clear that they share many similarities and parallels. In fact, it is very likely that both are part of the phenomenon observed at Çatalhöyük: Pottery imitates basketry and the increasing pottery quantities and the increasing diversity indicate a shift away from organic basketry vessels to mineral basketry-looking vessels roughly between 6200 and 5800 BC. The different Mesopotamian pottery styles follow the local, already centuries-old basketry traditions, and show us the high variety of Neolithic basketry in the region. The replacement of organic basketry with “baskets made of clay” can most likely be explained by a multi-causal approach for each region or site. Three differently valued reasons could include the lack of suitable resources for basket making, a better time-saving production process for making transportable containers, and an increased dependence on pottery over time. These quite practical reasons indicate that the painted Neolithic pottery in Central Anatolia and Mesopotamia does not appear to have been a “prestige product”, as it is stated for the Halaf pottery, but just an easy-to-make replacement for baskets.