SOCIO-ENVIRONMENTAL DYNAMICS
OVER THE LAST 12,000 YEARS:
THE CREATION OF LANDSCAPES II

OPEN WORKSHOP
14TH-18TH MARCH, 2011
KIEL, GERMANY

PROGRAMME AND ABSTRACT VOLUME
TERRA NOSTRA – *Schriften der GeoUnion Alfred-Wegener-Stiftung*

**Publisher**
*Verlag*

GeoUnion Alfred-Wegener-Stiftung  
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**Vol. 2011/1**  
**Heft 2011/1**

Open Workshop – Socio-environmental Dynamics over the Last 12,000 Years: the Creation of Landscapes II. 14th-18th of March 2011, Kiel

**Editor**  
*Herausgeber*

Graduate School “Human Development in Landscapes”, CAU Kiel

**Editorial staff**  
*Redaktion*

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Oliver Nelle

**Printed by**  
*Druck*

Printing house at the Christian-Albrechts University of Kiel (CAU Kiel)

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ISSN 0946-8978

GeoUnion Alfred-Wegener-Stiftung – Berlin, March 2011
Address of Johannes Müller,
Speaker of the Graduate School “Human Development in Landscapes”

The concept of the symposium “Open Workshop – Socio-environmental Dynamics over the Last 12,000 Years: The Creation of Landscapes II” results from the scientific work of the Graduate School “Human Development in Landscapes”. As a basis, this work has the interdisciplinary research of scholars in natural, life, cultural and social sciences on the formation of prehistoric and historic societies.

In our understanding social space and natural environment amplify the concept of landscape: different layers of human activities are visible in societal fingerprints on the environment. Global tendencies, regional developments, and local episodes interact in processes of human and environmental change. The development of social space is linked to ideological systems used by societies for economic reasons or ritual purposes. Thus, the study of landscapes does not only concern environmental, demographic, and social aspects but also ideological changes. A transdisciplinary effort of scientists and scholars is necessary to achieve a better understanding of societies beyond landscapes.

Within this framework public lectures and different sessions will take place during the workshop. The sessions represent the dynamics and perceptions of social landscapes in different time periods and different environments. In this respect the experimental character of joint activities of scholars and scientists from different subjects is visible within each session. Furthermore, there are sessions concerning methodological and theoretical progress dealing with new investigation technologies, modeling and the dynamics within special fields of interest.

The entire workshop would not have been possible without the tremendous personal engagement of many individuals, beside others I would like to mention pars pro toto our project manager Rhina Colunge and the scientific coordinators Oliver Nelle and Mara Weinelt, as well as the coordinators of the different sessions: David Bergemann, Rémi Berthon, Hans-Rudolf Bork, Robert Hofmann, Stefan Inderwies, Jutta Kneisel, Ben Krause-Kyora and Doris Mischka. The workshop is being financed by the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) within the Excellence Program of our Graduate School.

[Signature]

Johannes Müller
Speaker of the Graduate School
“Human Development in Landscapes”
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programme</td>
<td>7</td>
</tr>
<tr>
<td>General schedule</td>
<td>7</td>
</tr>
<tr>
<td>Plan of site</td>
<td>8</td>
</tr>
<tr>
<td>Public lectures</td>
<td>9</td>
</tr>
<tr>
<td>Programme Sessions 1-10</td>
<td>10</td>
</tr>
<tr>
<td>Abstracts</td>
<td>25</td>
</tr>
<tr>
<td>Public Lectures</td>
<td>26</td>
</tr>
<tr>
<td>Abstracts of Session 1</td>
<td>28</td>
</tr>
<tr>
<td>Abstracts of Session 2</td>
<td>41</td>
</tr>
<tr>
<td>Abstracts of Session 4</td>
<td>54</td>
</tr>
<tr>
<td>Abstracts of Session 5</td>
<td>60</td>
</tr>
<tr>
<td>Abstracts of Session 6</td>
<td>68</td>
</tr>
<tr>
<td>Abstracts of Session 7</td>
<td>74</td>
</tr>
<tr>
<td>Abstracts of Session 8</td>
<td>77</td>
</tr>
<tr>
<td>Abstracts of Session 9</td>
<td>86</td>
</tr>
<tr>
<td>Abstracts of Session 10</td>
<td>95</td>
</tr>
<tr>
<td>List of participants and authors</td>
<td>101</td>
</tr>
<tr>
<td>MONDAY</td>
<td>TUESDAY</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>9.00 - 10.30</td>
<td>Session 1</td>
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<td>Session 2</td>
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<tr>
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<td>Session 3</td>
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<td>Session 6</td>
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<td>Session 7</td>
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<td></td>
<td>Session 8</td>
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<tr>
<td>10.30 - 11.00</td>
<td>Coffee break</td>
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<tr>
<td>11.30 - 13.30</td>
<td>Registration at the foyer of building 3, Olshausenstr. 75</td>
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<td>13.30 - 14.00</td>
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<td>14.00 - 15.30</td>
<td>Session 1</td>
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<td>Session 9</td>
</tr>
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<td></td>
<td>Poster sessions</td>
</tr>
<tr>
<td>15.30 - 16.00</td>
<td>Coffee break</td>
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<td>16.00 - 17.30</td>
<td>Session 1</td>
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<td>Session 2</td>
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<tr>
<td>19.30 Ice breaker</td>
<td>19.30</td>
</tr>
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Session 1: Tells: Social and Environmental Space
Session 2: Collapse or Continuity? Environment and Development of Bronze Age Human Landscapes
Session 3: Socio-Environmental Dynamics during Roman Iron Age in Denmark and Germany – The Example of the Jutlandic Peninsula
Session 4: The Creation and Dynamics of Urban Landscapes – Networks and Interactions within Towns, around Towns and between Towns from the 12th to the 16th Century
Session 5: “As Time Goes by?” Monumentality, Landscapes and the Temporal Perspective
Session 6: Dynamics of Social Space, Social Resistance and its Reflection and Production in Landscape
Session 7: Signal Synchronies and Asynchronies: Towards Supra-Regional Patterns in Interdisciplinary Palaeolandscape Research?
Session 8: Natural or Anthropogenic – Dynamic and Mobility of Faunal Landscapes
Session 9: Quantification and Modelling in Geo- and Economic Archaeology
Session 10: Novel Technologies in Biomolecular Archaeology

Ice breaker: Leibniz Labor, Max-Eyth-Str. 11-13
Conference dinner: Restaurant Galileo, Westring 453
Plan: Created by the Press Office of CAU Kiel, edited for the Workshop by F. Bauer
Monday 14th of March

11.00 - 13.30
Registration at the foyer of building 3, Olshausenstr. 75

13.30 - 14.00
Welcome / Introduction

Gerhard Fouquet, President of the Christian-Albrechts-University of Kiel (CAU Kiel)
Johannes Müller, Speaker of the Graduate School
“Human Development in Landscapes” (GS HDL, CAU Kiel)
Hans-Dieter Bienert, German Research Foundation (DFG)
The Excellence Initiative with a Specific Look on Graduate Schools

PUBLIC LECTURES

14.00 - 14.45
Nicki Whitehouse, Queen’s University Belfast, Palaeoecology Centre
North West European Neolithic: Agriculture, Economy, Landscape and Chronology

14.45 - 15.30
Ingmar Unkel, CAU Kiel, Institute of Ecosystem Research
Stymphalos - Environmental History and Landscape Perception

15.30 - 16.00 Coffee break

16.00 - 16.45
Antonia Davidovic, CAU Kiel, Institute of European Ethnology
Concepts of Human-Environment-Relationships

16.45 - 17.30
Helle Vandkilde, Aarhus University, Department of Anthropology, Archaeology and Linguistics
“Travelling Cultures” in Theoretical and Archaeological Perspective

17.30 - 18.15
Klaus Schmidt, Orient Department, DAI, Berlin
Göbekli Tepe – A Pre-Pottery Neolithic Sanctuary in the North Mesopotamian Landscape

19.30
Ice breaker
Venue: Leibniz Labor, Max-Eyth-Str. 11-13
SESSION 1
TELLS: SOCIAL AND ENVIRONMENTAL SPACE

Tuesday 15th of March | 9:00 – 10:30
Chair: Johannes Müller, CAU Kiel
Mehmet Özdoğan, Istanbul University
Understanding the Mound: Its Dynamics and Problems Encountered in Reading Mounds in the Cultural Landscape (Invited)
William A. Parkinson¹, Attila Gyucha², Field Museum of Natural History Chicago¹, Hungarian National Museum²
Tells in Perspective: Long-Term Patterns of Settlement Nucleation and Dispersal in Central and Southeast Europe (Invited)
Pál Ratzky and Alexandra Anders, Eötvös Loránd University of Budapest
Appearance and Collapse of the Tell Based System in the Polgar-Region (Invited)

10:30 – 11:00 Coffee break

Tuesday 15th of March | 11:00 – 12:30
Chair: Hans-Rudolf Bork, CAU Kiel
Eva Rosenstock, FU Berlin
Environmental Factors in Tell Formation – An Archaeometric Attempt
Stefan Dreibrodt¹, Robert Hofmann¹, Carolin Lubos¹, Marcella Frangipane², Johannes Müller¹, Hans-Rudolf Bork¹, CAU Kiel¹, University of Rome “La Sapienza”²
The Potential of Geoarchaeological Investigations at Tell Sites – Examples from Germany, Bosnia-Herzegovina and Turkey
Kemal Moetz, GS HDL, CAU Kiel
Neolithic Settlement and Landscape Studies in Upper Mesopotamia

12:30-14:00 Lunch break

Tuesday 15th of March | 14:00 – 15:30
Chair: Mehmet Özdoğan, Istanbul University
Peter F. Biehl¹, Ingmar Franz², David Orton³, Sonia Ostapchouk⁴, Jana Rogasch⁵, Eva Rosenstock⁶, SUNY Buffalo¹, Freiburg University², Cambridge University³, Paris University⁴, FU Berlin⁵
One Community and Two Tells: The Phenomenon of Relocating Tell Settlements at Neolithic-Chalcolithic Transition in Central Anatolia
Şafak Nergiz, GS HDL, CAU Kiel
A Preliminary Evaluation of the Interaction between Culture and Its Natural Environment in the Eastern Thrace
Andrea Ricci, GS HDL, CAU Kiel
Tell and Settlement Dynamics in the Middle Euphrates River Valley Region from the 5th through the 3rd Millennium BC

15:30 – 16.00 Coffee break

Tuesday 15th of March | 16:00 – 17:30
Chair: Andrea Ricci, GS HDL, CAU Kiel
Michelle de Gruchy, Durham University
Mapping the Cultural Landscape of the Uruk Expansion along the Tigris River and its Tributaries
Dan Lawrence, Durham University
The Dynamics of Growth and Stability: Tell-Based Settlement in Northern Mesopotamia during the 4th and 3rd Millennia
Alessia Masi, Laura Sadori, Diego Sabato, University of Rome “La Sapienza”
Changes in Timber Use at Arslantepe (Malatya, Turkey) from 3350 to 2000 years BC: Environmental Versus Social Forcing

17:30 – 17:45 Break

Tuesday 15th of March | 17:45 – 19:15
Chair: Silvia Balatti, GS HDL, CAU Kiel
Simone Mühl, University of Heidelberg
Human Landscape – Site (Trans-)Formation in the Trans Tigris Area
Stefan Smith, Durham University
Settlement Shifts in Tell-Based Occupation of the Khabur Valley of North-Eastern Syria during the 2nd Millennium BC
Daniel Knitter¹, Barbara Horejs², Steffen Schneider², FU Berlin², Austrian Archaeological Institute²
Prehistoric Gaps in the Kaikos Valley – Results of a Different Perception of Space or Environmentally Forced?

Wednesday 16th of March | 9:00 – 10:30
Chair: Kemal Moetz, GS HDL, CAU Kiel
Silvia Balatti¹, Maria Elena Balza², GS HDL, CAU Kiel¹, University of Limoges²
Kınık-Höyük and Southern Cappadocia (Turkey): Geoarchaeological Activities, Landscapes, and Social Spaces
Barbara Helwing¹, Tevekkül Aliyev², Andrea Ricci³, DAI Eurasia Department¹, and Azerbaijan National Academy of Sciences², GS HDL, CAU Kiel³
Mounds and Settlements in the Lower Qarabakh – Mil Plain, Azerbaijan
Marcel Burić, University of Zagreb
Tells in Croatia – Western Outskirts of the Tell Phenomenon
**PROGRAMME: SESSION 1**

10:30 – 11:00 Coffee break

**Wednesday 16th of March | 11:00 – 12:30**

Chair: Pál Racky, Eötvös Loránd University of Budapest

Agatha Reingruber, DAI, Eurasian Department, Berlin

*Pietrele— “Magura Gorgana”, Romania: Copper Age Households on and Nearby the Tell*

Arne Windler, CAU Kiel

*Increasing Inequality in South Eastern Europe and the Collapse of Chalcolithic Societies: The Cemetery of Durankulak*

Carsten Mischka, CAU Kiel

*Late Neolithic Multiphased Settlements in Central and Southern Transylvania*

12:30 – 14:00 Lunch break

**Wednesday 16th of March | 14:00 – 15:30**

Chair: William A. Parkinson, Field Museum of Natural History Chicago

Wolfram Schier, FU Berlin

*Architectural History, Environment and Cultural Identity at the Tell of Uivar / Romania (5200-4300 calBC)*

Barbara Dammers, FU Berlin

*The Middle and Late Neolithic Tell of Uivar Seen from a Ceramic Perspective*

Johannes Müller, CAU Kiel

*Surplus and Division of Labour: Social Organisation of a Late Neolithic Society in Central Bosnia (5200-4500 BC)*

15:30 – 16:00 Coffee break

**Wednesday 16th of March | 16:00 – 18:30**

Chair: Eva Rosenstock, FU Berlin

Robert Hofmann, CAU Kiel

*Pottery in Okolište: Style and Use in Relation to the Evolution of Settlement Pattern within a Late Neolithic Tell Landscape in Central Bosnia (5200-4500 BC)*

Martin Furholt, CAU Kiel

*Kundruci: Development of Social Space in a Late Neolithic Tell-Like Settlement in Central Bosnia*

Nils Müller-Scheßel, DAI, RGK, Frankfurt

*“Good to Use and Good to Think”: Procurement of Flint Raw Materials within the Tell Landscape of Central Bosnia*

Stefan Auber, CAU Kiel

*Donje Moštre: A Chalcolithic Settlement in the Visoko Basin in Central Bosnia*

Helmut Kroll, CAU Kiel

*Neolithic Economy in Okolište, Central Bosnia (5200-4500 BC)*

Ulrich Bultmann, CAU Kiel

*Putting Sites in their Catchment: Site-Catchment Analysis of Late Neolithic Settlements within the Visoko Basin, Central Bosnia (5200-4500 BC)*

10:30 – 11.00 Coffee break

**Thursday 17th of March | 9:00 – 10:30**

Joint session: SESSION 1 – SESSION 2

Chair: Hans-Rudolf Bork, CAU Kiel

Andreas Nebe, Halle

*3,000 Years of Settlement Continuity? Looking for Indications at the Settlement Mound of Niederröblingen*

Carolin Lubos¹, Stefan Dreibrodt¹, Marie-Josée Nadeau², Harald Meller², Hans-Rudolf Bork³, CAU Kiel¹,

State Office for Heritage and Archaeology, Saxony-Anhalt¹

*Knut Rassmann¹, Jozef Bátor², Anja Behrens³ und Mariya Ivanova³, DAI, RGK, Frankfurt¹, Slovakian Academy of Science², CAU Kiel³

*The Settlement Mound of Niederröblingen: What do the Sediments Reveal About the Past?*

11:00 – 12:30 Coffee break

**Thursday 17th of March | 11:00 – 12:30**

Chair: Robert Hofmann, CAU Kiel

Swend Hansen, Meda Toderaș, DAI, Eurasian-Department, Berlin

*Pietrele in the Lower Danube Valley – A Central Site of the 5th Millennium BC*

Walter Dörfler, CAU Kiel

*Neolithic Activities in the High Mountains of Bosnia-Herzegovina? Pollen Analytical Results from Prokoško Jezero*

Tim Mattis Schrödter, GS HDL, CAU Kiel

*Woodland Management in the Surroundings of Tells in the Visoko-Basin, Central Bosnia between 5300 and 4000 BC*

12:30 – 14.00 Lunch break

**Thursday 17th of March | 14.00 – 16.00**

Plenary meeting – Final discussion of all sessions
SESSION 2

COLLAPSE OR CONTINUITY?
ENVIRONMENT AND DEVELOPMENT OF BRONZE AGE HUMAN LANDSCAPES

Tuesday 15th of March | 9:00 – 10:30
Chair: Marta Dal Corso, GS HDL, CAU Kiel
Anna Maria Mercuri, University of Modena and Reggio Emilia
Environment and Economy of Terramaras in the Central / Southern Po Plain (Invited)

Giovanni Leonardi, Michele Cupitò, Elisa Dalla Longa, Valentina Donadel, University of Padova
Resistances to the 12th Century BC Crisis in the Veneto Region (Italy): The Case-Studies of Fondo Paviani and Monte bello Vicentino

Renata Perego, IPNA - University of Basel and CNR IDPA Milan
The Rise of the Bronze Age Pile-Dwelling culture in North Italy as Seen in the Long-Lasting Palaeobotanical Record of the Lavagnone Lacustrine Settlement

10:30 – 11:00 Coffee break

Tuesday 15th of March | 11:00 – 12:30
Chair: Marta dal Corso, GS HDL, CAU Kiel and Wiebke Kirleis, CAU Kiel

Benjamin Jennings, IPNA University of Basel
When the Going Gets Tough...? Climatic or Cultural Influences for the LBA Abandonment of Circum-Alpine Region Lake-Dwellings

Jean Nicolas Haas, Janusz Czебrzeszuk, Philippe Hadorn, Albin Hasenfratz, Martina Hillbrand, Sabine Karg, Jutta Kneisel, Johannes Müller, Bas van Geel, Notburga Oeggl-Wahlmüller, Elisabeth Waldner, University of Innsbruck, Adam Mickiewicz University, Cortaillod/NE, Department of Archaeology, Frauenfeld, The National Museum of Denmark and Saxo Institute of Copenhagen University, CAU Kiel, University of Amsterdam

Human Settlement Activities Producing Changes in Water Trophy Levels during Prehistory: Examples from the Neolithic in Thurgovia (Switzerland) and from the Early Bronze Age at Bruszczewo (Greater Poland) – (Invited)

Walter Dörfler, CAU Kiel
Continuity and Interruptions – The Bronze Age Landscape Development of the Kościan Region, Northwest Poland

12:30 – 14:00 Lunch break

Tuesday 15th of March | 14:00 – 15:30
Chair: Jutta Kneisel, CAU Kiel

Poster session
Verena Tiedtke, GS HDL, CAU Kiel
To be Continued – A Long Term Cemetery in Müllrose, Brandenburg
Heiko Scholz, GS HDL, CAU Kiel
Hoard Find Places from the Bronze Age in Northern Central Europe in the Context of Cultural and Environmental Changes

Ute Brinker, Gundula Lidke, Sebastian Lorenz, StateOffice for Culture and Heritage Mecklenburg-Vorpommern, University of Greifswald
Landscape and Death in the Tollense Valley – Environmental Context of an Outstanding Bronze Age Site in Mecklenburg-Vorpommern

Mateusz Cwaliński, Jakub Niebieszczański, University of Poznań
The Tumulus Culture Burial Mounds in South-Western Poland. Construction of the Tumuli and its Place in the Landscape

Balázs Benyhe, György Sipos, Timea Kiss, University of Szeged
Chronology of Past Aeolian Activities at an Archaeological Site: Relationship of Human Impact and Environmental Change

Marta Dal Corso, Wiebke Kirleis, Giovanni Leonardi, Marco Marchesini, GS HDL, CAU Kiel, CAU Kiel, University of Padova, Soprintendenza per i Beni Archeologici dell’ Emilia Romagna and C.A.A. G.Nicoli, S. Giovanni in Perisceto, Bologna

Environmental Changes and Human Impact on an Italian Lowland During Bronze Age: Palynological Investigation at Fondo Paviani (Legnago, Verona)

Milena Primavera, Girolamo Fiorentino, University of Salento
The Bronze Age Paleoenvironment of the Puglia Region (South-Eastern Italy): The Micro-Climatic Oscillation and the Continuity of the Socio-Economical Strategies

15:30 – 16.00 Coffee break

Tuesday 15th of March | 16:00 – 17:30
Chair: Wiebke Kirleis, CAU Kiel

Helmut Kroll, CAU Kiel
The Two Economies of Bruszczewo: Simple Rural Life versus an Advanced Agriculture

Jutta Kneisel, CAU Kiel
The Problem of the Middle Bronze Age Inception in North East Europe

Uwe Sperling, FU Berlin
Putting Estonia on the “Bronze Age Map”: Rise and Fall of Asva-Type Sites
Daugnora Linas, Algirdas Girininkas, Institute of Baltic Sea Region History and Archaeology Herkau, Lithuania
*How Early Bronze Age Man Changed the Environment?*

Wednesday 16th of March | 9:00 – 10:30
Chair: Jutta Kneisel, CAU Kiel

Kristian Kristiansen, University of Gothenburg
*Collapse Versus Continuity During the Bronze Age (Invited)*

Carola Metzner-Nebelsick1, Louis D. Nebelsick2, Michael Peters2, Carol Kasco4 with contributions by William Shotyk1, LMU, München1, University of Warsaw2, Baia Mare3, University of Heidelberg4
*Environmental and Anthropogenic Impact Factors During the Bronze Age in the Ore-Rich Lăpuș Microregion, Northwest Romania*

Mario Gavranović, Berlin
*Ore Exploitation and Settlement Dynamic during the Late Bronze Age in Bosnia*

10:30 – 11:00 Coffee break

Wednesday 16th of March | 11:00 – 12:30
Chair: Nicole Taylor, CAU Kiel

Sabine Reinhold, DAI, Eurasian Department
*Collapse or Adaptation? Late Bronze/Early Iron Age Mountain – Lowland Dichotomy in the North Caucasus as Reflections of Ecological and Cultural Transformation*

Anke Marsh-Cross, University College London
*Modelling Sustainability: The Near East in Transition*

Sabine Beckmann, University of Crete
*Cretan Middle Bronze Age Landscape after 4000 Years – Re-Inventing the Past?*

12:30 – 14:00 Lunch break

Wednesday 16th of March | 14:00 – 15:30
Chair: Nicole Taylor, CAU Kiel

Helmut Kroll, CAU Kiel
*Prehistoric Olynth: Arkadian Leisure versus Pre-Urban Life in Late Bronze Age Northern Greece*

Girolamo Fiorentino1, Valentina Caracuta1, Cosimo D’Oronzo2, Maria Clara Martinelli2, University of Salento1, Cultural Heritage Office – Messina2
*Insularity and Climate Changes: The Role of Weather on the Bronze Age Communities in the Eolian Archipelagos*

Almuth Alsleben, Academy of Sciences and Literature Mainz, Schloss Gottorf, Schleswig
*Pollen and Fossil Plant Macro Remains: Proxies for Changes in the Economy of the Nordic Bronze Age Culture?*

15:30 – 16.00 Coffee break

Wednesday 16th of March | 16:00 – 18:30
Chair: Verena Tiedtke, GS HDL, CAU Kiel

Ralf Lehmlphul, FU Berlin
*An Endneolithic to Early Iron Age Settlement-Stratigraphy from Brandenburg*

Jonas Beran, Wustermark, Brandenburg
*Burnt Village Buried under Blown Sand at the Beginning of Urn Field Period*

Olaf Fabian, University of Göttingen
*Beyond Unétice - The Transformation from the Late Neolithic to the Early Bronze Age in the North German Lowlands*

Thursday 17th of March | 9:00 – 10:30
Joint session: SESSION 1 – SESSION 2
Chair: Hans-Rudolf Bork, CAU Kiel

Andreas Nebe, University of Halle
*3,000 years of Settlement Continuity? Looking for Indications at the Settlement Mound of Niederröblingen*

Carolin Lobus1, Stefan Dreibrodt1, Marie-Josée Nadeau2, Hans-Rudolf Bork2, CAU Kiel1, State Office for Heritage and Archaeology, Saxony-Anhalt2
*The Settlement Mound of Niederröblingen: What do the Sediments Reveal About the Past?*

Knut Rassmann1, Jozef Bátor2, Anja Behrens3 und Mariya Ivanova1, DAI, RGK, Frankfurt1, Slovakian Academy of Science2, CAU Kiel3
*The Rise and Fall of the Early Bronze Age Settlement Fidvar near Vráble*

10:30 – 11.00 Coffee break

Thursday 17th of March | 11:00 – 12:30
Chair: Heiko Scholz, GS HDL, CAU Kiel

Immo Heske1 and Magdalena Wieckowska2, University of Göttingen1, CAU Kiel2
*The Bronze Age Settlement Chamber on the Hill Heeseberg – An Ecoregion in Transition between the Unétice and House Urns Culture*

Johannes Müller, CAU Kiel
*Bronze Age Collapse? Social Versus Environmental Reasons*

Final discussion of session 2
Chairs: Wiebke Kirleis and Jutta Kneisel, CAU Kiel

12:30 – 14:00: Lunch break

Thursday 17th of March | 14.00 – 16.00
Plenary meeting – Final discussion of all sessions
SESSION 3

SOCIO-ENVIRONMENTAL DYNAMICS DURING ROMAN IRON AGE IN DENMARK AND GERMANY – THE EXAMPLE OF THE JUTLANDIC PENINSULA

Tuesday 15th of March | 9:00 – 10:30
Session 3 is planned as an open forum moderated by Hauke Jöns, Lower Saxony Institute for Historical Coastal Research, Wilhelmshaven.

In each part of this open forum, representative Danish and German archaeologists (from equal areas of responsibility) will discuss research strategies and results on both sides of the border in pairs. The discussion is open for the audience, participation in the scholarly exchange is very welcome!

First open forum:
Digging and Digging and Digging: Rescue Excavations on the Jutlandic Peninsula

Between Per Ethelberg, Museum Sønderjylland, Haderslev and Ingo Lütjens, State Office for Archaeology Schleswig-Holstein, Schleswig

10:30 – 11:00 Coffee break

Tuesday 15th of March | 11:00 – 12:30
Second open forum:
Decision Making: Why, When and How Much Will it Cost?

Between Lennart Madsen, Museum Sønderjylland, Haderslev and Martin Segschneider, State Office for Archaeology Schleswig-Holstein, Schleswig

12:30 – 14:00 Lunch break

Tuesday 15th of March | 14:00 – 15:30
Third open forum:
Laws, Frameworks and Concepts: It’s not That Easy!

Between Orla Madsen, Museum Sønderjylland, Haderslev and Claus v. Carnap-Bornheim, State Office for Archaeology Schleswig-Holstein, Schleswig

Thursday, 17th of March | 14.00 – 16.00
Plenary meeting – Final discussion of all sessions
SESSION 4

THE CREATION AND DYNAMICS OF URBAN LANDSCAPES – NETWORKS AND INTERACTIONS WITHIN TOWNS, AROUND TOWNS AND BETWEEN TOWNS FROM THE 12TH TO THE 16TH CENTURY

Wednesday 16th of March | 9:00 – 10:30
Chair: Gabriel Zeilinger, CAU Kiel

Welcome and Introduction
Gabriel Zeilinger, Department of History, CAU Kiel
Ulrich Müller, Institute of Pre- and Protohistoric Archaeology, CAU Kiel

Jerzy Piekalski, University of Wroclaw
Current Problems of the Research of High Medieval Towns in East-Central Europe (Invited)

10:30 – 11:00 Coffee break

Wednesday, 16th of March | 11:00 – 12:30
Chair: Gabriel Zeilinger, CAU Kiel

Tom Scott, University of St. Andrews
Co-Operation and Conflict in Urban Landscapes, 1200-1600 (Invited)

Round table discussion of session 4

12:30 – 14:00 Lunch break

Wednesday 16th of March | 14:00 – 15:30
Chair: Gabriel Zeilinger, CAU Kiel

Christian Hagen, CAU Kiel
Urban Landscape Tyrol – Conditions and Dynamics from the 12th to 16th Century

Nina Kühnle, CAU Kiel
Urban Community and Noble Rule: The Medieval Urbanization of Württemberg

Stefan Inderwies, GS HDL, CAU Kiel
Networks in the County of Holstein

15:30 – 16.00 Coffee break

Wednesday, 16th of March | 16:00 – 18:30
Chair: Ulrich Müller, CAU Kiel

Yannick Devos, Luc Vrydaghs, Sylvianne Modrie, Ann Degraeve, Free University of Brussels, Research Centre for Archaeology and Heritage
Dark Earth: Privileged Witnesses of the Emergence and Development of Brussels (Belgium)

Ramona Harrison, CUNY Graduate Center
Gásir and its Hinterlands? An Emerging Idea of the Dynamics of Socio-Political Power Structures in a Medieval Icelandic Landscape

Michel Pauly, University of Luxemburg
Landscapes of Hospitals? / Hospitälerlandschaften? (Invited)

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Thursday 17th of March | 9:00 – 10:30
Chair: Stefan Inderwies, GS HDL, CAU Kiel

Armand Baeriswyl, Archaeological Service of Canton of Bern
Founded Towns vs. Grown Towns? The Example of the so-called “Zähringerstädte” in the Southwest of the Holy Empire (Invited)

10:30 – 11.00 Coffee break

Thursday 17th of March | 11:00 – 12:30
Chair: Stefan Inderwies, GS HDL, CAU Kiel

Flora Hirt, University of Saarland
The Setting up of a Medieval City – Social Structures in 13th Century Basel

Bastian Walter, University of Münster
Informal Interactions and Secret Relations between Cities: Espionage and Information Gathering during the Burgundian Wars (1468-1477)

Final discussion of session 4

12:30 – 14.00: Lunch break

Thursday 17th of March | 14.00 – 16.00
Plenary meeting – Final discussion of all sessions
SESSION 5

“AS TIMES GOES BY”? MONUMENTALITY, LANDSCAPES AND THE TEMPORAL PERSPECTIVE

Tuesday 15th of March | 14:00 – 15:30
Chair: Martin Furholt, CAU Kiel

Introduction
Trevor Watkins, University of Edinburgh
*Household, Community and Social Landscape: Building and Maintaining Social Memory in the Early Neolithic of Southwest Asia (Invited)*

Emma Cunliffe, Durham University
*Modernity, Monumentality and the Moment: A Syrian Case Study of Monumental Reconstructions*

15:30 – 16.00 Coffee break

Tuesday 15th of March | 16:00 – 17:30
Chair: Martin Furholt, CAU Kiel

Jelena Steigerwald, GS HDL, CAU Kiel
*Monumentality in Modern History – Monuments in Denmark and Germany*

Maria Guagnin, University of Edinburgh
*The Rock Carvings of the Messak: Monuments in a Changing Landscape*

Wednesday 16th of March | 9:00 – 10:30
Chair: Jelena Steigerwald, GS HDL, CAU Kiel

Alasdair Whittle¹, Alex Bayliss² and Frances Healy¹, Cardiff University¹, English Heritage²
*Quick, Quick, Slow: New Perspectives on the Tempo and Experience of Change (Invited)*

Martin Hinz, GS HDL, CAU Kiel
*Preserving the Past, Building the Future? Concepts of Time and Prehistoric Monumental Architecture*

10:30 – 11:00 Coffee break

Wednesday 16th of March | 11:00 – 12:30
Chair: Martin Hinz, GS HDL, CAU Kiel

Doris Mischka, CAU Kiel
*Temporality in the Monumental Landscape of Flintbek*

Darius Król, Rzeszow University
*Submegaliths, Megaxyrons, Paramegaliths. The Results of Analysis of Monumental Tombs in the South-Eastern Group of Funnel Beaker Culture*

Martin Furholt, CAU Kiel
*Monuments and the Durability of Landscapes in Northern Europe*

12:30 – 14:00 Lunch break

Wednesday 16th of March | 14:00 – 15:30
Chair: Doris Mischka, CAU Kiel

Małgorzata Rybicka, Dariusz Król, Jakub Rogoziński, University of Rzeszów
*The Niche Grave of the Corded Ware Culture in the Vicinity of an Earthern Long Barrow of the Funnel Beaker Culture*

Henrik Skousen, Uffe Rasmussen, Moesgaard Museum
*Nonmonumental Ritual Activity in a Megalithic Environment. Neolithic Man Interacting with the Landscape*

Marzena Szmyt, Janusz Czебreszuk, Adam Mickiewicz University, Poznań
*Monumental Funeral Places: Creation, Use and Re-Use in the Neolithic and the Bronze Age. Case Studies from the Polish Lowland*

15:30 – 16.00 Coffee break

Wednesday 16th of March | 16:00 – 18:30
Chair: Doris Mischka, CAU Kiel

Erik Drenth
*The Re-Use of Megalithic Tombs in the Netherlands during Beaker Times*

Andrzej Pelisiak, University of Rzeszow, Rzeszow
*The Messages – Consigners and Addressees. Corded Ware Culture Barrows in the Cultural Landscape of East Polish Carpathians during III and II Millennium*

Thursday 17th of March | 9:00 – 10:30
Chair: Magdalena Midgley, University of Edinburgh

Joshua Wright, Stanford University
*Temporal Perspective and Monumental Constellations of Inner Asia*

Carsten Mischka, CAU Kiel
*A Monument, Lasting for Ever? Big Roman Villae in the Western Vulkaneifel as Monumental Complexes Through the Times*

Janine Lehmann, University of Cologne
*Loca Sacra of the Iberian Peninsula and the Meaning of Monumentality in Time*
Poster:
Mette Løvschal, University of Aarhus
The Temporal Dynamics of Landscape Boundaries in
Northern Europe the First Millenium BC

10:30 – 11.00 Coffee break

Thursday 17th of March | 11:00 – 12:30
Chair: Magdalena Midgley, University of Edinburgh
Jana Škundrić, DAI Berlin and FU Berlin, TOPOI
The Palace of Felix Romuliana and its Hinterland,
Changing Landscape from the Bronze Age until Modern
Period
Manfred Boehme, State Office for Heritage
Management and Archaeology Saxony-Anhalt
The Recurring Monument. Records on Hafit- and Umm
An-Nar Period Tomb Architecture in Oman Peninsula

Discussion of session 5 – Publication

12:30 – 14.00: Lunch break

Thursday, 17th of March | 14:00 – 16:00
Plenary meeting – Final discussion of all sessions
SESSION 6

DYNAMICS OF SOCIAL SPACE, SOCIAL RESISTANCE AND ITS REFLECTION AND PRODUCTION IN LANDSCAPE

Tuesday 15th of March | 9:00 – 10:30
Roberto Risch, Universitat Autònoma da Barcelona
Resistance and Revolt as Social Praxis: An Archaeological Approach (Invited)

Susan Pollock, FU Berlin, University of Binghampton
Reading against the Grain: A Critique of Regional Settlement Studies in Mesopotamia (Invited)

10:30 – 11:00 Coffee break

Tuesday 15th of March | 11:00 – 12:30
Matthew Liebmann, Harvard University
“Returning to the State of their Antiquity”: Pueblo Landscapes of Resistance to Spanish Colonialism in 17th Century New Mexico (Invited)

Sabine Reinhold, DAI, Eurasian Department, Berlin
Indicators of Social Dynamics Expressed in Architecture and Landscape Design during the Late Bronze Age in the North Caucasus

12:30 – 14:00 Lunch break

Tuesday 15th of March | 14:00 – 15:30
Ulf Ickerodt, State Office for Archaeology Schleswig-Holstein
Hadza “Flux” and “Fusion” as Product of Social Resistance – Changes in Social Organization of an East African Forager Society and the Effects of “Borders of Ignorance” on Archaeological Research

Marta Bazzanella¹, Giovanni Kezich¹, Luca Pisoni¹, Laura Toniutti², Museum of Customs and Traditions of the People of Trento, Department of Physics, University of Trento²
Dynamics of a Pastoral Landscape: The Case of the Cornon Mountain in the Fiemme Valley (TN-Italy)

Simone Bonzano, FU Berlin
Formation of Social landscape: Lake Van in the Middle Ages

15:30 – 16.00 Coffee break

Tuesday 15th of March | 16:00 – 17:30
Ivanka Slavova, Sofia University, “St. Kliment Ohridski”
The Ancient Kabyle. Social Transformations and Reflection on the Landscape

Simone Deola¹, Simone Pedron¹, Nicola Bergamo², Studio Associato Sestante¹, Associazione Culturale Symposium²
A Survey of the Equidistances and Alignments of a Composite Landscape: the “Motte” (Fortified Villages and Tumuli) in Central Veneto

Laetitia Phialon, Maison R. Ginouvès, Archéologie et Ethnologie, Paris
Cultural Groups and Palatial Societies Creating Aegean Landscapes: A Dynamic Approach

Christoph Nübel, GS HDL, CAU Kiel
Getting Ready for Combat: Soldiers, Violence, and the Spatial Dimensions of the Western Front, 1914-1918

Wednesday 16th of March | 9:00 – 10:30
Monica De Cet, Selina Delgado Raack, Universitat Autònoma de Barcelona and GS HDL, CAU Kiel
The Millares Horizon: Two Case Studies for the Analysis of the Copper Age in South-Eastern Spain

Almut Schülke, University of Oslo
Landscapes and Resistance: Aspects of Balance and Unbalance in Archaeological Interpretation

Nils Müller-Scheessel, RGK, Frankfurt
Upheaval and Resistance in the Hallstatt World: Facts and Narratives

10:30 – 11:00 Coffee break

Wednesday 16th of March | 11:00 – 12:30
Podium discussion
Johannes Müller, Martin Hinz, Nils Müller-Scheessel, Antonia Davidovic, Almut Schülke, Mathew Liebmann, Roberto Risch

Thursday 17th of March | 14.00 – 16.00
Plenary meeting – Final discussion of all sessions
SESSION 7

SIGNAL SYNCHRONIES AND ASYNCHRONIES: TOWARDS SUPRAREGIONAL PATTERNS IN INTERDISCIPLINARY PALAEO LANDSCAPE RESEARCH

Tuesday 15th of March | 9:00 – 10:30

Oliver Nelle, CAU Kiel
Detecting Supra-Regional Patterns: Challenges and Approaches

Valentina Caracuta, Girolamo Fiorentino, University of Salento
The Resilience of Syrian Protohistoric Communities to Climate Changes: High Resolution $^{14}$C AMS and delta$^{13}$C Analyses

Daniela Moser$^1$, Oliver Nelle$^2$, Gaetano Di Pasquale$^3$
GS HDL, CAU Kiel$^1$, Institute for Ecosystem Research, CAU Kiel$^2$, Università degli Studi di Napoli Federico II$^3$
Human Activities and Natural Factors in the Creation of Roman Age Landscapes in Southern Italy: Interpretation Problems

10:30 – 11:00 Coffee break

Tuesday 15th of March | 11:00 – 12:30

Doris Jansen, CAU Kiel
Diachrony and Synchrony in Prehistoric Wood Usages in Northern Central Europe

Mykola Sadovnik$^1,2$, Hans-Rudolf Bork$^1$, Marie-Josée Nadeau$^3$, Marie-Jose Gaillard$^4$ and Oliver Nelle$^1$, Institute for Ecosystem Research, CAU Kiel$^1$, GS “Human Development in Landscapes”, CAU Kiel$^2$, Leibniz-Laboratory for Radiometric Dating and Isotope Research, CAU Kiel$^3$, Palaeoecology Research Group at the Linnaeus, University of Kalmar$^4$
Holocene Woodland Dynamics and Land-Use History of the Westensee Morane Region, Northern Germany, Based on Three Pollen Records

Discussion of session 7

12:30 – 14:00 Lunch break

Tuesday 15th of March | 14:00 – 15:30

Open poster session (no thematic specialisation) together with session 7 POSTER:

Ingo Feeser, Walter Dörfler, CAU Kiel
Synchronisation of Pollen Records and Identification of Over-Regional Pollen Stratigraphical Patterns during the Neolithic in Northern Germany

15:30 – 16.00 Coffee break

Tuesday 15th of March | 16:00 – 17:30

Jürgen Zahrer$^1$, Ingo Feeser$^2$, Walter Dörfler$^3$, Stefan Dreibrödt$^4$, Institute of Ecosystem Research, CAU Kiel$^1$, Institute of Pre- and Protohistoric Archaeology, CAU Kiel$^2$
Synchronous and Asynchronous Signals from Annually Laminated Lake Sediments – Results of Palaeolimnological and Palynological Investigation in Northern Germany

Round table discussion: Strategies for Data Synthesis Needed for Supra-Regional Pattern Detection

Thursday 17th of March | 14.00 – 16.00

Plenary meeting – Final discussion of all sessions
SESSION 8

NATURAL OR ANTHROPOGENIC – DYNAMIC AND MOBILITY OF FAUNAL LANDSCAPES

Tuesday 15th of March | 9:00 – 10:30
Session Chair: Welcome and Introduction

Richard Meadow, Ajita K. Patel, Harvard University
Faunal Remains as a Proxy for Human Response to Climatic Fluctuations (Invited)

Frank Schlütz1 and Frank Lehmkuhl2, FU Berlin1, RWTH University of Aachen2
Holocene Landscape Creation by Nomadism in Tibet

Alexandra Trinks1,4, Pamela Burger2, Norbert Benecke3, Joachim Burger4, Durham University2, University of Vienna2, DAI, Berlin1, Johannes-Gutenberg-University of Mainz4
Adaptations to the Eurasian Landscapes: An Ancient DNA Approach to the Domestication of the Two-Humped Camel

10:30 – 11:00 Coffee break

Tuesday 15th of March | 11:00 – 12:30

Ulrich Schmölcke, Centre for Baltic and Scandinavian Archaeology, Schleswig
Limits and Possibilities of the Actualistic Principle in Palaeoecology (Invited)

Karina Iwe, GS HDL, CAU Kiel
The Role of Animals in Burials in Siberia (on Selected Examples from the 9th to 3rd Century BC)

Rebecca Reynolds, University of Nottingham
A Sense of Place: Early Medieval Marine Fishing and Landscapes

Discussion of session 8
12:30 – 14:00 Lunch break

Tuesday 15th of March | 14:00 – 15:30
Poster session

Silvia Balatti, GS HDL, CAU Kiel
Mobile Pastoralism in the Zagros Mountains during the Iron Age: A Multidisciplinary Approach

Luminita Bejenaru, Mariana Popovici, Simina Stanc University “Alexandru Ioan Cuza” of Iași
Neolithic Migrations in the Eastern and Southeastern Territories of Romania: Metric Variations in Cattle (Bos Taurus) Populations

Frazer Bowen, Richard Easton, Katie Gibson, Zoe Knapp, James Westoby, University of Nottingham
Late Medieval Attitudes to the Natural World: A Zooarchaeological Exploration

Anja Prust, GS HDL, CAU Kiel
Continuity, Adaptation and Innovation – Livestock Economy of the Roman Mediterranean Provinces

Giovanni Siracusano, CAU Kiel
Fantasy Zoology or Zoology’s Wonder? Remnants of Animals Which are not There, There Were, but They Should not Have Been There

15:30 – 16.00 Coffee break

Tuesday 15th of March | 16:00 – 17:30

Anne Tresset, CNRS, Paris
Last Hunter-Gatherers and Early Herders of Europe: When Mobility, Seasonality Patterns and Land Uses Break the Rules (Invited)

Frazer Bowen, University of Nottingham
Worldviews in Transition: The Impact of Exotic Animals on Iron Age/Romano-British Landscapes

Ophelie Lebrasseur1, Wim Van Neer2, Greger Larson1 Durham University1, Royal Belgian Institute of Natural Sciences2
Mitochondrial DNA Provide Insights on the Origins of Goats, Pigs, Cattle and Java Deer (Rusa timorensis) from Mauritius

Julia Best, Cardiff University
Free as a Bird: Exploiting a Mobile Wild Resource in Scottish Island Landscapes

Discussion of session 8

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Wednesday 16th of March | 9:00 – 10:30

Benjamin Arbuckle, Baylor University
Mobile Landscapes, Settled Landscapes: Pastoral-Urban Interaction at MBA Acemhoyuk, Turkey (Invited)

Aikaterini Glykou, GS HDL, CAU Kiel
A Changing world? Hunters and Gatherers in Transition. A Case Study from the Site Neustadt in Ostholstein, Northern Germany

Suzanne Pilaar Birch, University of Cambridge
Changing Climate, Changing Landscapes, Changing Mobility: Human Response to Fluctuating Resource Availability at the Pleistocene-Holocene Transition in the Northern Adriatic

Discussion of session 8
10:30 – 11:00 Coffee break

Wednesday 16th of March | 11:00 – 12:30

Emily Hammer, Harvard University
Regional and Local Landscapes of Vertically Transhumant Pastoralists in Southeastern Turkey
Elizabeth Henton, University College London  
Shepherding Herds, Conserving Pastures: An Ecological Approach to Herd Management, Using Oxygen Isotope and Dental Microwear Analysis in a Case Study

Richard Madgwick, Cardiff University  
Mobility, Husbandry and Feasting: An Integrated Approach to Understanding the Role of Fauna in Late Bronze Age Landscapes in Southern Britain

Katerina Papayiannis¹ ² and Thomas Cucchi³ ⁴,  
University of Athens ¹, Wiener Laboratory, American School of Classical Studies, Athens ², CNRS-National Museum of Natural History, Paris ³, University of Aberdeen ⁴  
The Microenvironment of Bronze Age Aegean: Minoan Commerce and the Spread of Micromammals

Discussion of session 8

12:30 – 14:00 Lunch break

Wednesday 16th of March | 14:00 – 15:30

Konrad Smiarowski, The City University of New York, Graduate Center  
Mobile Farmers: Long Term Human Ecodynamics and Changing Faunal Landscapes in Medieval Norse Greenland

Jacqui Mulville, Cardiff University  
Where the Wild Things are? Deer in the British and Irish Isles

Cheryl Makarewicz, CAU Kiel  
Title to be announced soon

Final discussion of session 8

15:30 – 16.00 Coffee break

Thursday 17th of March | 14.00 – 16.00

Plenary meeting – Final discussion of all sessions
SESSION 9

QUANTIFICATION AND MODELLING IN GEO- AND ECONOMIC ARCHAEOLOGY

Tuesday 15th of March | 14:00 – 15:30
Poster (together with session 8)
Elke Hänßler1, Kimon Christianis2, Marie-Josée Nadeau3, Oliver Nelle3, Norbert Nowaczyk4, Helen Zagana2, Ingmar Unkel3, GS HDL, CAU Kiel1, University of Patras3, CAU Kiel3, GeoForschungsZentrum Potsdam4
A Quantitative Approach to the Environmental History of the Gulf of Patras Region (W-Greece)

15:30 – 16.00 Coffee break

Wednesday 16th of March | 9:00 – 10:30
Marina Fischer-Kowalski, Alpen-Adria University of Klagenfurt, Vienna
Quantification of Societal Metabolism and Colonization of Nature (Invited)

Daniel Knitter, Brigitta Schütt, Michael Meyer, FU Berlin
Central Places of the Historic and Prehistoric World – An Attempt to a Holistic Explanation of the Formation of Prominent Places

Mans Schepers, University of Groningen
The Interpretation of Dung Layers

Discussion of session 9

10:30 – 11:00 Coffee break

Wednesday 16th of March | 11:00 – 12:30
Peter Houben, University of Frankfurt a. M.
Sediment Fluxes and Budgets during Holocene: Quantification and Modelling (Invited)

Riccardo Klinger, Philipp Hoelzmann, Wolfgang Schwanghart, Brigitta Schütt, FU Berlin
River-Lake Interactions in the Middle Orkhon Valley (Mongolia): Sedimentary Analysis and Implications for Local Landscape Evolution

Svetlana V. Khannueva1, Dmitry Kasimov1, Roshani Sitaula1, Yang Yu1, Andrej Mitusov2, Environmental Management Programme, CAU Kiel1, GS HDL, CAU Kiel2
Quantitative Reconstruction of Palaeoenvironment during Holocene Based on Colluvial Layers Sequences

Discussion of session 9

12:30 – 14:00 Lunch break

Wednesday, 16th of March | 14:00 – 15:30
Christian Heymann1, Lutz Käppel2, Oliver Nelle2, Kimon Christianis3, Helen Zagana1, Norbert Nowaczyk4, Ingmar Unkel3, GS HDL, CAU Kiel1, CAU Kiel2, University of Patras3, GeoForschungsZentrum Potsdam4
Holocene Environmental and Cultural Dynamics in the Karst Polje of Stymphalia – Preliminary Results

Michael Lay, Tina Wunderlich, Ercan Erkul and Wolfgang Rabbel, CAU Kiel
Comparative Studies of Soil Magnetic Susceptibility on Archaeological Targets

Anita Casarotto, Francesco Ferrarese, Armando De Guio, Giovanni Leonardi, University of Padua
A Multicriteria and Multiobjectives GIS Model to Locate Archaeological Sites in the Landscape: The Case Study of Eastern Lessinia

Discussion of session 9

15:30 – 16.00 Coffee break

Wednesday 16th of March | 16:00 – 18:30
Philip Verhagen, Free University of Amsterdam
Predictive Archaeological Modelling (Invited)

Wolfgang Rabbel, Harald Stümpel, Christina Klein, Ercan Erkul, CAU Kiel
Miletos – Geophysical Investigation of an Ancient Mega Polis

Christina Klein, Ercan Erkul, Harald Stümpel, CAU Kiel
Geophysical Investigations in Elaia – Harbour City of Ancient Pergamon

Tina Wunderlich, CAU Kiel
Geophysical Survey on the Island of Föhr

Ercan Erkul, CAU Kiel
Combined Geophysical Prospection of Neolithic Large-Scale Buildings

Georg Roth, University of Leipzig
Analysing Measurements with Spatial Autocorrelation – A Case Study from a Neolithic Flint Mine

Discussion of session 9

Thursday 17th of March | 14.00 – 16.00
Plenary meeting – Final discussion of all sessions
SESSION 10

NOVEL TECHNOLOGIES IN BIOMOLECULAR ARCHAEOLOGY

Wednesday 16th of March | 9:00 – 10:30

Eline Lorenzen, Centre of GeoGenetics, University of Copenhagen
*The Last Megafauna Extinction* (Invited)

Swetlana Peters¹, Alexander V. Borisov², University of Applied Sciences Osnabrueck¹, Institute of Soil Sciences RAS, Pushino²
*Microbiological Soil Analysis as a Tool to Detect Functional Areas in Habitation Sites*

Julia Elsner, Institute for Prehistory and Archaeological Science, IPAS
*From Rockshelter to Lakeshore – Ancient DNA from Horse Remains in Switzerland*

10:30 – 11:00 Coffee break

Wednesday 16th of March | 11:00 – 12:30

Matthew Collins, BioArCh, University of York
*ZooMS, Zooarchaeology by Mass Spectroscopy Rapid Identification of a Fragmentary Zooarchaeological Record* (Invited)

Marie Kanstrup, Faculty of Agricultural Sciences, University of Aarhus
*Experimental Evaluation of the Stable Isotope Method to Characterise Prehistoric Manuring Practices*

Jennifer Jones, Cardiff University
*Animals and Isotopes: Palaeoenvironmental Isotope Modelling in the North Atlantic Islands*

12:30 – 14:00 Lunch break

Wednesday 16th of March | 14:00 – 15:30

Johannes Krause, Department of Evolutionary Genetics, Max-Planck-Institute for Evolutionary Anthropology
*What Makes us Human: Insights from Sequencing Extinct Hominin Genomes* (Invited)

Ricardo Fernandes, GS HDL, CAU Kiel
*Dietary Effects on Radiocarbon Dating*

Bente Philippsen, Aarhus University
*Reconstructing the Limfjord’s History: Radiocarbon Dates of Shells and Stable Isotope Values of Bulk Sediment*

15:30 – 16.00 Coffee break

Wednesday 16th of March | 16:00 – 17:30

Christopher Eizaguirre, IFM-GEOMAR, CAU Kiel, Leibniz Institute of Marine Sciences
*Adaptive Allele Frequency Shift Maintains Standing Genetic Variation at MHC Genes* (Invited)

Frederick Feulner, BioArCh, The University of York
*Sulphur $^{34}$S Isotopes as Geolocation Tracer? First Results from Champ-Durand Causewayed Enclosure*

Nienke Van Doorn¹, Hege Hollund², Julie Wilson³, Matthew Collins³, BioArCh, University of York¹, VU Amsterdam², YCCSA, University of York³
*Exploring Collagen Damage in Archaeological Bone through a Non-Destructive Method in Mass Spectrometry*

Thursday, 17th of March | 9:00 – 10:30

Poster Session

Melanie Harder, GS HDL, CAU Kiel
*SNP-Typing as a Tool in aDNA Research*

Ben Krause-Kyora, GS HDL, CAU Kiel
*The Domestication of Pig – An Interdisciplinary Approach*

Esther Lee, CAU Kiel
*Tracing Maternal Lineages of Ancient Siberian Canids through Mitochondrial DNA*

Christine Schuh, GS HDL, CAU Kiel
*An Interdisciplinary Approach to the Investigation of Early Medieval Populations*

Susanne Schwarz, GS HDL, CAU Kiel
*Palaeopathological and Molecular Differentiation of the Human Treponematoses – An Approach*

10:30 – 11.00 Coffee break

Thursday, 17th of March | 11:00 – 12:30

Discussion

12:30 - 14.00 Lunch break

Thursday, 17th of March | 14.00 – 16.00

Plenary meeting – Final discussion of all sessions
The paper aims to explore the different concepts developed in cultural anthropological research in order to explain the relationships between humans and their environment. While earlier concepts argued for a deterministic perspective of the passive adaptation to the environment, today the agency of humans is seen as an important factor, looking for example at the multiple ways of interacting with the environment.

Göbekli Tepe – A Pre-Pottery Neolithic Sanctuary in the North Mesopotamian Landscape
Klaus Schmidt
Orient Department, DAI, Berlin

No abstract

Stymphalos – Environmental History and Landscape Perception
Ingmar Unkel1, Christian Heymann2, Saskia Hoffmann3, Kimon Christanis4, Ercan Erkül5, Lutz Kääppeli1, Oliver Nelle1, Norbert Nowaczyk6, Helen Zagana1
1Institute of Ecosystem Research, CAU Kiel, 2GS "Human Development in Landscapes", CAU Kiel, 3Department of Geology, University of Patras, 4Institute of Geosciences, CAU Kiel
5Institute of Classics, CAU Kiel, 6GeoForschungsZentrum, Potsdam

Known from the ancient Heracles myth of the Zeus' son slaying the Stymphalian birds, the mountainous landscape of Stymphalos, including the lake, the ancient Greek town, a river and a mountain by the same name, is an ideal site to study the environmental history of the area by combining the climate archive of lake sediments with the historical and archaeological record.

One focus of the newly started project “StymphaCore” is on reconstructing the environmental history of the Stymphalos area based on palaeoclimatic and geomorphological proxies. In a first field campaign in March 2010, a 15.54 m long sediment core (STY1) was retrieved covering a time span of more than 30,000 years, based on AMS 14C dating. In a first step, the project will focus on the time period of the last 9,000 years, spanning the Byzantine period, the Roman and Greek Antiquity, the Bronze Age and the Neolithic. The sediment analyses, of which we here present first preliminary results, include the combination of geochemical (i.a., XRF-scanning, CNS) and geophysical methods (i.a., Magnetic Susceptibility). High resolution AMS 14C dating will be used to establish detailed time series of the climate variables. Highlighting the balance between sustainability and exploitation, important questions of this project part are: (1) how did the different cultures manage the water resources and (2) and how sustainable was the agricultural land use?

The second part of the project is dealing with the topic of Stymphalos with respect to the question of landscape perception reflected in the written sources of the classical antiquity. Beyond the Heracles myth, the mental representation of Lake Stymphalos and the surrounding region of Arcadia has been widely neglected so far. However, this landscape as a whole has plenty of perceptive aspects that are worth to be investigated, following the key questions: (1) what do ancient authors say about Stymphalos and (2) how do they perceive that landscape, describe it and reflect about it? The literature sources show that the poetic texts (e.g. Apollonios of Rhodes or Apollodorus or Seneca) mainly refer to the myth of Heracles and the Stymphanian birds, while the prose texts comprising historical and geographical writings (e.g. Xenophon, Strabo or Pausanias) give information about historical persons and/or events and the involvement of Stymphalos in it as well as they describe lake and the region around it.

“Travelling Cultures” in Theoretical and Archaeological Perspective
Helle Vandkilde
Department of Anthropology, Archaeology and Linguistics, Aarhus University

Recent archaeology has come to terms with the fact that human culture is far from stationary, and this is supported by state-of-the-art science such as stable isotope analysis of bone, teeth and metal. My presentation will argue that unless we allow ourselves to reflect theoretically on the character of movement the knowledge we gain will be superficial and without social perspective. The Scanian coastal site of Pile (c. 2000-1700 BC) will be discussed using the anthropological concept of ‘travelling cultures’ (Clifford, Urry, a.o.). Sociologically, this builds on the insight that movement encompasses most of what humans do and that culture is mediated, received and transformed while we move small-scale at home or larger-scale across landscapes and seas, hence forming distinct travelling cultures in the process. Inspiration will be drawn from my recent fieldwork in contemporary globalised Papua New Guinea. The archaeological search for travelling cultures will focus upon the turning point in the middle of the EBA, during which demands for copper, tin, gold and amber created a new world in motion. It will be suggested that it was around this time, c. 2000 -1700 BC, that long-distance maritime travelling became intertwined with cosmological beliefs in traveling to the Other World: Corporeal and imaginary journeying thus became a creative force for each other, later
ABSTRACTS: PUBLIC LECTURES

giving rise to amazingly rich material cultures such as the Rørby scimitars, the Valsømagle hoard, the Trundholm sun chariot, the Kivik cist, elaborate rock carving scenes, the Viksø helmets, the Grevensvænge figurines, etc.

North West European Neolithic: Agriculture, Economy, Landscape and Chronology

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A defining characteristic of the Neolithic is the appearance of domesticated plants and animals, alongside changes in material culture and mortuary practices. At the landscape level, we see major environmental changes, some of which appear as a continuation of previous events, whilst elsewhere, these are abrupt and dramatic. There has been huge debate about the mechanisms of the transition to agriculture, but relatively less emphasis on what happens after its arrival. What was the nature and timing of activities in terms of subsistence economy, settlement patterns and the nature and scale of the effects of these on the wider landscape and environment? Did these vary across space and time? What was the climate context associated with early agriculture?

Some of these issues are explored by reference to north-western Europe and particularly to Ireland, Britain and its wider context, drawing upon published and unpublished evidence. Much of the work has formed part of a Republic of Ireland’s Heritage Council INSTAR 2008-2010 research programme entitled ‘Cultivating Societies: assessing the evidence for agriculture in Neolithic Ireland’. The nature of the evidence analysed is diverse, multi-strand and complimentary: palaeoecological data (pollen, stratigraphic, dendrochronological), archaeological (‘domestic’ structures, alongside burial and ritual monuments) and associated economic data (in particular, macro-botanical remains). A major new dating programme, focusing on short-lived samples (primarily plant macro-remains) and using Bayesian approaches, has facilitated the examination of the sequence of archaeological and palaeoecological events in much greater detail than previously. This work reveals an abrupt transition to agriculture, from c. 3800 cal BC, particularly associated with the early ‘house horizon’, 3715-3625 cal BC. At about 3500 cal BC, we see major changes evident both within agricultural practises and settlement data, the nature of pollen record at this time and possible wider climatic changes within the North Atlantic region.

Bayesian analyses of palaeoenvironmental and archaeological 14C data have allowed us to examine the linkages between environment, economy and settlement within a much stronger chronological framework, whilst pollen modelling and GIS have allowed us to explore the spatiality of this highly resolved dataset.

Further information on the project can be found at www.chrono.qub.ac.uk/instar.
SESSION 1

TELLS: ENVIRONMENTAL AND SOCIAL SPACE

Donje Moštre: A Chalcolithic Settlement in the Visoko Basin in Central Bosnia

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The talk presents the results of an excavation at the Early Chalcolithic site Donje Moštre in Central Bosnia, carried out in 2008. This relatively large tell settlement was situated only 900 m far away from Okolište, the central site of this settlement hotspot during the Late Neolithic period. This spatial vicinity as well as 14C dates suggest, that here possibly a settlement displacement took place. Nearly contemporary with tells in other regions such as in the Carpathian Basin, the settlement in Donje Moštre ends around 4350 BC.

Style analysis of the ceramic material proves that the society of Donje Moštre was stronger orientated to the Central Balkan area than the Late Neolithic ones. A copper tool and the finds of technical ceramics suggest that this new orientation could probably be evoked by the innovation of copper metallurgy in the region. Furthermore, during the settlement time of Donje Moštre considerable changes of the dwelling architecture pointed to huge houses with compartments of several families.

Kınık-Höyük and Southern Cappadocia (Turkey): Geo-archaeological Activities, Landscapes, and Social Spaces

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The Southern Cappadocia had, up to modern times, a huge strategic importance deriving from its position on one of the main land-routes connecting Europe and Northern Anatolia to the Levant and Middle East. In this promising but little known area – in particular on the Southern slopes of the Hasan and Melediz Mountains and on the adjoining plain – a group of researchers from Pavia University has been carrying out several historic-archaeological surveys over the last four years. The region investigated during the archaeological campaigns covers an area of ca 800 km\(^2\) within the Province of Niğde and is well representative of the landscape of Southern Cappadocia: it includes mountains, one large valley with many steep small tributary valleys, rich and cultivable lands on the plain, and marshland and salty arid areas. 37 sites covering a span of time of 7000 years – from the Neolithic down to the Middle Ages – were visited and registered in the course of the surveys.

According to a preliminary dating of the occupation phases of these sites, it is possible to notice a tendency from an earlier settlement pattern, characterized by a series of spread farms and villages, to a clear distribution, during the Late Bronze Age and the Iron Age, of larger settlements on the plain. In particular, one site, Kınık-Höyük, with its surface of ca 24 ha and its structure composed of an acropolis, a terrace and a lower city, must have played a prominent role in the region. The increasing importance of the settlement during the LBA and the IA is proved by the large quantity of ceramic collected for both these phases and by the presence of three, possibly four stele on the valley to the North of Kınık-Höyük. These typical Neo-Hittite monuments were probably located along a route passing to the valley between the Hasan and Melediz Mountains and have to be considered as land marking rocks. Regarding the reconstruction of the ancient landscape of the region, the presence of residuals of an ancient shallow lake not far from Kınık-Höyük, on the west of the modern village of Kayi, is fundamental. A geological study of the stratigraphic sections of the ancient basin shows fluctuations in the lake levels and concludes that more episodes of climate changes took place during the last 8000 years. Additionally, the abundance of water close to the site is proved by the founding of an ancient channel alongside the tell. Although the channel should be dated in the LIA and beyond, it shows how much water characterized the landscape around the site and how this factor could have been significant for the location and the growth of the settlement. The importance of spring water and soil fertility emerges clearly from several Neo-Hittite documents coming from the region. The strategic position on the foothills of the surrounding mountains, the presence of at least a communication road nearby, the abundance of water and pastures in the valleys behind, should have been the most important reasons for the development of the settlement of Kınık during the LBA and especially the IA. The present paper will thus focus on the changes in the settlement pattern of the region starting from the case study of Kınık-Höyük and by means of a combination of topographical, environmental, textual and iconographical data. In fact, these variations have to be seen as the result of both socio-political transformations and climatic changes.
One Community and Two Tells: The Phenomenon of Relocating Tell Settlements at Neolithic-Chalcolithic Transition in Central Anatolia

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The paper scrutinizes the process of spatial as well as cultural, social, economic and symbolic transition between the Neolithic and Chalcolithic in Central Anatolia as revealed at the Çatalhöyük East and West Mounds. It will situate the transition in the palaeo-environmental changes in the Konya plain and will examine how humans responded to the climate change that occurred during the 8200 calBP ‘climate event’. The key hypothesis is that the change in climate and environment caused people to move not only from the East to the West Mound but also westwards into Western Anatolia and across Europe. Çatalhöyük offers a microcosm that may help us unlock some of the key questions surrounding social and environmental space of tell settlements, settlement dynamics during the Neolithic-Chalcolithic transition as well as the phenomenon of relocating tell settlements in the Near East in this time period.

Putting Sites in their Catchment: Site-Catchment Analysis of Late Neolithic Settlements within the Visoko Basin, Central Bosnia (5200-4500 BC)

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The Neolithic settlements, located in the Visoko Basin (BiH), were linked to their surroundings. How these were influenced by variables of the landscape such as climate, soils and topology and in which way these parameters affected the sites in size and maybe in their importance will be the main topic of the discourse.

A method of classifying the former mentioned variables in order to get a valued map of the landscape to obtain an impression of the agricultural potential will be introduced. How this terminated the development of the settlements is going to be demonstrated by examples of Butmir sites in the Visoko Basin such as Okolište and Obre.

Tells in Croatia – Western Outskirts of the Tell Phenomenon

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The Tell phenomenon in Croatia has not been scientifically discussed since the archaeological activities of the late Prof. S. Dimitrijević, meaning for over thirty years. Considering the amount of new data on this topic that has emerged during the lapsed period, the territory of Eastern Croatia (SE part of the Pannonian Basin) is now experiencing serious problems related to chronological questions of the Neolithic period. A lack of AMS radiocarbon dates, even from some recent excavations, is an additional problem, alongside the fact that a significant amount of recently excavated material has not been processed nor published. However, some achievements have been reached and will be briefly presented in the paper. Since several tell excavations are expected to start in the near future, it is an imperative to gather the representative old data that can be used in forthcoming research and interpretations. Incorporating that old data into the new cognition is the main “barring” of this paper.

The Middle and Late Neolithic Tell of Uivar Seen from a Ceramic Perspective

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In the context of an almost finished research project funded by the German Research Foundation (DFG), the Neolithic pottery from the fortified tell site Uivar (Jud. Timiș Romania) was analyzed in respect of style and technology. The late Neolithic habitation layers of this site belong to the Vinča Culture (Phase C). Besides the canonical Vinča pottery with burnished or even polished surfaces and grooved or channelled decoration, a few sherds were found rarely but regularly, which differ substantially regarding pottery production technology, decoration techniques and decoration motives. Local and tiszaoid Vinča were defined as ceramic facies, sherds of the Tisza Culture might be imports, pottery of the Banat Culture is interpreted as a local phenomenon of synthesis in Romanian research.

The aim of the project was to resolve the considerable problems of definition and delimitation by a strictly scientific archaeometrical classification of technology groups which are independent from style. The archaeometrical analyses were realized at the Institute for Mineralogy, Crystallography and Material Sciences (IMKM) of Leipzig University, with the non-destructive µ-3D-X-ray computer tomography being the most innovative highlight in the broad spectrum of methods.

This approach had to be expanded by a diachronic perspective at the very beginning of the project. The last excavation campaigns in 2007-2009 in trench have shown that the formative layers date in the transition between Middle and Late Neolithic (Szakálhát culture and Szakálhát-Tisza transition). Furthermore, they also belong to another cultural sphere which is oriented towards Central Europe instead towards the Balkans. But even in the inferior layers a few atypical Vinča elements were detected. The change in Uivar is less profound than evoked
by Gh. Lazarovicis well-known concept “Vinča C-shock”. The assembly of a Vinča amphora with lid in form of an animal’s head together in the same house with a painted Szakálhát amphora with a lid as well – which is totally unusual for this culture – might be interpreted as a hint for assimilation and concealment of opposites. The ideas whether this equilibrium was aimed to create and protect social stability and to what extent this objective had succeeded effectively are open to debate. Concerning production technology the pottery in the formative layers differs from all ceramics in the superior layers by heavy use of organic temper. Banat Culture ceramics is characterized by the use of biomineral tempering. In the current state of research any further correlation between technological groups and style groups is not recognizable. The examination of spatial distribution of the above mentioned groups and facies did not result in any clear pattern as well. It was not possible to identify features with sherds from only or predominantly one of the non-canonical facies, any spatial concentrations in the layers were not verifiable either. These records are not in favor of any conception of households clearly separated according to their shared identity and group affiliation (familiar, ethnic or other).

For the interpretation of this double lack of pattern, post-structuralistic approaches like agency and hybridity are more appropriate than the conventional explanatory models ethnicity and migration which dominate the scientific discourse in Romania even today.

Mapping the Cultural Landscape of the Uruk Expansion along the Tigris River and its Tributaries

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While the strategic locations of individual tell sites like Habuba Kabira and Godin Tepe have been noted (Algaze 1993: 223; Henrickson 1988: 88; Strommenger 1980: 14-15), and despite decades of debate, the nature of the Uruk Expansion remains inconclusive. Separately, Andrew Sherratt (1999: 21) has described how choke points along routes carrying luxury items into a region are advantageous positions for emerging elites in pre-monetary societies to control, providing wealth and legitimizing the elites’ increasing power. The Uruk Period is certainly a time of unprecedented urbanization that undoubtedly increased social stratification in new ways. Yet, the patterning of sites with and without high densities of Uruk material along an entire transport route has never been investigated though this inter-regional, route-based perspective on such major tell sites and their landscapes is exactly the sort of approach that sheds insight into a cultural expansion based on inter-regional exchange and interaction between sites. Now, by utilizing GIS to track the changing social landscape from the early fourth millen-

References


Neolithic Activities in the High Mountains of Bosnia-Herzegovina? Pollen Analytical Results from Prokoško Jezero

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In the Bosna valley the tell of Visoko/Okolište has been investigated since 2002 in a common excavation project by archaeologists from Bosnia-Herzegovina and Germany (Hofmann et al. 2006). Müller (2006) estimated the population density and the area necessary to feed the people living in the valley. By this he assumed, that the stock would have to graze outside the valley bottom. As traditional husbandry in this region is connected to mountain pasture in summer times it is obvious to estimate a comparable economy for the Neolithic. 35km west of Okolište at an altitude of 1670 m the lake Prokoško Jezero serves as an archive to proof this hypothesis. Nowadays it is located near the upper tree limit. It is surrounded by
a number of shepherd huts and sheep grazing is widespread. The sediment record of Prokoško Jezero covers the Late Glacial and the Holocene with a length of 11.5 m. Seven $^{14}$C dates from leaf fragments give an independent framework for the chronology of the record. Thus, the main settlement phase of Okolište that dates to ca. 5200-4500 cal. BC is represented at a depth between 580 and 5400 cm. In this phase woodland species dominate the pollen record with high amounts of hazel as a light demanding shrub. The forest is composed of a mixed mountain forest of oak, pine, spruce, some fir and strong increasing values of beech and hornbeam. Lime and elm are obviously out-competed by beech as their values decrease while beech increases. Thus, the climatic conditions must have been favourable for forest growth even in the high altitudes. Few herb taxa indicate open space, and charcoal particles may show human presence in the region but there is no strong deforestation as it is obvious for the Roman Iron Age when the values of herbs and grasses rise steeply and even rye cultivation is recorded. In Neolithic times the higher mountain range was visited but no intensive mountain pasture is visible in the diagram. Thus, the woodland of the hilly lower elevations will have been used for forest grazing.

References

The Potential of Geoarchaeological Investigations at Tell Sites – Examples from Germany, Bosnia-Herzegovina and Turkey
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As geo-archaeology comprehends the application of techniques from earth science disciplines to solve archaeological questions, results of integrated approach of sediments surrounding archaeological sites as well as archaeosediments themselves are presented in this paper. Whereas the investigation of soils, alluvial and colluvial sediments enables reconstructions of landscape history and site history, research on archaeosediments adds information about the prehistoric settlement activities. Viewed in a holistic manner, a complex co-evolution of landscapes and prehistoric settlements appears. So far unrecognised connections between climate vari

Social Spaces in the Late Neolithic Tell-Like Settlement of Kundruci (Central Bosnia)
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The late Neolithic multi-layered settlement site of Kundruci lies at the fringe of the Visoko valley, in a remote side-valley, secluded towards the surrounding hillsides. Although material culture witnesses close contact to Okolište and the other Butmir settlements in the Basin, the site shows some distinct peculiarities in spatial organisation as well as economic activities that call for further attention. The focus of this paper will be on a 200-years-sequence of different settlement outlays that point towards drastic changes in social organisation. These are especially remarkable when compared to contemporary developments in the other sites of the Visoko area.

Pietrele in the Lower Danube Valley – A Central Site of the 5th Millenium BC
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The settlement mound Măgura Gorgana has been excavated since 2004 in order to make a substantial contribution to the analysis of the economy and subsistence strategy of an early Copper Age community on the Lower Danube, in the framework of a new chronology based on stratigraphy, pottery analysis and radiocarbon dating. It was intended to shed light on the period of the emergence of social inequality as it is visible in the cemetery of Varna 170 km east of Pietrele and belonging to the same archaeological complex of cultures (Kodshadermen-Gumelintisa-KaranovoVI). It could be shown in Măgura Gorgana that houses had been rebuilt at the same place as the older ones for over 250 years (c. 4500-4250 cal BC). Families with different specialisations lived in the houses. We could distinguish one house in which weaving activities took place and a second one in which hunting and fishing were predominant. For the first time in the KGGKI area it could be shown by geomagnetic investigations that the settlement mound was
only the centre of a much larger flat settlement. This raises many questions about the social role of settlement mounds and possible differences between people living on the mound and around it. During the last two excavation campaigns parts of the surrounding flat settlement were excavated. After the first results of pottery typology and radiocarbon dating the houses in the flat settlements seem to belong to different periods. In one case a superposition of two houses could be attested even in the flat settlement. One of the most exiting finds in one house was a large pithos, 130 cm high, with a capacity of 400 liters which is the first vessel of this size in the Gumelnitsa culture.

Mounds and Settlements in the Lower Qarabakh-Mil Plain, Azerbaijan

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Started in summer 2009 as the first project in the frame of the newly established cooperation between the National Academy of Sciences of Baku and the German Archaeological Institute, the rescue excavation on the mound of Kamitepe in South-Western Azerbaijan has revealed an unparalleled massive and compact mud brick platform datable to the pottery Neolithic period (6th mill BC) surrounded by a series of rooms. Thick layers of ash and debris along the edges of the platform were interpreted to indicate a possible function of the site as a central meeting or feasting location for Neolithic communities living in the surrounding region. The presence of at least ten possibly contemporary small Neolithic sites, discovered during the initial season of the geo-archaeological survey carried out around Kamitepe, suggests a dense and still greatly preserved Neolithic landscape, mainly characterised by low, shallow tells. These are typically located along the margin of the Kara Su valley, on low natural ridges or river terraces that slope down towards the river plain. Their occurrence together with the presence of a larger prehistoric occupation composed of several small low mounds raises questions regarding the emergence of different types of human occupations in the Kamitepe micro-region during the late Neolithic and Chalcolithic periods. This paper also aims to tentatively discuss the processes of settlement and mound formation during the prehistoric period in Western Azerbaijan and the role played by these tells in later landscape formation processes.

Pottery in Okolište: Style and Use in Relation to the Evolution of Settlement Pattern within a Late Neolithic Tell Landscape within Central Bosnia (5200-4500 B.C.)

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More complex societies with signs of vertical social stratification emerged for the first time during the 6th millennium BC of Southeast Europe, starting in innovative key-regions. In the course of this development the colonisation of low mountain ranges took place, such as in the Dinaric Alps within Central Bosnia. Here, an international and interdisciplinary team has carried out extensive field work in a settlement hotspot. Currently, the interpretation of the excavation features from the tell settlement Okolište – the central site of this area – have been completed regarding the identification of the building structures and the clarification of the stratigraphy. Based on this as well as on stylistic, functional, taphonomical and contextual analyses of the pottery the evolution of this village can be traced and related to the regional settlement dynamics. Thus, in the early stages the village Okolište grew to an extraordinary size with an exceptional population concentration, while the number of neighbouring settlements decreased. But already soon after the foundation of the village a step by step reduction in size (and importance) started. This development was accompanied by the increase in the number of settlements in the surrounding area resulting in a more dispersed settlement pattern. This paper in particular will specify this development and pursue the question as to how far this evolution comes along with changes of ceramic styles, of decoration complexity and of decoration rates. Based on this it should be possible to discuss, to what extent these parameters can be considered as criteria of social complexity respective-ly the willingness for innovations within Butmir societies.

Prehistoric Gaps in the Kaikos Valley – Results of a Different Perception of Space or Environmentally Forced?

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The Kaikos valley in western Anatolia offers high potential for questions concerning cultural development in prehistory as well as the Holocene landscape evolution. Therefore, new archaeological and geographical surveys have been conducted between 2008 and 2010 and will be continued in the future. On the basis of so far 17 prehistoric sites dating between the Late Chalcolithic and the Late Bronze Age, the picture seems more complex than expected. Although the river valley is geographically linked to the Aegean in the west and further inland
to the east, the whole region does not seem to be intensively integrated in some of the main cultural features of e.g. the Early Bronze Age (EBA) period. As it had been demonstrated convincingly in other regions of western Anatolia, a process of protourbanisation and centralisation can be attested in the developed 3rd mill. BC, detected from Troy down to the province of Caria. The lack of EBA-centres in the Kaikos valley could be explained by the natural features characterising the environment as well as by probable socio-cultural reasons aside methodological problems. To deal with these problems on a regional level a spatial approach is utilized that compares the different circumstances of the landscape by quantifying and illustrating their characteristics. Based on this analysis it can be answered whether the different natural factors lead to the lack of the EBA-centers in the Kaikos valley – offering new insights in the settlement history of western Anatolia.

**Neolithic Economy in Okolište, Central Bosnia (5200-4500 BC)**

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The tell site of Okolište in Bosnia has a specific economy, a rare mixture of agriculture, woodland management and collecting plants for various purposes. Especially the woodland management – hazel, cornelian cherry, apple tree – is quite unique in this millennium. The plant remains, seeds and fruits as well as charcoal, allow a profound interpretation of the economy and nutrition of the tell settlers. Some plants have surely been used as medicine or as psychoactive drugs.

**The Dynamics of Growth and Stability: Tell-Based Settlement in Northern Mesopotamia during the 4th and 3rd Millennia**

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The Fragile Crescent Project, a major new initiative run from Durham University, UK, seeks to analyse settlement patterns across Northern Mesopotamia through a combination of archive and current survey data, supplemented and expanded by the use of satellite imagery. The project brings together settlement data from several surveys undertaken over the past thirty years covering a range of landscape types and environments, including Southern Turkey, Western Syria, the Euphrates corridor and the Syrian/Iraqi Jazireh. These surveys are enhanced by reanalysis with the use of satellite imagery, particularly declassified spy imagery such as CORONA, to discover new sites both within and outside the boundaries of the original surveys. Such a dataset allows for the analysis of trends at the level of individual sites and surveys but also for a comparison between the different landscape zones which make up Northern Mesopotamia as a whole. This paper will focus on the tell-based settlement in each of these regions during the period when settlement hierarchy emerged in the 4th and 3rd millennia B.C. This period includes two phases of settlement expansion, the first during the Late Chalcolithic and Uruk periods and the second during the Mid-Late Early Bronze Age. Throughout this time, the tell was the major component of sedentary settlement, and is certainly the most visible in the present day. The specific context of the rapid expansion of certain sites in different areas will be examined and compared, as well as more general questions regarding distribution and density of tell and non-tell settlement. This leads to questions regarding causal factors behind the genesis of such hierarchical settlement patterns, and particularly the influence of environmental and social factors in the growth and maintenance of these systems, and in their subsequent decline. These factors include the importance of agricultural and pastoral resources in the immediate vicinity of major sites and densely settled areas, but also intra- and inter-regional trade and exchange networks, as well as the role of pastoralists and non-sedentary or semi-sedentary peoples. Finally, the idea of multiple cores and peripheries will be employed as a way of conceptualising the dynamics of settlement during this period.

**The Settlement Mound of Niederröblingen: What do the Sediments Reveal about the Past?**

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Settlement mounds are clearly defined as man-made structures. The tell sediments mainly consist of the deterioration of the buildings, only a small amount represents refuse (Rosenstock 2009; Miller-Rosen 1986). Therefore, the Tell sediments reflect the behaviour and culture of the people responsible for its construction (Miller-Rosen 1986). If these sediments are analysed by a multi proxy approach a reconstruction of different intensities of man-environmental interactions during the occupation may be feasible. The settlement mound of Niederröblingen was discovered in North Eastern Germany on 2006. It consists of at least 15 settlement layers. First settlement activity is characterised by a Neolithic flat settlement spanning from ca. 5300-4600 BC, followed by a settlement interruption. From ca. 3100 BC until 400 AD the mound was quasi-continuously inhabited and reached a height of 2,5 m, a total matter accumulation of 34 000 t on an area of 4,75 ha. The results of geoarchaeological and palaeoecological
investigations indicate an increase in land use intensity during the Bronze Age, where the local riparian forest was cut and replaced by pasture lands. Whether the raised water tables and the start of fluvial activity in the adjacent river valley (Helme) have been triggered by such severe impact of the settlers on their environment on a regional scale, or by climatic deterioration is a matter of debate. As high levels of matter fluxes into the settlement mound have been maintained until Roman times, the area affected by land use activities (woodland use, agricultural fields) must have increased over time. Considering the results of phytolith analysis a simple model for the reconstruction of prehistoric field sizes is presented.

References

Changes in Timber Use at Arslantepe (Malatya, Turkey) from 3350 to 2000 Years BC: Environmental versus Social Forcing
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Considerable amounts of charcoal remains from the Turkish tell of Arslantepe (Malatya) have been the subject of anthracological analyses. The charcoals are from five different archaeological periods, each one characterized by different anthropological features, ranging from the beginning of the Late Chalcolithic 5 (3350 years BC, 5300 BP) to the end of the Early Bronze Age III (2000 years BC, 3900 BP). The land exploited by the different populations that settled on the anthropogenic hill provided a rather short list of woody taxa (11 in all), with important changes along the five investigated periods. Both anthropological choices and environmental causes can be advocated to explain increase/decrease of key taxa. To estimate the meaning of such changes both the ecological features and the possible origin of the used trees, as well as the technological features of timber have been taken into consideration. Statistical analyses have been used to estimate the real importance of these changes in wood use. The first and the last of the investigated archaeological periods, respectively occurring between 3350-3000 and 2500-2000 years BC, show important similarities, with overwhelming presence of hygrophilous taxa depending from the water table (alder and poplar). As a matter of fact these periods are considered to have been rather instable from a climatic point of view in the Near East. The available data, though not giving the possibility to disentangle between climate forcing and human agency, supply new and important environmental information for a period under the lens of palaeoclimatologists and archaeologists. If we follow the hypothesis of the cultural change, we should imagine that human choices drove the selection of timber, either for the different technological needs, skills, or rituals. Both interpretations of the anthracological record can be defended, but in absence of independent evidence (e.g. stable isotope content of fossils plants), none of them should be taken for sure. We have to admit that some disturbing factors in interpreting this record could however occur: the ascertained climate instability of the area in the period, the extent of the exploited land to get wood, and the eventual trade routes for timber.

Late Neolithic Multiphase Settlements in Central and Southern Transylvania
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Starting in 2007, the University of Kiel conducted three geomagnetic survey campaigns and a test excavation in Romania. The aim of these campaigns were focussed on the settlement structures of Neo- and Aeneolithic sites. In Transylvania 6 sites were surveyed, revealing settlement structures from the Turdaş, Iclod and Petrēşti Period. The settlements’ several century long occupations, lasting until the Copper Age hiatus, often resulted in very large sites (>10ha) with a high density of settlement structures and massive, spacious enclosures with multiple ditches. Good examples for this type of settlement are the sites of Iclod in central, and Turdaş in southern Transylvania. On all surveyed sites, the clear arrangement of the house plots, sometimes reminding of the much bigger Cucuteni-Tripolye-Sites of the Ukrainian plains, show the strength of the social organisation, but in difference to the “real” tell settlements, the settlement dynamics lead not to a vertical growth, but to a horizontal expansion and shrinkage of the settled area. The nearer study of this dynamics is planned to be the next step of investigation, together with the research of the settlement hierarchies on a regional level. This is already in an initial phase, and indicates a comparatively egalitarian settlement pattern with sites of nearly even size nearby.

Neolithic Settlement and Landscape Studies in Upper Mesopotamia
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The transition from semimobile hunter and gatherer communities to sedentary food-producing villagers is a crucial process in human social evolution. Since sedentism is an important issue in this process, one of the main objectives of this paper will be an analysis of those aspects in the landscape, which attracted early settlers to establish sedentary communities. In order to achieve
this objective it is necessary to reconstruct ancient landscape and settlement distribution in the landscape. The latter derives from archaeological data such as site excavations and surveys. A database of all the archaeological information related to the Neolithic period in the study area has been created, and environmental records such as pollen analysis are used to reconstruct vegetation and land use history. In addition animal and plant remains from excavations are investigated in order to reconstruct faunal life. Geomorphic analyses are included for understanding formation processes and landform history of landscapes. Remote sensing is used in order to gain further spacial information and in combination with all the other data feed into a Geographical Information System Database. Based on this data it will be attempted to filter specific circumstances in the landscape which were favourable for the earliest sedentary communities.

Human Landscape – Site (Trans-) Formation in the Trans Tigris Area

Simone Mühl
University of Heidelberg

The formation of urban centers in upper Mesopotamia during the early Bronze Age is the result of long term environmental, economical and social developments. Huge tell sites appear, surrounded by a web of inter-regional and inter site roads. These landscape features are traceable through aerial and satellite photography. They serve as classic testing grounds for new methods such as automated site detection, agent based modeling. The plains of northern Syria have little variation in terrain and are therefore ideal for aerial prospection. The situation in the central Trans-Tigris region is more difficult, because of a highly differentiated landscape dominated by the ridges of the Zagros Piedmont zone. The variation in climate and soil conditions required different economical strategies and resulted in diverse settlement patterns. This paper will discuss settlement changes and variation in two case study areas: The Makhul area at the mouth of the Little Zab River and the Shahrizor plain in Iraqi Kurdistan. A spatial analysis of the wider region will be combined with the results from new excavations and site surveys in both areas. This gives a multi period picture of cultural interaction and landscape formation. The effects of these processes are still evident in the modern landscape of Iraq. Through the use of models borrowed from particle physics one can show mechanisms of urbanization as evident in the piedmont zone of the Trans-Tigris area and the transformation of settlement patterns through time.

Surplus and Division of Labour: Social Organisation of a Late Neolithic Society in Central Bosnia (5200-4500 BC)

Johannes Müller
Institute of Pre- and Protohistoric Archaeology, CAU Kiel

Specialisation, over- and underproduction within communities, in between communities, and between different regions are driving forces for the rise of social stratification within egalitarian societies. From household level to supra-regional impulses this paper tries to identify processes of social differentiation and its impact on landscape development. The investigation in settlement mounds and other domestic sites of the Bosnian Neolithic is the focus of the presentation.

“Good to Use and Good to Think”: Procurement of Flint Raw Materials within the Tell Landscape of Central Bosnia

Nils Müller-Scheessel
Roman Germanic Comission, DAI, Frankfurt am Main

Among the raw materials used by Neolithic people, the different kinds of flint undoubtedly occupy a very prominent position. Rightly dubbed “the steel of the stone age”, large parts of Neolithic social life would be inconceivable without flint implements. However, instead of dealing with the actual usage of flint tools, in my paper I will concentrate on the different qualities of flint raw materials employed and on their respective origin. Taking the tell settlements of Central Bosnia and its surrounding as an area of research, I want to tackle the questions why specific raw materials were used, where they came from and how the procurement of these materials might have influenced the perception of the Neolithic user in social as well as environmental terms. If the assumption is correct that Neolithic life without flint tools is unimaginable, and taking into account that the visual and mechanic qualities of flint can be strikingly different, it is to be expected that the means of getting access to flint resources, socially as well as physically, also reflected back on the actual settlement patterns.

3,000 Years of Settlement Continuity? Looking for Indications at the Settlement Mound of Niederröblingen

Andreas Nebe
University of Halle

During a rescue excavation by the State Office of Heritage Management and Archaeology Saxony-Anhalt (LDA), settlement layers from several prehistoric periods were detected in the floodplain of the river ‘Helme’ near Nied-
erröblingen (Ldkr. Mansfeld-Südharz). The deposits were preserved to a height of 1.8 m and a presumably extension of 250 x 190 m and were visible as a gentle mound in the Helme valley.

An initial settlement phase during the early Neolithic was followed by a 1,500 year long interruption of settlement activities. Various radiocarbon dates from the settlement layers suggest a continuity of settlement from the 3rd Millennium BC until the middle of the 1st Millennium BC. Whereas only scarce evidence of house structures has been documented within the late Neolithic and early Metal Age layers, extensive settlement remains like floor pavements, collapsed mud walls, stoves and ovens were found in the layers dating to the late Bronze Age and early Iron Age. The layers from the mid-1st Millennium BC and from the last settlement phase in the Late Roman Period had already eroded to a large extent.

The aim of this paper is to discuss the archaeological record according to the seemingly continuous occupation of the settlement. Amongst other limiting factors, the limited time frame did not permit the use of adequate excavation methods in all areas of the mound. Therefore, it is necessary to consider in which areas traces of concrete settlement activity could be found, how to estimate the time span of these settlement activities and what could be indications of discontinuity. Finally, the obtained information is discussed in the context of regional prehistoric settlement patterns and environmental aspects in order to identify indications of continuity, change and collapse.

A Preliminary Evaluation of the Interaction Between Culture and Its Natural Environment in The Eastern Thrace

Safak Nergiz
GS “Human Development in Landscapes”, CAU Kiel

Eastern Thrace can be seen as a bridge between Europe and Asia. Thus, archaeological evidence can provide information on past cultural relations between these two continents. One of the most debated issues are the incipient stages of farming economies in Europe and the early stages of urban-city states. Therefore, Eastern Thrace is one of the most important regions for understanding the relation between Europe and Asia.

Eastern Thrace consists of different environmental zones. Hundreds of prehistorical sites are known in the region from surveys, however they are not evaluated in relation to their habitat. At that point, this study concerns to analyze the interaction between culture and natural environment in the area of Eastern Thrace. In this context, the presentation concentrates on preliminary evaluation of settlement patterns in the region, using results of surveys from specific zones that represent the general landscape of the region.

Understanding the Mound: Its Dynamics and Problems Encountered in Reading Mounds in Cultural Landscape

Mehmet Özoğlan
Istanbul University

Mounds are complex structures, like living organisms in time they change in size, shape and in morphology. Even though there is an extensive variety in the formation and development of the mounds, nevertheless they are governed by certain rules that control their eventual shape. Archaeological remains are imbedded in this complex system; accordingly, in evaluating the results of archaeological excavations, it is absolutely necessary to develop a mutual understanding on the formative process of the mounds. In considering that the mounds are also artificial appended forms in topography, the dynamic process between the cultural habitat and its natural environment, constitutes another level of complexity in reading the data. However, in most cases the available data is extremely limited to draw conclusions. In particular recent trends guiding research design has resulted in minimized archaeological exposures, evidently insufficient even in understanding settlement organization, not to mention mound formations. Considering the complex nature of the interaction of the mound settlements with their environmental setting, validity of assessments based on extremely limited data becomes more questionable. The presentation will cover a general overview on these issues, noting selected cases.

Tells in Perspective: Long-Term Patterns of Settlement Nucleation and Dispersal in Central and Southeast Europe

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Tell settlements occur — and reoccur — in several parts of the Old World. Without exception, this durable settlement type is associated with sedentary agricultural communities. But the social and environmental conditions within which tell settlements were established, occupied, and abandoned, varied tremendously in different regions. Most tells on the European continent never approached the vertical or horizontal extents of their Near Eastern counterparts, in part because they were not occupied as long. But even within Europe, there also was striking variation. This paper compares the long-term sequences of two European regions — the Great Hungarian Plain in the Carpathian Basin and the Thessalian Plain in northern Greece — in an attempt to understand how environmental and social factors in these two regions led to radically different trajectories of social organization during the Neolithic.
Emergence and Decline of the Neolithic Tell-Based Cultural System in the Polgár Micro-Region (Northeastern Hungary)

Pál Raczky and Alexandra Anders
Eötvös Loránd University of Budapest

A special feature of the Late Neolithic in the Great Hungarian Plain is the emergence of tell settlements north of the Maros river, all the way to the Körös river system. It has been well known for some time that smaller or larger settlement mounds began occurring in the Tisza-Herphy cultural environment during the 6th-5th millennium BC. In the Upper Tisza Region the Csőszhalom and Bosnyák-domb tells and their adjacent horizontal settlements started developing during this time as well.

By now it has become clear that the majority of Neolithic tell settlements in the Tisza river region (e. g. Szevgár-Túzköves, Öcsőd-Kováshalom and Berettyőújfalű-Herphy) had external horizontal settlements, comparable to that of Csőszhalom forming an organic settlement unit. The vertical tell and its horizontal settlement formed dual systems on a microregional level. Settlement clusters formed by the tell and several smaller horizontal, single-layer units could be best recognized on a regional level predominantly in the Körös river region (J. Makkay and W.A. Parkinson). By the 1980s it could be established on the basis of topographic data that the greatest supra regional difference between the northern and southern settlement systems of the Tisza culture is manifested in the difference between their tell-types settlement systems (J. Makkay and N. Kalicz).

The origins of this complex settlement system may be traced back to the process of settlement concentration that began during the Alföld LBK Period (J. Makkay, A. Sherratt, J. Chapman). The transformation of a dispersed settlement system into nucleated varieties could be well demonstrated on a regional level. Meanwhile, houses within settlements aggregation could also be detected in the tight arrangement of houses.

All these complex developments and their relevant levels can be profitably studied in the direct microregional context of Polgár-Csőszhalom, that is the natural environment of Polgár Island. Within this areal unit of 66–70 km², once surrounded by ancient meanders of the Tisza river and its floodplain zone more than gross tendencies can be analized: events on a micro-scale may also be modelled. These include following the random movements of individual household units, that added up to the form of patterning recognizable in the nucleated settlement system. This old problem can be approached from a new angle using new data. As households move together during the settlement integration process, they create new “residential corporate group” whose social associations within each settlement are of immense interest. In this new social environment there is an increasing need to define various levels and definitions of groups. This novel “construction” of physical, social and mental spaces may be recognized in an increasing number of material manifestations that may be considered declarations of community. Among others, settlement mounds (tells) may be considered a new, three dimensional definition of emerging “organic communities”, as the artificially constructed symbolic “habitual monuments” that provide an artificial space/time context to social interplay.

By the end of the Late Neolithic (4600-4400 BC), the two settlements that dominated the “Polgár island”, Csőszhalom and Bosnyák-domb, began displaying signs of disintegration, the opposite of the previous trend. The abandonment of tells again resulted in a dispersed settlement system that embodied a new group definition. Within the context of the Tiszapolgár culture, cultural components that once belonged to tell settlements formed qualitative new combinations with new materialistic/symbolic elements. Properties of the physical, social and mental spaces combined in this new cultural synthesis have changed significantly, while material culture shows signs of continuity on an elementary level.

The Rise and Fall of the Early Bronze Age Settlement Fidvár near Vráble (Slovakia) on the Northern Border of the Pannonian Basin

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1Archaeological Institut of the Slovakian Academy of Science, 2Roman-Germanic Commission, DAI, Frankfurt, 3CAU Kiel

The settlement Fidvár is situated in the southwestern part of Slovakia, near the northwestern Carpathian Montains. Since 2007 the settlement is the subject of research by a common project of the Roman-Germanic Commission and the Archeological Institute of the Slovakian Academy of Science, the University of Heidelberg and the Bergbaumuseum Bochum.

Large-scale geophysical prospection, field walking and excavations have delivered first insights into the genesis of the settlement. Starting out as a small aneolithic settlement, fortified by bank and ditch, it grew into one of the largest Early Bronze Age settlements in the Pannonian Basin. The field work has produced some indications for a decline of the settlement at the end of the Early Bronze Age.

Pietrele - “Magura Gorgana”, Romania: Copper-Age Households on and nearby the Tell

Agatha Reingruber
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Since 2004 the German Archaeological Institute has been excavating the tell settlement of Pietrele and its surrounding flat settlement in collaboration with the
Romanic Academy in Bucharest and with the financial support of the German Research Foundation. By 2010 a depth of 6 m had been reached in the southern trench F on the tell; according to drillings at least 2.5 more meters of cultural deposits can be expected in this area. Thus, the sequence has not been comprehended entirely yet; in spite of this, an impressive 200 years of occupation (4450-4250 calBC) with several overlying generations of burnt and unburnt houses have been uncovered. Inventories were preserved in houses that burned down in devastating conflagrations, yet the ceramic assemblages differ even within coeval buildings: In rooms with elaborate clay installations and big mill stones, specific combinations of closed vessels with associated lids appeared, the surface of most covered with barbotine. Neighbouring houses, also heavily burnt, contained in addition to middle-sized storage vessels also bowls, cups and jars with sophisticated patterns, either painted with graphite or incised. In the unburnt houses that were destroyed in a controlled way before erecting the new one above, only a random sample of the original ceramic inventory was preserved, most of the vessels being incomplete and thus not fully restorable.

Geomagnetic investigations around the mound have shown that in the tell’s immediate surroundings buildings were aligned in parallel rows running roughly east-west, similar to the rows of houses on the tell. Some of these buildings were excavated in 2009 and 2010. Accordingly, in the two trenches J and M, 15 m and 18 m respectively north of the tell, burnt areas of houses were uncovered, whereas 30 m farther to the east an unburnt ceramic inventory came to light in trench G.

In this paper the house inventories from the mound and those from the outer flat settlement will be compared, and both functional and chronological issues will be discussed.

Tell and Settlement Dynamics in the Middle Euphrates River Valley Region from the 5th through the 3rd Millennium BC

Andrea Ricci
GS “Human Development in Landscapes”, CAU Kiel

This paper explores the archaeological landscapes of the Syro-Turkish border region along the Middle Euphrates River, an area that has witnessed an increasing number of pilot surveys and excavations conducted over the past three decades. By integrating published data of earlier surveys with results of new geoarchaeological investigations carried out by the Land of Carchemish Project in the Syrian sector and with the support of large remote sensing datasets, in particular declassified CORONAs satellite imagery taken in the late 1960s, this study will analyze tell-based settlements and occupational dynamics of the region from the 5th through the 3rd Millennium BC. Possible local system of movements and longer communication routes will be examined together with an analysis of site hierarchies and population trends in order to investigate possible causal factors of how the process of nucleation on tells took off and developed. This will also shed light on the mutual interactions of socio-cultural factors and landscape transformation processes and lead to an evaluation of regional trajectories in socio-economic organization during the considered periods.

Environmental Factors in Tell Formation – An Archaeometric Attempt

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Institute of Prehistoric Archaeology, FU Berlin

Explanations of the tell phenomenon are based upon two approaches: One approach views tells as an accidental by-product of sedentary life under certain environmental circumstances. The other, however, sees tells as the result of deliberate social decisions. All models proposed from V. G. CHILDE onwards tend towards either the first or the second approach, but so far no consent has been reached as to what degree environmental factors constrained the formation of tell settlements. Moreover, the factors that have been proposed were usually not tested for significance. Using Multiple Regression Analysis, this paper examines the influence of a number of tell-internal and environmental factors on a sample of 330 Neolithic tell heights dating from Pre-Pottery Neolithic A to ca. 3000 BC. Models using settlement duration, building density and dummies for enclosure and timber or mud architecture can explain up to 32% of the variance in tell heights in the sample, whereas low summer precipitation, low soil fertility, sparse forest cover and non-intensive modern land use can be identified as significant external factors that explain 23% of the variance. Mechanisms as to how these factors influenced tell growth are discussed. A minimal model would be that soils of low fertility tend to be more suitable for mud construction, and thus—given a warm and dry season when houses can be built—provide an alternative construction material in regions where timber is sparse. The high mud content of decaying houses then facilitates the build-up of deep stratigraphies, especially if the existence of an enclosure enforces high building density and long-term settlement on the same spot. All factors taken together, these independent variables can explain at least one-quarter or one-third of the variance in the sample.
ABSTRACTS: SESSION 1

Architectural History, Environment and Cultural Identity at the Tell of Uivar, Romania (5200-4300 calBC)

Wolfram Schier
FU Berlin

Fieldwork at the Late Neolithic / Early Copper Age tell site of Uivar (Romania) have been performed 1998-2009 as a joint project by the Banat Museum Timișoara and the Institute of Prehistoric Archaeology at Free University Berlin. High resolution magnetometric prospection revealed a complex ditch system and house structures both on and around the visible settlement mound. In one of 20 excavation trenches the complete stratigraphy could be documented, comprising 4 m of cultural layers. The architectural sequence of 2-4 house sites could be followed over a time span of 500 radiocarbon years. While orientation and position of these houses remains approximately constant over centuries, shifts in the size and construction seem to reflect environmental changes. Only in the last two excavation campaigns it became obvious that at Uivar a cultural transformation can be observed as the pottery shows a complete change from east Hungarian Szakálhát culture to Vinča C culture, originating from Serbia. The paper will discuss the obvious discrepancy between architectural continuity and changing material identity.

Woodland-Management in the Surroundings of Tells in the Visoko-Basin, Central Bosnia between 5300 and 4000 BC

Tim Mattis Schroedter
GS “Human Development in Landscapes”, CAU Kiel

The main focus of the PhD-project “Tell in the Woods? Anthropological Investigations in SE Europe and Turkey” is on exploitation of wood resources during the late Neolithic and Chalcolithic. Charcoal analyses are used as a tool for environmental reconstruction and can help to understand the use of wood in prehistoric societies. In connection with excavations in Central Bosnia from 2002-2009 charcoal samples from several settlements in the Visoko-Basin were analysed. A wide range of wood genera could be detected and enabled to give answer to the following research questions: What kinds of wood were used? Are there differences in the charcoal spectra from the settlements? If so, how can they be explained? Are there indications of selective wood use for special purposes? Can a management of wooden resources be traced? What role do collectable fruits and seeds play in the economic life of the late Neolithic in the Visoko-Basin? Did the vegetation change during time and if so, what causes do these changes have?

Settlement Shifts in Tell-Based Occupation of the Khabur Valley of North-Eastern Syria during the 2nd Millennium BC

Stefan Smith
University of Durham

This paper aims to somewhat redress the balance of tells in that area as separate entities by integrating them into the landscape. It does so by examining the phenomenon of settlement dispersal during the 2nd millennium BC and the variety of transformations from nucleated sites that tell in the Khabur underwent at this time. Specifically it determines a handful of definable types of settlement transformation processes pertaining to tells and their landscapes during this period, and how these types relate to the settlements’ locations and complexities. These types are defined not only in terms of the transformations themselves, but also the continuity or discontinuity of what each tell signified and was used for.

This is largely done by using satellite data – mostly CORONA imagery – to plot the dispersal (or lack of dispersal) of smaller sites around larger tell centres. However, excavation and survey data are also vital to determine the temporal distribution of these sites. From the former, changes in the use of tells, for example from habitational centres to religious landscape markers, can be gleaned. From the latter, the ground truth of satellite data can be ascertained, and care has been taken to select intensive surveys that are more likely to have investigated even visually unremarkable locations of habitation. Such an investigation of settlement dispersal allows for regional comparisons across wide areas of Mesopotamia, and ties in with notions of territoriality and land tenure, in terms of what space was free to be settled on and what causal factors affected the transformation. Thus, this paper employs vital methods of archaeological interpretation to enable full comprehension of such important factors of tells’ existence as the complexity, distribution, and evolution of their surrounding landscapes.
Increasing Inequality in South Eastern Europe and the Collapse of Chalcolithic Societies: The Cemetery of Durankulak

Arne Windler
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Measuring inequality is an important aspect in analysing the social structure of the society we are living in and can usefully be applied in archaeology to understand societies of the past. To analyse inequality it is inevitable to draw back on economic tools. There are a few useful coefficients in economics, e.g. the Gini coefficient which is one of the most commonly used variables and likewise associated with the Lorenz curve; an interpretation is uncomplicated.

In this case study these tools are applied to measure inequality at the cemetery of Durankulak. During the occupation of Durankulak inequality decreases from Hamangia I to Varna I, whereas in the last periods, Varna II and III, a rapid increase of inequality can be measured. This is in concordance with present observations: In modern countries economic inequality correlates with dependence on natural resources, this connection can also be seen at Durankulak. The increasing inequality during the last periods of Durankulak promotes an economic decline, which can be seen as a driving force in the destruction of the Chalcolithic societies in South Eastern Europe.

To summarise, a connection between the insights of Durankulak and modern economic theory reveals another sophisticated explanation for the collapse of tell settlements in South Eastern Europe.
SESSION 2
COLLAPSE OR CONTINUITY?
ENVIRONMENT AND DEVELOPMENT OF BRONZE AGE HUMAN LANDSCAPES

Pollen and Fossil Plant Macromains: Proxies for Changes in the Economy of the Nordic Bronze Age Culture?
Almuth Alsleben
Academy of Sciences and Literature Mainz, Schloss Gottorf, Schleswig

Period II (1500-1300 BC) of the Nordic Bronze Age is characterized by a change of house construction types from two-aisled to three-aisled houses and the keeping of livestock in houses during winter. The reasons for these changes are not discussed in this paper, but rather does the providing of winter fodder automatically imply a change in agriculture and land use, and so, in which way is a change is indicated by botanical records as they are pollen and fossil plant makremains i.e. seeds and fruits. In regional pollen diagrams as for instance the profile from Lake Belau in Schleswig-Holstein (Wiethold 1998), a moderate increase of nonaboral pollen as indicators of open land and settlement activity clearly marks the beginning of the Bronze Age. But first with the beginning of the Iron Age the indicators of human impact reach a value about the 25 % in total. Changes in the course of the Bronze Age are not visible in these diagrams. But, eventually effects on the landscape caused by human activity might be seen on a local scale. Regarding collections of fossil fruits and seeds from conserved culture layers and other settlement structures as pits and postholes, new cultivated plants are introduced during the younger Bronze Age (Periods V/VI, ca. 950 BC). In the Netherlands and in northern Lower Saxony oats appear additionally to the dominant barley (Hordeum vulgare) and emmer wheat (Triticum dicoccum). In the eastern parts of Northern Central Europe (Mecklenburg-Vorpommern and Schleswig-Holstein) and Southern Scandinavia we can observe a different development. Next to barley and emmer wheat, the cultivation of naked wheat (Triticum aestivum s.l.) and spelt (Triticum spelta) had already played a bigger part. Since the younger Bronze Age, agriculture is based on an enriched spectrum of cereals which allows to draw connections to the Urn Field culture in the south. Three important components of Bronze Age economy (house construction types, land use systems and the spectrum of culture plants) are changing during this period, but the changes do not occur simultaneously. The introduction of new culture plants could be seen as an innovation in agriculture. Is it likewise a sign of advanced agriculture and quality or rather a sign of subsistence economy in order to minimize the consequences of a bad harvest?

Cretan Middle Bronze Age Landscape after 4000 Years. Re-Inventing the Past?
Sabine Beckmann
University of Crete

In the mountain area of north-east Crete above Agios Nikolaos, over 300 Minoan (datable mainly to the Minoan Protopalatial period, i.e. ca.2000-1650 BCE) ruins were discovered arranged in a peculiar dispersed settlement-pattern, isolated but on average not more than 300 m apart from each other, interconnected with a network of paths/roads that also includes local caves and wells.

Many of these ruins were built at least in their lower layers with massive block masonry, and around most of them long enclosure-walls are still visible, claiming an area of several thousand square meters (and up to 6 hectares) for each respective habitation site, including small patched arable and rocky land. The setting and massive construction of these enclosures (perivoloi), originally more than a meter high (and with a total known length of ca 150 km in this area), clearly show that they belonged to the sites.

Archaeologists in the past believed a few of the then known sites (the enclosures and small connecting roads being unknown to them) situated on the old roads to have been defensible forts or watch-towers because of their often seemingly “monumental” or “Cyclopean” masonry. Landscape opening and structuring going along with this massive settlement phase covers an area of ca. 30 sqkm (at least), studied in the author’s ongoing PhD thesis. There are very few earlier traces of land use or settlement to be noted in the region, and it seems that not long after the change of climate (aridification) with the “4.2 Kiloyears event” this region became attractive more or less in a rush, to be mostly abandoned again after a few centuries.

The area shows hardly any traces of settlement until re-use by mixed agriculture (with an emphasis on pastoral economy) from the second half of the 19th century, nowadays reduced to pure pastoral use. Cretan mountain shepherd/farmers have been living and working from their traditional sheepfolds cum field houses (mitata) and grazing areas until recently, in this region often topographically identical with Minoan installations, many mitata built on top of and with the use of Minoan ruins, sharing an environment that had first been dramatically shaped in the Bronze Age. Thus, it is possible to see pre-industrial Cretan mixed farming on the background of Bronze Age landscaping of the same area, suggesting that the Minoan installations were used as farmsteads. The local traditional way of life has been called hardly changed since medieval times, but the typical use of the surviving Bronze Age structures and landscape indicates the possibility that it had its roots some 4000 years ago.
The Danube Tisza Interfluve is one of the driest regions in Hungary due to its climatic and geomorphologic attributes. As a consequence it is highly susceptible to wind erosion and aeolian activity. Previous studies suggested several periods of sand movement in the Late Pleistocene and Holocene. Prevailing NW winds developed NW-SE oriented deflation ridges and blowouts. Stratigraphy is characterised by the alternation of pure blown sand and layers implying soil formation, which mark few hundred year pauses in aeolian activity. Our study was related to an archaeological site, where archaeological dates can directly be compared to luminescence ages, thus the relationship between aeolian processes and human activity can be assessed. On the basis of archaeological artefacts, there were several large migration and settlement periods in the area, so it means an ideal place to study the relationships between aeolian processes and human activity, as well as to compare luminescent data with archaeological results. Known by archaeological proofs it had served as a residence for sarmatians and people lived in the Bronze Age. The studied archaeological section is situated on the western edge of the Bugac Dune Field in a transitional area between the dunes and the adjacent blow out depressions. The territory is made up of 100-140 m thick Late-Pleistocene sand deposits. Sand layers were examined along a 0.5 km long 2.4 m deep NE-SW excavation site (made for a gas pipeline). In order to set up the luminescence chronology of the site, three profiles were sampled along the excavation. The profiles were selected (1) on the southern part of the ridge, (2) near the Sarmatian settlement (3) and at a depression NE of the ridge. Samples were taken from each separate layer, from 8-11 points depending on the number of strata. The OSL ages of the samples correlate well to the archaeological results. The deposition of the sand layers can be divided into five main periods. The bottom of the profile was deposited during the Copper Age (6.58 ± 1.44 ka), suggesting Atlantic Phase aeolian activity. The next strata with large organic content, based on archaeological artefacts could be directly related to Bronze Age settlers, who were grazing large herds. The OSL age of the sample from this layer was 4.78 ± 0.70 ka (Early-Middle Bronze Age). As shown by archaeological findings the area was inhabited in the 2-3rd centuries by Sarmatians, who disturbed underlying strata by their activities. This might explain large dispersion of equivalent dose values. Artificial forms were covered by less intense or short aeolian events 2-3 hundred years after the Sarmatian settlers (1.47 ± 0.34 ka). There was no evidence for man induced aeolian activity at this time, however the vicinity of the area was grazed by Avar tribes in this period. The most intensive aeolian accumulation (60 cm) occurred during the Hungarian Conquest and the Early Árpád Age. These layers were formed in one or two centuries, referring to intensive human activity (grazing and ploughing). The top layer was deposited in the middle Árpád Age after a supposedly calm period, which is also signed by soil formation in underlying layers from the 9th till the 12th century. As there was only indirect evidence of human inhabitation and this was the time of the Medieval Climatic Optimum we suggest a simultaneous climatic and anthropogenic cause for sand movement.

**Burnt Village Buried under Blown Sand at Beginning of Urn Field Period**

Jonas Beran
Wustermark, Brandenburg

In the years 1995, 2005, 2008 and 2009 some rescue excavations lead to the investigation of a multi period settlement place in the city of Potsdam at the bank of the river Havel. A culture layer containing Mesolithic stone and flint tools and sherds of different Neolithic cultures covers pits and stake holes of a long existing Early Bronze Age settlement belonging to an older and a younger phase of Únětice Culture. A nearly complete house plan and some post rows of other houses could be found. It is the third and greatest settlement place with houses of the Únětice Culture found till now in the land of Brandenburg at all.

The Neolithic and Early Bronze Age surface is buried under a thin layer of sandy soil of light brown colour. In the western half of the excavation area it is covered by 5 to 40 cm of black sand with great amount of charcoal and many sherds of late Period III but with only very little burnt clay. A villagelike settlement consisting of some wooden houses must have been destroyed by fire. Only at one place we found the traces of a burnt post row. The post holes are only about 20 cm deep. They seem to belong to a late Middle Bronze Age house type, till now only known from Horno in the lignite mining area north of Cottbus. Within the Lusatian Culture this horizon (about 1200 B.C.) is called “Fremdgruppenzeit”, deriving from some fundamental changes and strong influences from the north.

Immediately after the fire the settlement place was covered by a yellow sand dune layer of which up to half a meter is preserved. Coming from the new higher surface level the layer of blown sand and the ashy/coaly destruction layer are perforated by hundreds of storage pits of younger Bronze Age. They contain many finds of Stone Age, Early and Middle Bronze Age, but only a few complete vessels of their own time, belonging to the younger (Period IV) and youngest (Period V) Bronze Age. There are no other settlement structures, the location of the younger Bronze Age houses is unknown. The place was
left after that time, maybe the settlers moved about 400 m to the south, where we found many pits of Period V and Early Iron Age within the area of a fortified slavonic settlement of Early Medieval time. One of the fortification trenches there seems to belong to Late Bronze Age.

Though there are no radiocarbon datings nor other results of natural scientific research this place thanks to its outstanding preservation conditions seems to supply some evidence and illustration of the chaotic times about 1200 BC not only in Troy VI and VII and in the eastern Mediterranean but also in eastern Germany.

Landscape and Death in the Tollense Valley – Environmental Context of an Outstanding Bronze Age Site in Mecklenburg-Vorpommern (poster)

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An outstanding Bronze Age site of the 13th century BC from the valley of the River Tollense in the eastern part of Mecklenburg-Vorpommern is currently the object of systematical interdisciplinary research. Weapon finds and human skeletal remains as well as animal remains, mainly horse bones, discovered along a stretch of several hundred meters along the River Tollense indicate an unusual situation, currently interpreted as the remains of a Bronze Age group conflict. Up to now, skeletal remains of more than 80 individuals, mostly young males, have been identified. Several of them exhibit traces of violence, e.g. a skull with a severe impression fracture or an upper arm bone with embedded flint arrowhead.

The Bronze Age environment of the river valley can be described as a partly open landscape that showed limited human impact. The development of the valley during the Bronze Age is closely connected to changes of sea level due to the Holocene transgression. Organic gyttja and fluvial sediment layers rich in molluscs identified under peats and 1.5 to 4 m below the ground surface indicate back waters and abandoned fluvial channels. During the Bronze Age the River Tollense obviously meandered as a broad, flat river in a corridor c. 100 m wide close to its modern course.

Archaeological, anthropological, geomorphological and botanical research of the site finally aims at a close understanding of the events that resulted in such a special find situation, in connection with providing new insights into the development of a landscape, placed within the wider cultural context. First results of these studies are to be presented here.

The Tumulus Culture Burial Mounds in the South-Western Poland. Construction of the Tumuli and it's Place in the Landscape (poster)

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The main goal of this paper is to show the principles of creating cultural landscape by Tumulus culture societies. The first part of the presentation aims to explain the conditions of choosing places for burial grounds, which consequently will show the landscape preferences of the Middle Bronze Age societies in the south-western Poland. The second part is based on the analysis of the construction elements of particular grave mounds including their chronological diversity.

Environmental Changes and Human Impact on an Italian Lowland during the Bronze Age: Palynological Investigation at Fondo Paviani (Legnago, Verona), (poster)

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The so-called “Terramare culture” developed from the Middle to the Recent Bronze Age (from the 17th to 13th century BC) in the Po plain (Northern Italy) and the neighbouring areas, where until now a lot of settlements have been detected showing a complex cultural system on the network between the Italian peninsula, Northern Europe and the Mediterranean, that generally declined around 1200 BC. The reasons for this almost contemporary decline or collapse of a lot of terramare is still an object of debate. For this purpose, moreover than detecting environmental changes, human impact and land-use practices, palaeo-environmental investigations have been carried out on some sites. Instead very little is known about environmental conditions during the Bronze Age on the cluster of settlements located North of the Po river, in a peculiar alluvial area called Valli Grandi Veronesi (southern Veneto). A short insight on what is known until now on this area will be given, to concentrate then on the ongoing researches and planned analyses, focusing on the site of Fondo Paviani. In the V.G.V. context, the settlement of Fondo Paviani (Legnago, Verona) seems to represent a central place able to survive the crisis during the Final Bronze Age, thus providing a link with the following context of this region. Since 2007 the site is the object of annual excavation campaigns led by the University of Padova, in a multidisciplinary research framework. Among this, a preliminary palynological investigation has been performed in 2008 in collaboration with CAA
“Giorgio Nicoli” (S.Giovanni in Persiceto, Bologna), concerning samples from the on-site stratigraphic sequence. The result of this pollen analysis are presented and considered as a starting point for the new researches. Since 2010 at the Graduate School “Human Development in Landscapes” at Kiel University a new project has started, in order to better depict the evolution of the vegetation and of the environment in the surroundings of the Bronze Age settlement. With these aims on September 2010 a profile has been sampled and investigated, in correspondence with the peripheral structures that surrounded the village (moat of the I phase of life of the village, moat and rampart of the II phase). The deposits filling the moats have been seen as interesting pollen archives inserted in an archaeological stratigraphic context, giving information about human activities and natural environment before, during and after the life of the settlement. These data coming from the archaeological layers will be integrated with data coming from the samples from a peat core drilled in the natural park “Palude del Brusà” (Cerea, Verona), ca. 5 km far from Fondo Papi. While the whole Valli Grandi Veronesi area now is a dry and cultivated land, on the “Palude del Brusà” a humid environment is still present that should guarantee better pollen preservation and a less human influenced archive. Furthermore, there are known other Bronze Age evidences, testing the preservation of ancient deposits.

**Continuity and Interruptions – The Bronze Age Landscape Development of the Kościan Region, Northwest Poland**

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On-site and off-site investigations have been carried out at the Bronze Age settlement near Bruszczewo, 50 km southwest of Poznań (Haas/Wahlmüller 2010; Diers 2010). In comparison to the local studies a regional pollen diagram from a medium size lake 11 km south-southeast of Bruszczewo shows the general development of the wider region in high resolution. The Wonieść Lake is 121 ha in size and has a maximum depth of 14.5 m. In total 22.46 m of sediment represent late glacial and Holocene development. Ten 

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-samples from leaves and wood fragments give a good framework for independent dating of the record. Pollen samples for the Bronze Age are taken every 4 cm, equal to 18 years intervals in average. By this also short time fluctuation in human pressure on the landscape can be detected. The Únětice Culture is not a static era but is subdivided by several crises and phases of increasing human activities on the regional scale. After strong indicators for human presence in the Neolithic there is an obvious decrease around 1820 cal. BC. From 1730 cal. BC to 1640 in intensification is recognized that lasted for less than a century or five generations. Around the middle of the 16th century BC the curves settlement indicators decreased again but there is no indication for an overexploitation of the landscape as still 90 % of arboreal pollen show a lot of woodland in the regional scale. Traces of cereals and weeds account for human presence in the following centuries even if the values are small and scattered.

**Beyond Únětice – The Transformation from the Late Neolithic to the Early Bronze Age in the North German Lowlands**

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Individual aspects of the transformation from the Late Neolithic to the Early Bronze Age in the North German Lowlands are often discussed. However, this epoch of regional history of Lower Saxony has never been summarized as a whole. In particular, from the 22nd to possibly the 17th century BC numerous dynamic, external cultural influences had an effect on the northern part of Lower Saxony and led to different changes within the local population. The present state of the archaeological research of this transitional horizon is very different if you view it in terms of single subjects or regions, and it shows now and again big gaps. Therefore, up till now it has been difficult to gain a picture of this time, with a society which was in the transition from stone to bronze technology. The knowledge about the processing of bronze reached the North German lowlands exceptionally late in comparison with much of the rest of Europe. Only occasionally did single bronze objects from the early metal cultures of Europe reached today’s Lower Saxony. The Únětice Culture, whose remains can be traced as far as the Lüneburger Basin had particularly influenced the regions northwest of their central settlement area and thereby differentiated themselves from the “rest of the world”. Only after the Únětice Culture had peaked, could the lowlands establish a bronze technology of their own. Till then the Únětice forms are known to have been imitated in flint and/or stone. Local bronze forms were first able to develop properly once the Únětice Culture, as a phenomenon, ceased to exist, and its first bloom arrived with the formation of the Lüneburger Bronze Age, while the north-east of the country fell completely under the influence of the established Nordic Bronze Age. At the same time, the ceramic production of what is now Lower Saxony completely breaks down at the end of the late Beaker cultures – the range of shapes plunges, the firing becomes miserable and as a rule decoration ceases. However, is this dynamic process of change also tied together provably with a change in landscape? The pollen profiles obtained from the numerous bogs in Lower Saxony deliver interesting results regarding the reconstruction of the landscape during this transformation from stone to early metal technology. It looks as if these changes took
Insularity and Climate Changes: The Role of Weather on the Bronze Age Communities in the Eolian Archipelagos

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The present work deals with the analysis carried out on three Bronze Age sites of the Eolian Archipelagos and it is aimed at identifying the pattern of short-term climate changes and evaluating the human response to those variations in a stressful environment such as that of an archipelago. The group of islands under study is located in the centre of the Mediterranean Basin at the crossing point between the eastern and western trajectories of Bronze Age marine trades. The archipelagos has a volcanic origin, and thus influence the morphology and the rainfall regime. Local weather conditions and the type of soils determine variations in the plant cover and in general biodiversity. The reduced extension of arable lands, due to the morphology of the islands, together with the lack of perennial water resources, limits the possibility of extensive agriculture. The different availability in natural resources of each single island makes people to move from one to another to look for food or other resources. Within this work, we show the result of a new methodological approach which let us to point out abrupt climate changes even when they were to short to entail change in biota, or when the ancient society was able to cope with the raw material scarcity by means of trading. The application of the carbon isotopes analysis on twenty-eight plant samples collected from three islands (Filicudi, Paarea, Salina) let us identify variations in palaeoprecipitation rate and therefore to evaluate the role of climate in cultural and political changes occurred during the Bronze Age in the Archipelagos.

Human Settlement Activities Producing Changes in Water Trophy Levels during Prehistory: Examples from the Neolithic in Thurgovia (Switzerland) and from the Early Bronze Age at Bruszczeowo (Greater Poland)

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Changes in prehistorical limnic trophy levels are difficult to reconstruct using classical palynological methods. Here we present results from Lake Nussbaumersee, Switzerland (with excavated lake-shore and pile-dwelling villages from the Neolithic 3840-3700 BC, Early Bronze Age 1580-1538 BC, and Late Bronze Age 850-800 BC) and from a former oxbow lake-shore village at Bruszczeowo, Poland (Early Bronze Age 2000-1700 BC) showing that the analysis of non-pollen palynomorphs (e.g. cyanobacteria, algal cysts, fungal spores) and macrofossil remains of aquatic plants can highly improve our understandings of prehistorical water pollution. The results indicate toxicity of the lake water due to intense eutrophication, which may have been responsible for an ecological collapse of some of the prehistorical village societies. Such effects were up to now only known from Medieval Times. Interestingly in terms of environmental protection, recovery of the lake ecosystems and lake water quality did occur within a few decades after the settlements were given up, suggesting a high level of resilience to eutrophication of lake ecosystems in prehistoric times.

Ore Exploitation and Settlement Dynamic during the Late Bronze Age in Bosnia

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The focus of this paper will be on a main ore region in Bosnia located in a central part of the country, also known as Ore Mountains (Zentralbosnisches Erzgebirge) and the relationship between surviving hilltop settlements. Although ore mining can be only assumed, since no chemical or metallurgical analysis considering objects from this period (Ha B1-Ha B3) has been done, there are several strong indicators of ore exploitation during the final stage of the Late Bronze Age. Clear archaeological evidence of a changing settlement picture are new layers in long existing hilltop sites with characteristic carved pottery (geometrical ornaments), completely unknown from the previous stages. Beside that, there is a number of new established settlements with the same material (carved pottery), which are all situated in narrow river valleys around the Ore Mountains. Furthermore, there are stones and clay molds among finds from nearly all investigated settlements, which suggests metal production in all of these sites. Based on the example of central Bosnia it can be discussed how the use of new resources affect the organization and establishment of settlements in landscape.

place under dramatic circumstances or were caused by them.
The Bronze Age Settlement Chamber on the Hill Heeseberg – An Ecoregion in Transition between the Únětice and House Urns Culture

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The area around the hill Heeseberg in southeastern Lower Saxony is characterized by a notably arid microclimate. On particularly dry slopes even small areas of meadow steppe occur. Another feature of the landscape is its fertile loess soil. These favorable natural conditions of the Heeseberg area attracted human settlers from the beginning, as evidenced by numerous archaeological finds of settlements and graves. Within a radius of 2 km several settlement- and/or grave finds from the late Neolithic, the Únětice and the House Urns Culture can be verified. Of particular intensity is the settlement during the late Bronze Age and the Early Iron Age with a fortification and so called “Außensiedlung” (peripheral settlement) of an extent of at least 20 hectares. This period of intensive settlement is followed by a significant hiatus.

The combination of archaeological findings, geomagnetic and palaeoecological examinations allow for different time slices the extraction of significant information on the interplay between settlement activities and the ecoregion changing over a period of about 1500 years. Pollen analytical studies also provide evidence that settlement activity declines due to climatic deteriorations, among other during the Middle Bronze Age.

When the Going Gets Tough...? Climatic or Cultural Influences for the LBA Abandonment of Circum-Alpine Region Lake-Dwellings

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Research into the lake-dwelling tradition of the Circum-Alpine region has shown several temporary abandonments of lakeshores and other wetland environments throughout prehistory. Traditionally either climatic or cultural/social influences have been proposed as the cause of these abandonments. However, research from the last decade concerning the Middle Bronze Age lake-dwelling hiatus has shown that an interaction of climatic and cultural influences led to the large scale abandonment of the lake shores because negative attitudes and towards lake side settlements due to direct climatic influence at one or two settlements. Despite the resolution of the Middle Bronze Age hiatus there is still a debate as to the influences for the final abandonment of the lake shores and cessation of the lake-dwelling tradition in the Circum-Alpine region at the end of the Bronze and beginning of the Iron Age around 800 B.C. It has been proposed that this final abandonment is connected to a climatic deterioration after circa 1000 B.C. However, this does not explain why the lakeshores and wetland settlements were not re-occupied when climatic conditions returned to more favourable levels, nor the fact that as the lakeshores were abandoned in the Circum-Alpine region the tradition of lake-dwelling gained momentum in the Baltic region – particularly Poland. Lake- and wetland-settlements are by their nature constructed in difficult and inhospitable environments; climatic deterioration may have made little difference to this. To avoid a climatically deterministic interpretation of the final desertion of the lakeshores it is essential to consider the influence of cultural and social interaction in the Circum-Alpine region. Material culture evidence suggests that long distance, Mediterranean to Baltic trade routes shifted from the Danubian route to the Alpine route around 900 B.C. Is there a connection between this intensified contact through the Circum-Alpine region and the abandonment of the lakeshores there, and the intensification of lake-dwellings in the Baltic region? Ongoing analysis of material culture from final lake-dwellings of the Circum-Alpine region, manufacturing and redistribution centres from the Italian peninsula, and lake-dwellings form the Baltic, is intended to identify links between the three regions and highlight changing social and cultural attitudes towards material objects which may indicate cultural reasons behind the abandonment of lake-dwellings in the Circum-Alpine region.

The Problem of the Middle Bronze Age Inception in North East Europe

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The beginnings of the Middle Bronze Age in the area between the Elbe and the Warthe Rivers are up to now difficult to describe. Between the end of the Early Bronze Age settlement and the beginning of the Lusatian Culture only a few find complexes point to activities in this region. This striking decrease in the artefacts culminating in a period of 200 years of absence demands explanation. The settlement Bruszczewo in Greater Poland serves as an example. There, a local explanation model could be generated on the basis of scientific analyses for the abandonment of the settlement: The exploitation of the local resources and the pollution of the waters changed the original favourable situation and led to the end of the settlement. Whether these local causes are also applicable to other settlements in the region and led to a abandonment of the existing Early Bronze Age settlements as well as to a change in settlement structures in the Middle Bronze Age, is part of a research project at the Christian-Albrecht-University of Kiel. On the basis of settlement complexes of the Early Bronze Age and the Middle Bronze Age the transition from the Early to the Middle Bronze Age should be examined with the inclu-
session of pollen data. The first overview of pollen profiles from Brandenburg and Greater Poland clearly show a decline of the settlement indicators at the beginning of the Middle Bronze Age. The talk gives an overview of the state of the project’s present research.

Collapse versus Continuity during the Bronze Age
Kristian Kristiansen
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No abstract

The Two Economies of Bruszczewo: Simple Rural Life versus Advanced Agriculture
Helmut Kroll
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Bruszczewo is a Bronze Age fortified site in Western Poland, at a former lake. The archaeological plant remains of this site reflect two settlement phases, an older one with a very simple agriculture and a younger one with an advanced agriculture which is similar to that of the Celtic Pre-Roman Iron Age. A hiatus separates these two economies, which are totally different.

Prehistoric Olynth: Arkadian Leisure versus Pre-Urban Life in Late Bronze Age Northern Greece
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Prehistoric Olynth or the Tell of Agios Mamas is a Bronze Age site on the Chalkidike Peninsula in Northern Greece. The rural economy of this tell is thoroughly studied, animal bones as well as plant remains. The economy of the Late Bronze Age differs in many aspects from that of the Middle Bronze Age.

An Endneolithic to Early Iron Age Settlement-Stratigraphy from Brandenburg
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The focus of my studies is based on a well-preserved stratigraphy of a polyphased settlement, located on the Niederoderbruch, a lowland area in the east of Brandenburg. The site was discovered and excavated prior to the construction of the OPAL-pipeline. Due to the extraordinary stratigraphy it is possible to separate three main layers, that dates from the Late Neolithic era to Early Bronze Age. During the Late Bronze and the Early Iron Age, the area was re-inhabited as shown in a high density of features, such as pits, fire places and storage pits. The ceramic finds display a remarkably rich decoration. After a huge periodical gap, the site was reoccupied in the 8./9. century as an Early-to Mid-Slavic riverside settlement. The main reason for the excellent condition of the End Neolithic / Early Bronze Age stratigraphy is the preservation under a massive sand drift. Even traces of a hook plow – the oldest known in the area of eastern Germany – could be documented. The dune itself exposed different features as well, such as settlement layers, postholes and some pits. Due to this fact, it is safe to say, that the area was continuously used as a settlement site. Therefore, the settlers weren’t forced to leave the site, despite the difficult environmental conditions that lead to the building of sand dunes. This site offers the great opportunity to study the interaction of Early Bronze Age settlers within their environment and the change of environmental conditions. Of course the site was abandoned at some point, but obviously not in connection with the massive sand drifts and the Early Bronze Age. Geological profiles were taken and their evaluation will help to reconstruct the old surface of the settlement and its environmental parameters during the Early Bronze Age. Additionally it is possible to combine the different layers of the settlement activities with datable finds such as flint artefacts, stone axes and pottery vessels. The well-preserved animal bones not only give an insight into the animal husbandry but an option for absolute dating for the different layers within the stratigraphy. And last but not least, the settlement site offers the opportunity of diachronological comparison. Due to the stratigraphic sequence it is possible to compare the fundamentally different settlement patterns of the Early and Late Bronze Age on the same site.

Resistances to the 12th Century BC Crisis in the Veneto Region (Italy): The Case-Studies of Fondo Paviani and Montebello Vicentino
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The development of “palafttico-terramaricola facies” is one of the most important historical and demographic phenomenon in the European Bronze Age. It developed in an area including the regions of eastern Lombardia, western Veneto and Emilia during a span of time going from Ancient Bronze Age to an advanced phase of the Late Bronze Age, that is between the last decades of the 3rd millennium BC and the first half of the 12th century BC. In this chronological period, the considered area is one of the most populous and probably one of the most wealthy of Italy and of the whole Europe, but in the advanced phase of the Late Bronze Age, a widespread collapse of settlements occurs. However, this crisis strikes
the accumulated archaeological, osteoarchaeological, and palynological material. When the climate worsened and natural resources lessened in the Subboreal, the need for a farming economy grew, although it still did not become a causal factor in the economy of the Forest Early Bronze Age communities. Distinctive cultural landscape areas in Lithuanian territory with different material cultures used by communities began to form in the environmental regions: sea shore and continental area. Alongside the traditional branches of economy – fishing, amber gathering, seal hunting – the beginnings of a farming economy appeared, with their characteristic tools, which stand out in the region of the Lithuanian sea shore. In contrast to the seaside lowland, the economy of the Early Bronze Age in the continental area (in this case the communities of the Kretuonas 1C settlement in the eastern part of Lithuania) gained momentum. An agrarian type of landscape extended around the Kretuonas 1C settlement: meadows, hoed-up fields. This is confirmed by zooarchaeological and palinological data. Domesticated animals already comprised up to 18% (by MNI) of all known osteological material. Cultured cereal plant pollen is found in the sediments of the settlement’s Kretuonas 1C cultural layer. Production loci spread from the Early Bronze Age: jetties, structures for catching fish, and a number of places related to metal working, pottery production and slaughterhouse where wild and domesticated animal meat was processed. These also had an effect on the surroundings. Accumulations of waste-rubbish heaps formed around the habitants site. Two different cultural landscape areas stand out in the development of a farming economy in the Lithuanian territory. In the sea shore region farming spread slowly. One reason why the Early Bronze Age farming economy there spread slowly was a decline of amber processing centres. Economic changes in the eastern part of Lithuania were closely connected with the economic changes in the upper Dnieper and with the trade occurring among the communities living in the Dysna-Daugava-Berezina-Dnieper basins.

The Settlement Mound of Niederröblingen: What Do the Sediments Reveal about the Past?

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Settlement mounds are clearly defined as man-made structures. The tell sediments mainly consist of the deterioration of the buildings, only a small amount represents refuse (Rosenstock 2009; Miller-Rosen 1986). Therefore, tell sediments reflect the behaviour and culture of the people responsible for its construction (Miller-Rosen 1986). If these sediments are analysed by a multi proxy approach a reconstruction of different intensities of
man-environmental interactions during the occupation may be feasible.

The settlement mound of Niederröblingen was discovered in North Eastern Germany in 2006. It consists of at least 15 settlement layers. First settlement activity is characterised by a Neolithic flat settlement spanning from ca. 5300-4600 BC, followed by a settlement interruption. From ca. 3100 BC until 400 AD the mound was quasi-continuously inhabited and reached a height of 2.5 m, a total matter accumulation of 34 000 t on an area of 4.75 ha.

The results of geoarchaeological and palaeoecological investigations indicate an increase in the land use intensity during the Bronze Age, when the local riparian forest was cut and replaced by pasture lands. Whether the raised water tables and the start of fluvial activity in the adjacent river valley (Helme) have been triggered by such severe impact of the settlers on their environment on a regional scale, or by climatic deterioration is a matter of debate. As high levels of matter fluxes into the settlement mound have been maintained until Roman Times, the area affected by land use activities (woodland use, agricultural fields) must have increased over time. Considering the results of phytolith analysis a simple model for the reconstruction of prehistoric field sizes is presented.

References

Modelling Sustainability: The Near East in Transition
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The Early to Middle Bronze Age transition in the Near East is marked by the collapse of the Houses of Akkad and Ur as well as the Old Kingdom in Egypt. There also seems to be evidence of collapse in southern and northern Mesopotamia - the case of Tell Leilan being the collapse site par excellence. This sequence of events seems to be linked to a climatic event known as the 4.2KY event – a sudden shift to increasing aridity – which may have tipped the balance for some societies, especially those living in already marginal landscapes. While the magnitude of the 4.2KY event may be debated, and its effects will certainly have differed from place to place, what is certain is that at the end of the second millennium BC in the Near East, the climate was becoming more arid. This necessitated responses (economic, organisational, social and so on) from societies, both urban and rural, at that time. It would seem that the larger, urban sites should have failed because of their likely inherent rigidity (too much interconnectedness, too little flexibility). However, this would not always seem to be the case and therefore begs the question: why do some societies fail and others succeed? Or perhaps a better way of putting it would be: why are some societies more sustainable than others? This paper sets out a predictive model, taking into account various factors, including agricultural decisions (from types of crops grown to irrigation methods), husbandry, use of wild resources (plants and animals), use of other natural resources, trade, craft and other manufacturing, and tributes received. The datasets used are primarily botanical (phytoliths and macrobotanical), but also include archaeozoological, archaeological and textual sets. There is also consideration of the type of governance and size of site, and levels of flexibility and interconnectedness, particularly in terms of decision making. The sites examined are in the Near East, during the EB to MB transition, however, the model can be applied to any geographical area and period of time. The aim of the model is to show that ‘adverse’ environmental change does not necessarily lead to collapse, although there may be social change that can be seen in the archaeological record (including botanical). It also sets out to show that community size does not always matter. Rather, it is argued that the sustainability and thus longevity of both urban and rural communities can be safeguarded by their flexibility and resourcefulness.

Environment and Economy of Terramaras in the Central/Southern Po Plain
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The archaeobotanical research which has been recently carried out in terramara settlements and necropolis located in central/southern Po Plain is giving information on plant landscape evolution and economy of people living in northern Italy during the Bronze Age. Terramaras must have been extremely close to each other as, at present, hundreds of sites have been discovered. In particular, the civilization of Terramaras mainly developed in the Po Plain during the Middle and Recent Bronze Age (respectively MBA, and RBA; ca. 1650-1170 B.C.). Each site consisted of rows of houses, surrounded by an embankment and a ditch, and a territory out of the ditch. This territory was an area devoted to the exploitation of subsistence resources, and was more or less extended depending on the size of the settlement, its distance from other existing sites and the chronological phase. The natural environment probably influenced the main type of exploitation of the area of influence. Pollen was collected from on-site and off-site short sequences from three sites – that, in chronological order, are Terramara di Baggiovara (MBA), Terramara di Montale (MBA-RBA) [1,2] and Necropoli di Casinalbo (RBA). Plant macroremains were also studied from the Terramara di Montale.
Analyzes permitted local reconstructions of the distribution of lands in the open environment spread around the settlements from the Middle to the Recent Bronze Age. Main environmental changes were also observed in pollen data from layers preceding and following the Bronze Age depositional phase. Results showed similarities in the general trends in exploitation of resources and environmental changes suggesting that economic activities mainly consisted of cereal field cultivation (especially barley and wheats) and animal breeding. Charred caryopses of Hordeum vulgare, Triticum aestivum/durum and T. dicoccum were prevalent in the carpological spectra of Montale. Moreover, woods were important resources and managed as coppices to provide timber, charcoal and other products. A mixed deciduous Quercus-Carpinus betulus wood, with Acer, Ostrya, Fraxinus and Ulmus, was scattered in the plain, while mixed coniferous and broadleaved woods were mainly spread in the hill and mountain belts. Environmental changes were induced by human activities and climate changes. Climate changes could have acted as a trigger of cultural change or an amplifier of human impact [3].


Environmental and Anthropogenic Impact Factors during the Bronze Age in the Ore-Rich Lăpuş Micreognor, Northwest Romania

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The area of the upper Lăpuş Valley in northwest Romania lies in the piedmont zone of the eastern Carpathian Mountains, a region famous for its rich non-ferrous metal deposits which include copper and gold. A variety of Bronze Age sites have been recorded on the terraces of this wide river basin, of which the barrow necropolis and cult area of Lăpuş is the best known. In the course of our international research project we have investigated the extensive cemetery/ritual site near the present Lăpuş village and are currently excavating a monumental cult building of the Late Bronze Age in the centre of the site. As an integral part of this interdisciplinary project the environmental conditions in the Lăpuş micro region are being investigated by means of palynological as well as other scientific analyses in order to give a comprehensive explanation for the exceptional archaeological record of the site and its surroundings.

The analysis of a long pollen profile from an ombrogenic peat bog in the immediate vicinity of the site allows us to reconstruct the climatic as well as anthropogenic impact from the postglacial period up to the present day. Special attention is focused on the Bronze and Iron Age periods where peaks and drops of human impact are recognizable. One of the most striking results of the palaeobotanical research carried out so far is the fact that a significant increase of anthropogenic activity can be made out at the beginning of the Bronze Age and a noticeable decline of human impact marks its end. This pattern can be most prominently connected with Bronze Age metal working activities, i.e. mining and particularly smelting, in the area, as heavy metal isotope analyses of pollen, which been analyzed, indicate.

The paper will draw attention to the interaction between overall climatic factors and more importantly the anthropogenic impact on the archaeological as well as environmental record of the region, which sees a flourish of Bronze Age development during the second millennium and a drastic decrease in human activity and a complete change of the cultural development during the early first millennium at the end of the Bronze Age.

Bronze Age Collapse? Social versus Environmental Reasons

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In contrast to ecodeterminism and the over-estimation of environmental reasons for societal developments this paper tries to explain EBA to MBA changes differently: Contradictions within EBA communities were the main reason for the shift 1600 cal BC and the resulting problems in managing economy and environ.

3,000 Years of Settlement Continuity? Looking for Indications at the Settlement Mound of Niederröblingen

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During a rescue excavation by the State Office of Heritage Management and Archaeology Saxony-Anhalt (LDA), settlement layers from several prehistoric periods were detected in the floodplain of the river ‘Helme’ near
Niederröblingen (Ldkr. Mansfeld-Südharz). The deposits were preserved to a height of 1.8 m and a presumably extension of 250 x 190 m and were visible as a gentle mound in the Helme valley.

An initial settlement phase during the early Neolithic was followed by a 1,500-year long interruption of settlement activities. Various radiocarbon dates from the settlement layers suggest a continuity of settlement from the 3rd Millennium BC until the middle of the 1st Millennium BC. Whereas only scarce evidence of house structures has been documented within the late Neolithic and early Metal Age layers, extensive settlement remains like floor pavements, collapsed mud walls, stoves and ovens were found in the layers dating to the Late Bronze Age and Early Iron Age. The layers from the mid of 1st Millennium BC and from the last settlement phase in the late Roman period had already been eroded to a large extent.

The aim of this paper is to discuss the archaeological record according to the seemingly continuous occupation of the settlement. Amongst other limiting factors, the limited time frame did not permit the use of adequate excavation methods in all areas of the mound. Therefore, it is necessary to consider in which areas traces of concrete settlement activity could be found, how to estimate the time span of these settlement activities and what could be indications of discontinuity. Finally, the obtained information is discussed in the context of regional prehistoric settlement patterns and environmental aspects in order to identify indications of continuity, change and collapse.

The Rise of the Bronze Age Pile-Dwelling Culture in North-Italy as Seen in the Long-Lasting Palaeobotanical Record of the Lavagnone Lacustrine Settlement

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The pile-dwelling culture becomes widespread in Northern Italy at the onset of the Bronze Age (XXI century B.C.), after a moderate development during the Neolithic. Lacustrine settlements as old as Early Neolithic occur at Varese lake basins (Lombardy), whereas the Middle Neolithic culture of the “Vaso a Bocca Quadrata – VBQ” developed in the Berico-Euganean hills in Veneto. The Late Neolithic dwelling cultures are represented by the late VBQ and the Chassej-Lagozza, first described at Lagozza di Besnate.

At the beginning of the Bronze Age, the dwelling sites became widely scattered in the Po Plain, north of the Po river, with a highest concentration in the Garda Lake region. In the glacial amphitheatre of Garda Lake, 24 Bronze Age dwelling sites have been excavated. Among them, the culture of the dwelling settlement of Polada is conventionally taken as the reference for the beginning of the Bronze Age in Northern Italy (dated back to 2100 B.C.).

We focus here on the pollen and macrobotanical stratigraphy of the long-lasting lacustrine settlement of Lavagnone, only 5 km SE of Polada, taking advantage from its huge archaeological stratified deposit. This well-known dwelling contains the complete cultural sequence covering almost all the entire Early and Middle Bronze Age and is considered as the main reference to define the chronological periodisation of the northern Italy Bronze Age. It was settled as long as 700 years, partially coeval with the Terramare culture characterizing the MBA of the region south of the Po river. The botanical record presented here originates from a mastercore in the center of the basin and spans over all the settlement phases. The foundation of the pile-dwelling did not take place at the lowest lake level recorded during the settlement history, while it caused a strong and sudden environmental change both in the surrounding landscape and in the aquatic ecosystem. Indeed, the overall change of the sedimentation style in the lake centre from carbonatic marls to organic mud (gyttja) is triggered by anthropic eutrophisation. According to the sedimentation rate obtained from the age-depth model, the change in pollen assemblages took less than three decades. Less intense and abrupt upheavals match the restoring events and phases of village expansion. Furthermore, an outline of the agricultural practices and subsistence plant economy is given by the analysis of plant macroremains from the cultural layers. A more diversified plant production, the regular cultivation of spelt wheat and millets, the spreading of new weeds and of “the new glume wheat” emerged during the course of the Bronze Age.

The Bronze Age Paleoenvironment of the Puglia Region (South-Eastern Italy): The Micro-Climatic Oscillation and the Continuity of the Socio-Economical Strategies (poster)

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The relationship between human society and their environment, which they exploited and shaped, have been discussed under a number of different perspectives; however the inter-relations between these two factors are quite complex and variety. The aims of this work is to present the first general survey of archaeobotanical data-set (seeds/fruits and charcoals) based on literature and our researches, with reference to the Puglia region (South-Eastern Italy) during the Bronze Age. The general overview of proto-historic plants gathered, exploited and cultivated, has been compared with late Holocene paleoclimate and paleoenvironment curves (marine and lacustrine sequences) available for the central Mediterranean.
area. The different proxies and data considered, such as pollen assemblages, stable isotope analysis, geomorphological systems, lake-level changes and plants remains collected in archaeological sites, point to short-term climate changes during the II mil. BC., defined by repeated periods of wet and dry conditions. The human response to the instability of rainfall and temperature parameters will be discussed in terms of socio-cultural continuity and socio-economic adaptation to the new environmental conditions (resilience capacity).

**The Rise and Fall of the Early Bronze Age Settlement Fidvár near Vráble (Slovakia) on the Northern Border of the Pannonian Basin**

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The settlement Fidvár is situated in the southwestern part of Slovakia, near the northwestern Carpathian Montains. Since 2007 the settlement is the subject of research by a common project of the Roman Germanic Commission and the Archeological Institute of the Slovakian Academy of Science, the University of Heidelberg and the Bergbaumausreum Bochum.

Large-scale geophysical prospection, field walking and excavations have delivered first insights into the genesis of the settlement. Starting out as a small aneolithic settlement, fortified by bank and ditch, it grew into one of the largest Early Bronze Age settlements in the Pannonian Basin. The field work has produced some indications for a decline of the settlement at the end of the Early Bronze Age.

**Collapse or Adaptation? Late Bronze/Early Iron Age Mountain – Lowland Dichotomy in the North Caucasus as Reflections of Ecological and Cultural Transformation**

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During major parts of the Bronze Age, Caucasian societies on both flanks of the mountains were characterised by a mobile life style based primarily on animal husbandry. Across a huge territory permanent settlements are virtually unknown. Burial monuments of the 3rd and 2nd millennia BC, yet, prove the presence of people. They reveal small scale societies, which had made their ways up even into the high mountains at the beginning of the 3rd millennium BC. About five hundred years later, at the turn of the 2nd to the 1st millennium BC, the mountains sees a withdrawal of people but the Caucasian lowlands become littered with vast settlements. The people had settled down, their lifestyle had changed towards a pre-dominance of agriculture and the small scale societies had grown into large communities. The Late Bronze Age sees the shift between these two phenomena. Recently, archaeological landscapes discovered on high plateaus south of the spa Kislovodsk more over have now located the actual process of sedentarism in an area between 1400 and 2400m altitude. Today it is very cold and extremely windy, however, starting from the 16th century BC a growing population started to live permanently in this high mountain terrain. During the 13th to 10/9th century BC they developed into sophisticated herdsmen with a settlement structure perfect for effective herding management. A calculation based on the architecture visible on aerial photos allowed to postulate 7,000-10,000 persons living contemporarily, i.e. a population density of 8,2-11,7 person/km² with a livestock of 25,000-43,000 animals. The subsistence strategy with intensive herding and seasonal pasture migration seems to collapse at the turn of the 10th to 9th century BC. All settlements were abandoned nearly simultaneously and the plateaus became virtual empty. At the same time the valley of Kislovodsk with altitudes of 800-1200 m became the focus of an increase of settlements unknown before. Moreover, soil studies on prehistoric field systems show an immense increase in areas exploited for agriculture in the valleys at this time. Missing structures to keep animals seem to reflect a decline of herding activities. The settlement dynamics of the Late Bronze/Early Iron Age consequently reveals not only a fundamental alteration in the inhabited areas. It reflects likewise an essential transformation of subsistence strategies and unavoidably changing perspective onto the landscapes exploited. The material culture of these societies as well as their social organisation, however, does surprisingly not alter beyond a normal change of style in time. The factors causing the both the settlement of the high mountain plateaus as well as their abandonment are perhaps correlated with changes of the climatic regime during Subborreal SB3. However, the mountain – lowland dichotomy must have involved many more aspects than merely a reaction to changing climatic conditions. It allows discussing ecological paradigms vs. cultural aspects during periods of cultural transformations such as changing social conception in lifestyle, habitation and territoriality.

**Hoard Find Places from the Bronze Age in Northern Central Europe in the Context of Cultural and Environmental Changes (poster)**

Heiko Scholz
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For a comprehensive look for breaks or continuities in the Bronze Age the hoard finds are an important subject. The majority of known bronze objects today came from these thousands of depositions. There are different frequencies of intensity, but we can notice that the custom
to deposit metal objects took place during the whole Bronze Age. So this custom is an elementary and continuous part of the European Bronze Age also over clear breaks in the material culture and burial practices. The hoards show not only aspects of the material culture, with their deposition places they are direct linked with the Bronze Age landscape or rather they are elements to structure and construct it. The hoards can be considered as parts of intentional acts in the context of rituals. This was shown in the past in different investigations, especially on the basis of inventory patterns. The places, where the hoards are deposited were not often in the focus in the past, but they have a special importance. If the hoards are result or part of an important social ritual, we can suppose that the locations where this ritual took place are important too. The depositions indicate, at least temporarily, “other”, “special” or possibly “sacrificed” places. The hoard places are not chosen arbitrarily, they follow cultural determinate patterns. Some of these patterns are largely static, others show continual changes. By means of examples from the southern Baltic region such deposition place patterns in their spatial and temporal distribution will be presented. A special focus lies on the question how far severe changes in the material culture and burial practise have an equivalent in the choice of the deposition places. Have we here a synchronous or a deviate picture? Basis for a comprehensive view on the hoard find places is to systemize the locations and to create a generalized model. For the research area such a model of “location types” will be presented. This model shows how clearly structured the supposed unstructured flat research area is and how selective it was used for the depositions. Another question is if there is a connection between the choice of deposition places and general environmental aspects, for example caused by climatic changes. An example for this is the question if wet climatic conditions had caused a preference or a rejection of wet milieus for hoarding or if is no noticeable connection there. For the general questions of the session a view on the hoard find places can show for a small sector of the Bronze Age life if environmental changes necessarily have social implications, in this case changes in the use of certain places for certain ritual actions.

To be Continued – A Long Term Cemetery in Müllrose, Brandenburg (poster)

Verena Tiedtke
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Different from most archaeological cultures in central Europe the Lausitz culture shows no collapse but a slow change of the existing belief system in art, hoards and burials. As a central burial site for a number of local communities (10th–7th century BC) Müllrose offers the possibility to detect beside social changes, also environmental changes.

Analysing the plants and animals used for the construction of tombs, grave goods and attending rituals wood management, changes of water level and nutrition could be shown.

Putting Estonia on the “Bronze Age Map”: Rise and Fall of Asva-Type Sites

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The East Baltic area is mostly out of scope in discussions of Bronze Age events in regions of Northern and Eastern Europe. That is mainly because of unattended archaeological research but also because of prevailing mindsets in view of the East Baltic as a peripheral or marginal zone with backward economies and simple social order. However, efficient efforts in recent research reveal a some-

what different and complex picture of the Bronze Age ‘world system’ in the circum-Baltic area. In fact, various so-called hill-forts and open settlements agglomerated in territories of Lithuania, Latvia and Estonia that display versatile economic strategies in speaking for advanced sociopolitical organization. Bronze casting, for example, was carried out in a few dozen hill-forts in the East Baltic, mostly conducted on a fairly intensive scale (mostly production of rings or bars). The abundance of bone and antler tools in these sites indicate textile, leather and fur processing on a sophisticated level as well. Everything points to a regional network of exchange with metals, leather/fur and farming products as basic commodities. Interestingly, the rise and fall of these prosperous settlements occurred within the final periods of the Late Bronze Age (Period V-VI after Montelius). The Asva-site at Saaremaa Island (Ösel/Øsel) exemplifies this phenomenon of quite short-period but intense inhabitation and with activities that stood to benefit from interregional exchange. Two other enclosed settlement sites located on the island, Ridala (ring-palisade structure) and Kaali (impact crater), existed simultaneously (Periods V/VI) with similar economical strategies (seal hunting, farming, metalwork etc.). These events at Saaremaa, particularly given its geographical island disposition, offer an excellent case for discussing the (missing) continuity and break in the local Bronze Age society at the turn to the Early Iron Age. Preliminary results from research in Estonian archaeology in relation to recent palaeoecological and palaeoenvironmental studies will be at issue. Both local socioeconomical catalysts and non-anthropogenic environmental factors will be considered as partaking in these changes.
Session 4

THE CREATION AND DYNAMICS OF URBAN LANDSCAPES – NETWORKS AND INTERACTIONS WITHIN TOWNS, AROUND TOWNS AND BETWEEN TOWNS FROM THE 12TH TO THE 16TH CENTURY

Founded Towns vs. Grown Towns? The Example of the So-Called “Zähringerstädte” in the Southwest of the Holy Empire

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„Was heisst „Gründungsstadt“? … mit diesem Wort wird eine Siedlung städtischen Charakters bezeichnet, die weder allmählich noch durch stückweise ummauerte Erweiterungen von innen nach aussen gewachsen, sondern durch Willensakt eines geistlichen oder weltlichen Gründers nach bestimmtem Plan ins Leben gerufen worden ist.”

This definition was formed in 1963 by Paul Hofer, a Swiss historian of urban development. It gives an outline of theories on the medieval city, which are still widely spread and still shape the discussion about the emergence and development of medieval towns from that particular research perspective. It is based upon the concept of a dichotomic couple – “grown” towns and “founded” towns. Settlements deriving from Roman or early medieval beginnings figure as grown towns, which attained their size and shape supposedly by a durable and organic growth. Their rather inordinate composition is said to have followed topographic features only. The founded town in contrast is supposed to have emerged from scratch by a founder’s act of volition – as quoted. This lecture’s topic will be the constructional emergence and development of medieval towns from an archaeological as well as a historical perspective alongside the terms urban foundation – urban planning – urban growth. In doing so, the so-called “Zähringerstädte” of Southwest Germany and the German speaking part of Switzerland will serve as case study – after archaeological surveys within the last 20 years have provided a whole lot of new results in that field of research.

Dark Earth: Privileged Witnesses of the Emergence and Development of Brussels (Belgium)

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In contrast to other cities like for example London, Rome and Paris that have a well documented occupation, the oldest documentation for the city of Brussels dates from the high Medieval Period (Billen, 2000). The early developments of Brussels are heavily debated. Historians and archaeologists studying its origins are facing, due to the scarce historical records and archaeological structures, great difficulties obtaining firm data that can support one of the many hypotheses on its origins, situated somewhere between the 10th and the 13th century AD (Despy, 1997; Deligne, 2003; Charruadas, 2009; Degraeve et al., 2010). However, the discovery of ‘Dark Earth’ in the historic centre of the city, witnessing the first occupation phases opens new perspectives. These ‘Dark Earths’ are thick, dark, humus-rich, non-peaty, strongly melanised and apparently homogeneous units. In order to study their complex origins, formation and archaeological significance a specific interdisciplinary research protocol has been developed. It includes archaeopedology (field study, physico-chemical analyses and micromorphology), micro-archaeology and archaeobotany (seeds and fruits, charcoal and phytoliths) (Devos et al., 2009). The formation of the Brussels’ Dark Earth results from a combination of various human actions (e.g. pasturing, agriculture, destruction, soil extraction, quarrying, dumping of debris and middening) and natural phenomena (e.g. bioturbation, erosion and colluviation). Through the study of the Dark Earth a complex picture of a rather rural environment that undergoes profound changes and becomes more intensively exploited during the 10th-13th century emerges. Some historians indeed suggest that the development of Brussels might be related to enhanced crop yields and intensification of the agricultural practices (Charruadas, 2009). The construction of the first city wall in the 13th century, sealing some of the Dark Earth, indicates the end of the pre-urban period and the reorganisation of the area.

Acknowledgements: The authors want to thank the Brussels Capital Region who financed this research.

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Urban Landscape Tyrol – Conditions and Dynamics from the 12th to 16th Century

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My paper will be based on my doctoral research within the research project ‘Urban community and noble rule – selected European regions during medieval urbanization.’ The foundation for this analysis is mainly composed of written sources as charters, notary books, judicial transcripts and letters. Urban development in Tyrol was influenced by two essential conditions: First of all the unique natural environment of the Alps, which allowed for only a limited number of traveling and trading routes. As a result the region was of geopolitical and economic importance, but settlement was constricted while the landscape was less accessible. Due to the political rise of the lords of Tyrol during the 13th century other powers, as the bishops of Trent and Brixen, paled in comparison. This led to early urban settlements which later were incorporated under sovereign reign and to another relatively late urban ‘take-off’ about 1250-1300. The paper investigates a sample of towns under sovereign reign by the lord of Tyrol (Bozen, Hall and Meran), their connection to the ‘Hinterland’ as well as personal interactions between and within towns. Therefore, the hitherto existing knowledge of pre-urban settlements in the region has to be combined with a look at the following genesis of towns as a form of internal ‘expansion of land’. The presentation of individual biographies of deputies, councilmen and inhabitants may exemplify the personal, as well as economic, political and cultural links within this urban landscape. How many urban citizens or inhabitants were for example verifiably born in other settlements? How did they interact with established families, perhaps gained access to political functions or maintained the connection to their provenance? Supplemental to this the role of the local sovereign, the counts of Tyrol, will be taken into account. In which way and to what degree did their policy control or influence the development of towns and thereby leave an impression within the landscape? This aspect interconnects with the previously mentioned look at urban citizens and inhabitants. Furthermore it has to be considered to what degree the political office holders, later on councilmen and mayors had a dependent relationship to the sovereign. The wide research period allows the examination of functional and social changes in these settlements and their surrounding. Another element of this dynamic is the changes of rulership as well as regional dynastic alternation, which produced altering political circumstances. Not only was the region regularly affected by imperial efforts in northern Italy, at the latest with Habsburg rule since 1363 Tyrol became part of a much larger framework. Did this process in addition have an impact on personal interactions and perceptions, so that we may reconstruct these with the material passed on to us?

Gásir and its Hinterlands? An Emerging Idea of the Dynamics of Socio-Political Power Structures in a Medieval Icelandic Landscape

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Coastal lowland and valley/highland environments are part of this initial investigation of an Icelandic region’s long term Human Ecodynamics with special focus on the Middle Ages and Gásir, a late medieval trading site. Iceland was initially settled by humans and their domestic livestock from Scandinavia in the 9th century AD. A climatic warming period briefly allowed for agricultural activities in most settled areas of this sub-arctic island. By the High Middle Ages, agricultural activities in Iceland were mostly limited to the south of the island, and the people living in the northern regions became sedentary pastoralists, making grass as a main fodder plant the most important crop in Iceland. No towns existed in Iceland until the late 18th century and the plains and interior highland plateau settlements consisted mostly of single farmsteads loosely connected through regional chieftains or ecclesiastical institutions. In more densely settled areas such as Eyjafjörður, however, the control over local resources, especially pastoral areas, potentially necessitated the establishment of regional power institutions. These power centers most of the time consisted of large manorial farms with access to summer and winter grazing areas for sheep and goats away from their home fields that needed to be preserved for hay to feed the more valuable cattle during the winter. Gásir as a center of exchange that connected this rural local society with continental European centers can be viewed as proto-urban institution. Gásir was a seasonal market station located on a coastal inlet in the southwest of a very long fjord in northern Iceland. Archaeological excavations of this composite of structural ruins that include the remains of the second largest medieval church in Iceland have revealed cultural remains from the mid-late 13th, 14th and early 15th centuries AD. Ongoing research of Gásir’s impact on the local and regional hinterlands and their respective environments indicates that Möðruvellir, a nearby medieval monastic manor was involved in the local and international market activities. This site had extensive farm lands and drew on available natural resources, especially grazing land, from a series of valley
systems that made up the hinterlands area for both Gásir and Möðruvellir, and potentially other powerful estate farms. Möðruvellir may have been one of the region’s powerful sites in control of the hinterland’s potential natural resource exploitation for surplus production and export of bulk goods (i.e. sheep wool and cloth). The Gásir Hinterlands Project (GHP) is aimed at a better understanding of the human impact on the local environment (and vice versa) combined with the decision making strategy involved with trans-Atlantic influences and a regional trading economy in medieval Iceland. Preliminary ideas on the region’s social and environmental dynamics draw on zooarchaeological and artifact analysis, are supplemented by ongoing processing of environmental data (i.e. soil Micromorphology, Tephrochronology, charcoal analysis, etc.) and isotopic analyses, and are based on an extensive regional landscape survey.

The Setting up of a Medieval City – Social Structures in 13th Century Basel

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So far, there aren’t any studies focussing on a close examination of the social structures of a 13th century town. This is mostly due to scarcity of documentary evidence. For Basel, one of the larger medieval towns with an approximate number of 5000-6000 inhabitants, evidence is given by about 2000 charters on property dealings illustrating not only daily life, but also socio-topographic conditions. These charters give a lot of information about transfer of property and the subjects responsible for it, thus enabling us to trace the medieval city’s growth, the development and setting up of its quarters. Reading the sources carefully, we learn which places were favoured and who succeeded in buying in on them. As far as we can tell, the heart of the old town, centered around the cathedral, had already been occupied by commission- ers and noblemen by the beginning of the century, thus making it difficult for others to buy or rent land there. Instead, many people of different social backgrounds seem to have dealt with properties located either on the edge of the town or in the unfortified suburban areas. Moreover, the smaller Kleinbasel, a planned city on the opposite bank of the Rhine river, provided an area for potential owners. Although directly connected to Basel by a bridge, it attracted not as many traders as the bigger city, but some wealthy and influential people, who acquired large parts of it within a short time. The fact that surprisingly few people owned possessions on both sides, but would rather keep to one side, might suggest that the picture of strong interweavement between the two cities in the 13th century has to be reconsidered.

Networks in the County of Holstein

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In the High Middle Ages the process of the “Stadt- werdung” and the concentration of urbane structures reached a peak, and also the County of Holstein was influenced by this, even though with a delay in time. This development which could develop a dynamic of its own in the course of the Middle Ages is marked by an emerging ‘wave of the urbanization’ which was a contribution to let a net of towns arise bit by bit. Furthermore, it is to be asserted that the general urbanization of Holstein took place in a remarkably short period of only about 15 years (1235-1250). The town sceneries, which are still there and which characterize the landscape until today – according to a current thesis of research – were able to often exert bigger influence on their sphere than a town without a net of other towns and settlements of urban character surrounding them. At the same time it is necessary to have an intense look on the communication between the towns to be able to explore whether in Holstein there were not individually operating towns, but rather a town network. If so, it has to be clarified, to what extent the single local authority districts could benefit from such a cooperation. The reasons and intentions of such foundations and elevations of towns may certainly have been various in the single cases, however, basically they served the purpose of strengthening the region and/or the position of the rulers. And it seems to be that a town net of the Schauenburger had, beside other functions, above all the purpose to challenge Lübeck for the increasing cutting edge in the region (and beyond), after the counts had lost their influence on the town early. Without going into detail on the origin process of a medieval town at this point, it should be mentioned that the urban development differs from a real new establishment – as it can be seen in the case of the younger ‘real’ foundations like Kiel, Itzehoe and Heiligenhafen. The name ‘Neustadt of Itzehoe’ indicates, that urbanization could occur in different ways. So the older ‘foundations’ are in reality rather elevations. That means that the Schauenburger especially in the east of Nordelbien could fall back on an already existing net of central places with suburban character and feoffed the settlements there bit by bit with more rights or equipped those ‘inhabitants’ with rights which they made them, in the end, ‘citizens’. As everywhere in the empire also in towns of Holstein “Stadtherr” and “Vogt” formed the manorial component whose counterpart was the council of a town. This group was composed differently in the single cases, but consisted mainly of above mentioned ‘citizens’, who became more and more powerful and who in general achieved such a great intra-urban autonomy that they took the right from the “Stadtherr” to appoint the “Vogt”. Obviously this was not the case in Holstein. The House of the
Urban Community and Noble Rule: The Medieval Urbanization of Württemberg

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The history of the County of Württemberg in the later Middle Ages is a history of success. At first intimately connected with the Staufen, the counts turned away from Frederick II in the 13th century, in order to build their own rule in south-western Germany. In spite of several conflicts with the kings and an increasing rivalry against neighbouring power-bearers they achieved a massive expansion during the 14th century, which led rapidly to the spatial unity of the comital possessions. The 15th century was marked by a forty-year division of the territory, but even this could not retard the rise of the house of Württemberg which was crowned with the raising to a duchy even this could not retard the rise of the house of Württemberg which was crowned with the raising to a duchy in 1495. At the same time and closely connected with the systematic territorial expansion, urbanization proceeded within the County, which is clarified by the very view to the increasing number of towns: Around 1250 the counts had dominion over only four towns with Leonberg, Stuttgart, Waiblingen and Schorndorf, whereas 200 years later there were over 50. Beyond the bare numbers the role of the towns in mutual relations to the rule becomes concrete in quite different ways. For the rulers they were an essential factor for the consolidation and intensification of reign by serving as regional administration centres, economic actors and objects of prestige. Stuttgart for example developed early into a capital with residential functions, while Tübingen with its university built in 1477 advanced to Württemberg’s “cadre-forge”. However, the towns did not remain passive instruments of the counts’ hands, but positioned themselves on their part in the manorial fabric of Württemberg. As a most significant group within the town the so-called Ehrbarkeit developed, an urban upper class of commoners, whose political intentions found expression in their representation at the Landtag, a diet of Württemberg’s estates, that was formed during the 15th century. The relationship between the counts and the nearer imperial towns turned out to be totally different. Reutlingen and Esslingen for example felt more and more encircled by the territory of Württemberg and tried to keep their independence which led to multiple conflicts. Beside the interactions between towns and rulership mentioned above, there are a whole lot of further aspects that are of great importance for the subject: What was the relationship like between the comital towns and the local lesser nobility or foreign lords? How did the towns get on with each other? And not least of all: in which way were the towns’ environs influenced by urbanization processes as far as it could be recognized within the sources? All of these questions can be discussed only cursorily in the presentation. But nevertheless they provide a first insight into the functioning of Württemberg’s urbanization.

Landscapes of Hospitals?

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The paper takes its starting point from the definition of a “Städtelandschaft” (landscape determined by several degrees of urbanization and specific types of towns) which Franz Isigler has presented: „Raumeinheiten mittlerer Größe, die einen unterschiedlichen Urbanisierungsgrad aufweisen; sie sind definierbar als naturräumliche Großseinheiten oder durch territoriale, kirchliche, sprachlich-dialektale bzw. kulturräumliche Grenzen oder durch gemeinsame Lagemerkmale (Flusslage, küstennahe Lage) oder durch die Verdichtung von Kommunikation. Sie werden entweder durch einen dominanten Stadttyp (z. B. Kathedralstädte, große Gewerbezentr. kleine Gewerbezentr. kleine Mittelstädte etc.) oder durch eine typische Ausprägung der Städtehierarchie charakterisiert.“

Alongside, Isigler defines “Stadtlandschaft” (landscape of predominantly urban character) as „Raumeinheiten mittlerer Größe (...), die eine überdurchschnittliche Ausstattung (über 25% der Bevölkerung) mit urbanen Zentren unterschiedlicher Größe und durchgehend sehr intensiven Umlandbeziehungen aufweisen und die Eigenbedeutung des ländlichen Raumes (Dörfer, Weiler, Einzelhöfe) stark zurücktreten lassen.“

This definition can be exemplified by the urban landscapes of Flanders and Luxembourg in the late Middle Ages.

The main part deals with the question, whether this definition can be transferred to other phenomena, in particular on urban hospitals. This question is especially interesting for hospitals as the existence of “networks of hospitals” is widely denied.

The base of the analysis are about 530 institutions of social security (or generally social character) which existed in the Middle Age between the Meuse and the Rhine river. To carve out landscapes of hospitals, one will consider not the hospitals as those, but examine whether certain types of hospitals are concentrated in certain spaces. This will first be checked on the basis of map series. The method leads only to very restricted results, though. 
The second approach is based on the so called multivariate correspondence analysis and focuses on the central question: Which factors influenced the foundation of a hospital at a certain place – and how strongly so? With this method different landscapes of hospitals can be separated indeed.

Current Problems of the Research of High Medieval Towns in East-Central Europe
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The acceleration in the process of urbanization was one of the features of the High Middle Ages of Central Europe. We comprehend the phenomenon as a part of transformations that took place in that region in this time. Recent years have brought a considerable intensification of studies on the said transformation, and discussions concerning the development of the towns enjoys in the said studies position relevant to the significance of the problem. Representatives of a variety of branches of knowledge – historians, art and architecture historians as well as archaeologists participate in the discussion. The discussion proved that the issue of urbanization in Central Europe is an intricate one and there is a considerable complexity of cause-effect interdependence of a variety of factors. At the present level of research into towns, it seems vital issues deserve due consideration.

1. The urbanization of individual regions is more and more often considered against a broad background of processes taking place all over Europe, or at least on the broad territory north of the Alps. Such an approach brings about considerable research benefits. We already know that by carrying out research into separate regions, we can not describe the genesis and the proper character of phenomena taking place in this region.

2. In order to understand the development of municipal towns in the 12th and 13th centuries the first stage of urbanization, described as prototown, needs to be born in mind. The problem may be closed by stating that the first and second stage of urbanization of central Europe are completely separate processes.

3. Was the structure of the towns developed as a result of a single layout, or was a result of long development? This issue has been raising a keen interest and discussion, in German literature in particular. It seems that the Western and Eastern region of Central Europe, on the border along the Elbe River keep a considerably distinct character in this regard. It would be difficult to find towns of the 12th to the early 13th centuries the plan of which would have been created following a single layout. In Central-Eastern Europe the plans of towns are more or less regular, hence they were made following a layout, nevertheless carried out in a few stages. The question of how efficient the geodesist was, how perfect the regularity of the layout and in what stages it was effect are of secondary importance. The layout of a town was a result of regulations of the relationship between the lord of the territory and town-colonists. It is the reflection of the founding in the meaning of an investment to bring profit from urban plots and trade dues.

Co-Operation and Conflict in Urban Landscapes, 1200-1600
Tom Scott
University of St. Andrew

The paper is divided into three sections, dealing in turn with political-diplomatic, legal-constitutional, and economic-demographic aspects of relations between towns in late medieval Europe.
1. The function, durability, and potential of urban leagues is considered under three categories: a) urban-political. The three north Italian Lombard Leagues of the late 12th and early 13th century; b) peace-keeping leagues; c) commercial associations (Hanseatic League and similar bodies)

This section will examine the plausibility of Hendrik Spruyt’s argument that urban leagues constituted a viable alternative – a ‘third way’ – of state-building between monarchical-territorial and city-state formation. The variety, permutability, and chronological friability of leagues must cast doubt on Spruyt’s thesis.

2. Legal-constitutional communications between towns include:

a) the adoption of certain town statutes as templates by other communes;
b) the function of certain town courts as courts of appeal (Oberhöfe) for neighbouring towns;
c) the appointment of podestà by dominant Italian cities to govern neighbouring communes;
d) the extension of citizen’s rights to dependent or neighbouring towns (in the light of the unduly critical recent remarks of Guy Marchal), with examples from Italy and the Low Countries in particular;
e) Information networks: the role of key cities as points of reference for and diffusion of new ideas. This is particularly visible in Southern Germany in the early sixteenth century, where leading cities offer advice or send officials to other towns to shape their Reforming allegiance.

a) Fritz Irsigler’s Städtelandschaften and Stadtlandschaften;

b) densely populated versus sparsely populated regions within an “urbanized landscape” the ambiguous evidence of the southern Low Countries;

c) regional grain provisioning as a spur to inter-city cooperation: the evidence from Swabia;

d) regional artisan and journeymen associations;

e) regional coinage leagues.

The survey concludes with reflections on the false teleology of urban dynamics.

Informal Interactions and Secret Relations between Cities: Espionage and Information Gathering during the Burgundian Wars (1468-1477)

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My contribution will discuss the importance of information gathering and espionage for foreign policy and military actions of the three cities Strasbourg, Bern and Basel in the context of the Burgundian Wars (1468-1477). It takes its starting point from the hypothesis that the aspect of information gathering – normally preceding its distribution – gains a place of crucial importance when one considers the distribution of information to be a central aspect in the legitimising strategies of rulers. In this context city councillors on the one hand fell back to using a number of alternative and kind of informal information channels. They endeavoured to be in contact with merchants, tavern keepers and clergymen. They also sent people to fairs to acquire information secretly. However, it is sometimes difficult to decide whether the councillors officially commissioned the groups mentioned before or whether these turned to the councillors of their own initiative, because they felt that they possessed relevant information. On the other hand, in times of military conflicts the three cities employed professional information gatherers: the spies. The secretiveness of their work, though, makes it difficult to trace their exact modus operandi, eventual oaths taken or payments received, in the sources under examination. They must be considered professionals who in times of war were sent into strategically important areas by their leaders. There, they were supposed to find news about the enemy, their place and the state and number of their arms. This information was transmitted either in written form through letters or “diaries” or in oral form after the spies’ return.

For the protection of information as well as informants, city councillors used the technique of the so-called “Zedulae inclusae”. These small-format documents have only been cursorily examined by researchers until now. They contain neither seals nor signatures, neither indications of date nor of the addressee. The information thus anonymized engendered growth and establishment of trust between allies to a far higher extent than the “official” letters could, since here councillors were communicating the most important and most confidential news. On the other hand, they made it harder for the enemy to assign specific information to a specific sender. Since neither the informants nor the places where the information had been gathered are named explicitly in the Zedulae, the sources of information are protected yet more. The fact that the information transmitted was always given and encoded with the attribution “secret” lead to the formation of a common identity between the allied cities. Against this backdrop the gathering of information as well as espionage played decisive roles in the construction of space in the Middle Ages.
SESSION 5
“AS TIME GOES BY”? MONUMENTALITY, LANDSCAPES AND THE TEMPORAL PERSPECTIVE

The Recurring Monument.
Records on Haft- and Umm An-Nar Period Tomb Architecture in Oman Peninsula
Manfred Boehme
State Office for Heritage Management and Archaeology Saxony-Anhalt

Haft- and Umm an-Nar Period (3200-1900 BC) tombs essentially determine the Omani landscape even today. The stone architecture was erected by an immense effort of work: procuring the stones at quarry sites, transportation over long distances and stone trimming. The aim of achieving a prominent appearance in the landscape, which has to be seen from afar, is evident.

In contrast to this, we can find indications suggesting that the idea of eternal existence of the monument was not the rule. Actually, tombs were dismantled and built anew. This probably already happened by two generations later. In regard to some grave groups it is possible to talk about a ‘circulation system’ in respect to the stone material. That is why the choice of the title is ‘The recurring monument’.

In general, we can figure out a very ambivalent mentality in all succeeding generations dealing with the monuments. This alternates between destruction and awareness. In particular, this leads to interesting biographies for the surviving fragments of former tombs, which have been permanently moved as spolia of different meanings up until the current day.

Modernity, Monumentality and the Moment:
A Syrian Case Study of Monumental Reconstructions
Emma Cunliffe
Durham University

Archaeologists often approach monumentality from the familiar perspective. Despite its wide archaeological usage (both geographical and chronological), monumentality is one of the least defined terms: meaning is assumed, and is assumed to be universal. Modern Western archaeological concepts of monumentality focus on power, legitimation, and labour co-option, and are often, although not always, divorced from any ideological components. These modern ideas share similarities with ancient concepts of the presentation of power, the expression of which is the subject of much study, but rarely acknowledge the legacy. Like many other countries, Syria is now exploring its rich heritage, both in terms of its intrinsic cultural value, and its economic potential. Many significant remains have been rebuilt or reconstructed, most of which have a monumental character. These reconstructions are inherently contradictory, reflecting the conceptual blend of east, west, ancient and modern. They are a mix of ancient monuments, presented in a uniquely modern way. They have a primarily touristic audience (local and western); however their construction reflects academic interests. A closer examination of the academic reconstructions and their more popularised interpretations can shed light on our own conceptions of monumentality, and how these have influenced modern eastern conceptions of the interpretation and value of heritage. I suggest that these monumental reconstructions began as a form of orientalism, which became a local modern movement, and which in turn is influencing, and influenced by, external pressures. Modern concepts of monumentality encourage the self-perpetuation of current ideologies, rebuilt in the contested arena of the so-called cradle of civilisation, and suggest that the current definitions, focus and use of monumentality are a product of our own society, and shape and limit our ability to understand the past. An understanding of our own preconceptions can allow us to engage with monumental structures on their own terms, and explore their changing natures, and wider roles within the landscape.

The Re-Use of Megalithic Tombs in the Netherlands during Beaker Times
Erik Drenth

About 75 megalithic tombs (53 of them still standing) are known from the Netherlands. These hunebedden do not only contain finds of their builders, the West Group of the Funnel Beaker Culture (TRB; c. 3400/3350-2800/2750 BC), but also artefacts of the Single Grave Culture (SGC; c. 2800-2400 BC) and Bell Beaker Culture (BBC; c. 2400-1900 BC). Usually it concerns pottery. The TRB finds from hunebedden are usually related to burials (grave goods) and funerary rituals. Should the Late Neolithic finds from this context also be interpreted as such? Although the poor preservation circumstances for unburnt bone, due to the acidity of the sandy subsoils on which the hunebedden are lying, hampers the answering of this question, there is at least one positive indication. In the megalithic tomb D30 at Exloo cremation remains of BBC age were found; a sample thereof has been 14C-dated to 3695 ± 35 BP (GrA-28350). Circumstantial evidence is furthermore provided by Late Neolithic interments in megalithic tombs abroad (f.e. Hulbjerg and Oldendorf). The SGC assemblages from hunebedden substantially deviate from contemporary grave inventories of the c. 250 flat graves and barrow interments (“single graves”) known from the Netherlands. Amphoras e.g. are better known from megalithic tombs than single graves. Furthermore, battle-axes have been discovered...
in c. 40 flat graves and barrows. Conversely, we know of but two specimens from megalithic tombs. Both artefacts are broken, which sharply contrasts with the complete battle-axes from single graves. Daggers of French tertiary flint and Grand-Pressigny flint are unknown from hunebedden; they are a frequent phenomenon in single graves. With respect to pottery, vessels with short-wave moulding (Wellenbandbecher) are well-known from hunebedden. There are, by contrast, no examples of such vessels as proper grave-goods in single graves. But pottery with short-wave moulding has come to light in several burial mounds overlying graves as well as from pits underneath barrows, suggesting these ceramics played a role in burial rituals. A similar explanation may be given for the finds from the megalithic tombs, thus implying that the SGC beakers constitute the proper grave gifts. It transpires that these customs were continued by the BBC, with bell beakers instead of SGC beakers and beaker pots instead of vessels with short-wave moulding. Continuity is also suggested by the low number of typical BBC stone implements from megalithic tombs. It seems that during the Late Neolithic persons with a high status position were interred rarely in megalithic tombs. Whether or not this was already the case at TRB times remains to be seen. There are differences in material culture if megalithic tombs and non-megalithic tombs are compared. Amber ornaments and flint strike-a-lights dominate in the former context. But what this difference means in social terms, is difficult to say. Judging from the number of finds the picture emerges of a clear difference in the intensity with which the hunebedden were used over time. Whereas usually a megalithic tomb yields dozens to hundreds of TRB vessels, the SGC or BBC remains are confined to one to seven vessels (usually one to four specimens) per hunebed.

Monuments and the Durability of Landscapes in Northern Europe

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The creation of durable physical and symbolic structures is often seen as one of the major behavioural innovations emerging since the Neolithic, because these structures connect the categories of space and time where dependance on the memorization of spatial patterns becomes more pronounced. These functions may be realised in different ways, as repetitive behaviour, the construction of substantial domestic buildings, or monuments connected to different spheres of ritual and cosmology. Concentrating on the Northern European evidence, such phenomena will be investigated in a diachronic perspective. Do the observable differences in these phenomena represent more than simple variations of comparable structural functions for societies organised in rather similar ways (as indicated above), are we dealing with more marked differences in the patterns of spatial behaviour and memory culture?

The Rock Carvings of the Messak:
Monuments in a Changing Landscape

Maria Guagnin
University of Edinburgh

The engravings of the Messak plateau form part of a monumental landscape that was continually shaped for more than 8,000 years. Changes in the cultural conventions and content of these engravings can be traced across this rock art tradition and relate to the changing Holocene environment of the central Sahara as well as the socioeconomic background of the engravers. Moreover, the symbolism of the rock art panels complements that of the burial practices and forms part of a wider belief system which found visible expression in the monuments and in the landscape. An analysis of the rock art tradition of the Messak in relation to the archaeological record of the area provides the data to track changes in the symbolism and use of these monuments from the hunter-gatherer societies of the Early Holocene, to the mobile pastoralists of the Middle Holocene and finally the urban civilization of the Garamantian Kingdom. In the Holocene environment of the central Sahara dramatic environmental changes influenced the way the engravers used and perceived their landscape. This had implications for the location and content of the engravings while also forcing socioeconomic changes and cultural convergences which are expressed in the imagery. Although the engravings are undoubtedly long lived, to establish monumentality it is necessary to distinguish between a deliberate decision to create images for future generations and longevity as a by-product of the technique and medium chosen for the depictions. A closer examination of the engraving tradition can provide information into how the engravers themselves may have perceived their creations and whether this corresponds to our understanding of what constitutes a monument.

Preserving the Past, Building the Future?
Concepts of Time and Prehistoric Monumental Architecture

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Time – this seems to be a quite natural phenomenon in itself. In the western view time is a monotonic process, which goes from the past through the present into the future. The intersubjective nature of this view is visible in the intersubjective knowledge collection par excellence, the free encyclopedia Wikipedia, where it says: “Time is often viewed as a continuum in which events occur in succession from the past to the
present and on to the future.” In light of this definition we are accustomed to thinking about and interpreting events of the past which we observe or imagine. This is also true for monumentality and its function for ancient societies. A quite natural interpretation is that monuments were built in an event and are meant to communicate messages of the contemporary present or past to the future in which these events are the past. Another interpretation might be that these communicative acts are directed to a contemporary out-group with a message about the past and/or present regarding possible actions in the future. Monuments are seen in this sense e.g. as external memory storage devices or territorial markers against other groups. But is this notion of time really universal? As a first example, cyclic world views differ from our notions of time, although they are still based on the same direction of the flow of time. But there seem to be (in our eyes even more unusual) concepts of time in the ethnographic record which are not so infrequent. In the book “African Religions and Philosophy”, the African theologian and philosopher John Mbiti (1969), wrote about the African notion of time. He stated that instead of a tripartite time concept (past, present, future) the African view is dualistic, dividing time into a prolonged present and the long gone past. Here the arrow of time is not directed into the future (principle of causality) but into the past. In such a world view, monuments and processes accompanied with them get a slight, but significant different meaning. People building monuments would not communicate to present or future recipients but would try to inscribe themselves into the past. Also activities that took place at the monuments later would not contradict an eternal character of a monument but would reactualise this eternity as a time horizon somehow contemporary and parallel to the present. In this sense the re-ritualisation of the past ensures on the one hand its eternal character and on the other hand links the current action with it so that it becomes eternal past itself. The intent of this presentation is not to state that this (generalised) African world view was dominant in the Neolithic and the era of megalithic architecture but to add this concept to the existing frameworks of interpretations for this phenomenon. At least some of the contradictions obvious in the biography of monumental places can be dismantled and they can be given coherent and meaningful interpretations in light of such a time concept.

Submegaliths, Megaxylons, Paramegaliths. The Results of Analysis of Monumental Tombs in the South-Eastern Group of Funnel Beaker Culture
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Factual functions and magnitudes of monumental tombs are one of the most enigmatic problems in all-European prehistory. Apart from their most obvious funeral role, attention was also paid to a series of other, often more attractive symbolic and social aspects. In Poland the monumental forms were the the most fully recognized in Kuyavia. New light seems to be put on this problem by results of analysis of monumental tombs in the Southeastern Group of TRB. Those tombs have been classified within three main types: submegaliths, megaxylons and paramegaliths. Such classification was based on type of building material used to build the tombs as well as the method of forming of their components. Nevertheless, sense of elaborate partition is manifested not only in architectonic differentiation of the mentioned forms but also in gender structure of individuals buried inside.

In the Southeastern Group of Funnel Beaker Culture three main zones of TRB tomb occurrence can be seen. Those are: Western Małopolska Upland, Sandomierz-Opatów Upland and Nałęczów Plateau. For the investigation above it is interesting that typological differentiation of tombs co-operates to a great extent with particular geographical position. For example, a region of sole paramegalith concentration was Nałęczów Plateau. The characterized partition – submegaliths, megaxylons, paramegaliths – must generate reasonable questions regarding importance and genesis of described constructions. There is no doubt that there must have existed important reasons why such tombs were constructed. Was it a result of ecologic conditions? Or maybe that differentiation was a result of chronological, genetic or functional and social aspects? “

Loca Sacra of the Iberian Peninsula and the Meaning of Monumentality in Time
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This lecture is concerned about monumentality and its definition and evaluation focusing on the Iberian Peninsula since the beginnings of the Roman occupation over the centuries and until the early modern period. The chronological perspective constitutes the main aspect in order to define and understand monumentality as the differentiation between previous and following centuries disclosing the intrinsic characteristics. Processes of monumentalization mainly emerge and become evident.
during periods of alternating political structures and by communicating with different cultures since they effect modifications in architectural design of landscapes, towns or extant buildings. In light of this, the Iberian Peninsula with its continuity of settlement and several conquests by different nations like the Phoenicians, Greeks, Romans, Visigoths, and Arabians affords appropriate premises to investigate the altered processes of monumentalization and to define the specific appearance within the cultural space. Apart from the chronological aspect also the geographical and cultural space form a matter of importance through which the conception of monumentality can be engaged. The main subject of this lecture are the loca sacra intra et extra muros of the Iberian Peninsula, and the impact of historical upheavals on the monumental design of these loca and their sacred character respectively connotations over a long period. The so called “Cerro de la Encarnacion” and “Cerro de los Santos” constitute examples for such sacral sites since both gained the first monumental shape after the Roman occupation. Considering the lack of former monumental sacred architecture, the new dimension defines a sharp contrast. Thus, the monumental alteration can be interpreted as a symbol for the political change initiated with the Roman conquest. This new dimension of architecture must be also valued by the beholder as monumental. Furthermore, the monumental buildings can be assigned also as an instrument conveying the new culture through their reception of Italian-Roman forms. These new buildings of Roman power survived for a long time as it is evidenced by drawings and writings which also represent an important source for the understanding of these buildings as monumental structures and their connotations at later times. The mosque of Córdoba as a further famous sacral site intra muros perfectly demonstrates the altered architectural structures within time which correlate with different claims to power on the Iberian Peninsula: first a Roman temple, later a chapel of the Visigothic time, the first building of the mosque under the Arab rulers and at last the modification into a Christian building. Till this day the visitor can distinguish the different phases of monumental design and association of monumentality. Finally, the investigations of the sacral sites intra muros and extra muros will be discussed in a comparative way.

A Monument, Lasting for Ever? Big Roman Villae in the Western Vulkaneifel as Monumental Complexes through the Times

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An accurate analysis of the existing database, geophysical surveys and the excavations resulting from them made it possible to give a detailed picture of the settlement pattern in the Eifel mountains in Roman times. Probably the most prominent sites of this time and region are the big mansions with associated farmstead, sometimes referred to as villae urbaeae. Emerging from Celtic origins, most probably the now romanised old Celtic establishment uses this special, enlarged form of the villa rustica to represent their still elevated status in the new social and political system. The smaller villae rusticate nearby can be seen as related, depending settlements, especially in the early phases perhaps a system, bringing the old social order in Roman times. The big complexes contained not only the up to 90 m broad mansions and sometimes 10 ha big enclosed farmsteads. In addition to this, 20 m high burial monuments as reference to the ancestors, and sometimes temple complexes were erected on prominent locations nearby, to create a “monumental landscape”. The sheer size of these arrangements makes geophysical surveys the only technique to investigate these sites in their full extension. The sites of Gillenfeld/ Strohn, Mettendorf, Weinfeld and Duppach are typical representatives of this kind of big villae, which were surveyed between 2001 and 2008. At Duppach, the survey leads to regular excavations, enduring until now. These excavations revealed the evolution of this kind of monument in late Roman times. Completely detached from the former traditions, the new inhabitants deconstructed the monuments to recycle the building materials, with the former central sites now becoming new, smaller centres of scrapmetal-working and stone quarry.

Temporality in the Monumental Landscape of Flintbek

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More than 150 AMS dates of 25 Neolithic features deliver the chronological backbone of the study of human behaviour of a small social entity within a delimited area next to modern Flintbek. The aim of this paper is to present the development of the activities within this research area. Early Neolithic settlement remains are super positioned by non-megalithic and megalithic burial monuments within long barrows and passage graves followed by the mounds of the Single Grave Culture. Especially for the transition of non-megalithic to megalithic monuments and from single graves to collective inhumations the short time spans indicate active and recognized processes of change within the society. This is visible in the sequences of construction phases within single monuments which do not occur contemporaneously within different monuments of this burial field. On the one hand traditional aspects are respected on the other hand innovations in burial practices and in the use of new technologies like wagons take place and it is questioned if these observations permit us to sketch an image of the former social entities and their behaviour.
The Messages – Consigners and Addressees. Corded Ware Culture Barrows in the Cultural Landscape of East Polish Carpathians during the III and II Millennium

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During the III and II millennia BC the round earthen barrows (kurgans) of the Corded Ware culture have been one of the most significant elements of the cultural landscape in the east Polish Carpathians (Dynów, Strzyżów and Przemyśl foothills). The total of about 500 barrows is known from this area. They are located on the top of hill ridges up to 500 m a.s.l. Barrows are concentrated into small clusters arranged in semi-rows according to the course of hill ridges. Kurgans are often grouped into clusters of 2-3 which may form larger conglomerations of dozens of barrows. There are strong spatial connections between areas of distribution of Funnel Beaker and Corded Ware cultures, and Early Bronze Age Mierzanowice culture sites. The Corded Ware culture barrows in the Carpathian foothills are located in relation to prominent landforms within the area previously inhabited by Funnel Beaker culture communities (the first Neolithic people in this region), frequently in the same place where Funnel Beaker culture settlements have existed. The hill ridges and slopes were deforested to some extent during realisation of slash and burn farming (plant cultivation and stock breeding) by Funnel Beaker culture people and clearances of forests are confirmed by pollen data. The barrows originally up to 5 m high and from 7 to more than 15 metres in diameter, built on the top of the cleared hills have been highly visible in the landscape from several kilometres around. The distribution of Carpathian settlement-sites and burials of Early Bronze Age Mierzanowice culture are linked in clear relationship to the Funnel Beaker culture settlements and Corded Ware culture barrows. The majority of focal places have been used on repeated occasions; by the settlements of Funnel Beaker culture, barrows of Corded Ware culture and settlements or graveyards of Mierzanowice culture. Moreover, in many examples we observe the repeated use of mortuary structures constructed by Corded Ware culture people. Barrows were remodelled, and Mierzanowice culture burials have often been dug into Corded Ware culture mounds. Some barrows were used many times over hundreds of years by both Corded Ware and Mierzanowice culture people. They should have been clearly visible in the landscape and conform to a long tradition of prominent places and structures which had persisted from the Late Neolithic throughout the Early Bronze Age. I will focus my attention on long biographies of monuments and monumental landscapes as well as an enculturation of landscapes. I would like to discuss different directions of messages addressed both inside the community (to Us) and outside (to Them), to the living people and to the descendants, and how the monuments (messages ?) have been read much later.

The Niche Grave of the Corded Ware Culture in the Vicinity of an Earthen Long Barrow of the Funnel Beaker Culture

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Archaeological investigations in south east Poland, at the construction area of the new motorway A4, have delivered many spectacular results in 2010. Among these the discoveries of the site Skołoszów 7 in the Subcarpathian Voivodeship are of special importance. The first Earthen Long Barrow of the Funnel Beaker Culture of this voivodeship was found here. This monumental tomb was approx. 50 m long and was of wooden construction. It was likely covered with an earthen mound. In the vicinity of the tomb also a niche grave of the Corded Ware Culture with a rich set of grave goods and a grave of the Mierzanowice Culture was found.

Nonmonumental Ritual Activity in a Megalithic Environment. Neolithic Man Interacting with the Landscape

Henrik Skousen, Uffe Rasmussen
Moesgaard Museum

The starting point of our paper is a presentation of a large pit structure which was excavated in 2010 by Moesgaard Museum in Aarhus, Denmark. The pit incorporated a complicated complex of several individual pits with finds from ceramics and worked flint dating to the Funnel Beaker Culture, Fuchsberg Phase. The structure has been interpreted as an offering pit dug in connection to a fount during times when man was moving into new landscapes and establishing a new relationship. It is a rarely investigated and rarely recognized type of structure and a place where man has felt contact to the forces of nature. The structure represents – along with other finds in the nearby area of often single found pits – a ritual behaviour which stands in contrast to the contemporary monumental constructions. We have knowledge that early in the 19th century at least 11 megaliths are reported from the surrounding landscape, none of which exist today. While the fount-pit along with other offering places from the period are related to the relation between man, nature and landscape, the monumental constructions on the other hand could be interpreted in the social relation between people, man, society and surroundings. Two different sides of ritual behaviour redefining and transforming landscape into a mental-cultural construction.
The Palace of Felix Romuliana and its Hinterland, Changing Landscape from the Bronze Age until Modern Period

Jana Škundrić
TOPOI Cluster: DAI Berlin, FU Berlin

The project “The Late Antique Palace Felix Romuliana and its surroundings” is being carried out within the framework of the ‘Topoi’ excellence cluster of the FU Berlin and the DAI. It is focussed on a late antique fortified palace complex associated with the Emperor Galerius (283-311 AD) and its immediate and wider environs in the valley of the Crni Timok river in Eastern Serbia, c. 11 km from modern town of Zaječar. The site resembles several characteristics found in other Tetrarchic residential sites, but appears never to have been an actual seat of governance.

The research area has a long history of occupation, ranging from the Bronze Age to the Medieval. During this time, it saw different settlement and use patterns that focussed on various geographical features. In the late 3rd/early 4th century AD, major input in site development over a period of 30 years, generally believed to have been the result of direct involvement of the imperial family, resulted in the creation of a fortified palatial complex that continues to dominate the landscape to this day.

Further key features of this landscape are two large tumuli, mausoleums and a tetrapsylon on a key ridge. In investigating the changes in settlement patterns over time, the project at hand traces changes in the use and understanding of the landscape surrounding Felix Romuliana, from a Bronze Age burial site to a Tetrarchic Residence, a late Roman and Byzantine Ecclesiastical centre and modern UNESCO world heritage site. A key interest is to identify to what extent changing cultural and political systems influenced the setting of the palace and what effects such developments had on its hinterland. To date, the results include an apparent “depopulation” of the landscape during the late Roman period, possibly triggered by the monumental nature of the key site, as well as various changes in land and site use over time. In the Post-Tetrarchic period, for example, changing cultural and political systems meant that the site initially lost its high-status character and stopped being of empire-wide importance. Instead, it adopted the role of an ecclesiastical centre for the surrounding area, including reuse of several palatial structures as churches and basilicas. From the 11th c. onwards, the central site appears to have been abandoned and never resettled permanently. Nonetheless, it retains monumental character in ethnographical terms to this day, as the local Vlach population of the region still see it as a sacred site with magic properties. As such, Felix Romuliana offers a unique opportunity to identify dynamic changes in perception and use of monumental structures and their landscape over time:

Spatially and visually the whole complex of monumental ramparts surrounding the richly decorated buildings and major temples in connection with the nearby sacral hill Magura with tumuli and mausolea, as well as the remains of a tetrapsylon, represents a sole unit. In terms of use and meaning, however, this ensemble was evidently subject to drastic change over time.

Monumentality in Modern History – Monuments in Denmark and Germany

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Monumentality in modern history is often connected with war memorials or national monuments. As in prehistoric discussions the term means that people are trying to mark statements or to symbolize something. They try to fix interests, ideas, values or meanings. The monument is meant to be impressive and to last for ever. But in fact most monuments undergo change when power structures changes. If places of memory remain over 200 years in the same shape then nobody is using them. Only since the state started to protect monuments is it possible to say that someone cares that old things should stay in the state they are or sometimes built back to an older state. So the construction history (who initiated the monument? How was it once planned and how was it changed or replaced? What was added later on?) tells about a lot of changings in societies, of different interests and of different meanings that people give the monuments. Furthermore, the use of monuments is very important because the meanings, interests and values of a monument are not that fixed as they maybe seem to be. They can only survive when they are included in practices or fixed in texts. The actual appearance of a monument, how it is seen and if it is impressive or not depends clearly on the surroundings (the landscape) and it is always reflected from our society compared to our interests and our knowledge about the “ancient” society who built the monument. My presentation will deal with different examples of monuments from Denmark and Germany in the 19th and 20th centuries. Monuments can be seen as a strong weapon supporting the interests of the authorities who built them. They can be used for forming a landscape of memory which has an impact on the people living there. But as Hobsbawm (2008, 263) states it is not simple to gain support and “invent a tradition” in which people believe in: “Yet we may as well note immediately that conscious invention succeeded mainly in proportion to its success in broadcasting on a wavelength to which the public was ready to tune in.” Monuments and monumentality are therefore an interesting research field for a lot of different questions referring to societies in the past and today.
Monumental Funeral Places: Creation, Use and Re-Use in the Neolithic and the Bronze Age. Case Studies from the Polish Lowland

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Our study is based on the analysis of monumental funeral places for which we have evidence of long-time use and re-use, stretching predominantly over the Neolithic and the Bronze Age. Geographically speaking, the study covers the Polish Lowland, with the region of Kujawy (Kuyavia) being a specific test area within it. It is for this region that we have the most information on the long-time use and re-use of monumental funeral places. As a rule, the history of such a funeral place started with the construction of a monumental tomb in the Middle or Late Neolithic periods. It could be either an un-chambered long barrow of the Kuyavian type, built by the populations of the Funnel Beaker culture or a grave under a round or oval mound, built by the populations of the Globular Amphora culture. In most cases such features had a long history of original use as tombs in which dead bodies were successively deposited (several, over a dozen or even several dozen). Since the building of the first tomb and a mound, the place was well marked in space and became a permanent fixture of the cultural landscape. Its original purpose was identified by the successive generations of people who considered it a ‘sacred space’ or a ‘funeral space’. This can be seen in the custom of placing following tombs nearby the existing one and giving them forms resembling the first feature as well as in placing following graves in the existing mound. Thus, a tradition of perceiving and using such places as sacred was formed, which must have been accompanied by giving them appropriate names. Usually, the tradition lasted as long as the monumentality of such features persisted in the landscape. In extreme cases, recorded in Kujawy, the mound of a Neolithic tomb continued to be used in the 19th century for burying people who had died of dangerous contagious diseases.

Household, Community and Social Landscape: Building and Maintaining Social Memory in the Early Neolithic of Southwest Asia

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Household, community, and social landscape are three, nested layers of community and social networks. In the Epi-Palaeolithic and early Neolithic of Southwest Asia, households and large, permanently co-resident communities were new social constructs that replaced the previous pattern of clusters of mobile hunter-gatherer bands. These new constructs enabled relatively large numbers of people to live together permanently. We also see the growth of further layers of nested network in which co-resident communities join in local, regional and supra-regional networks (or interaction spheres) within which sharing of symbolic values and exchange of goods and materials intensified over time. Key to understanding how these new forms of large-scale community were sustained is the role of social memory; and a key to understanding how social memory was sustained is the role of rituals and monuments. It is easy to understand how the repeated re-enactments of rituals served to sustain shared memories. It is impressive that many of the monuments (a category that includes houses in much of the Neolithic of Southwest Asia) were repeatedly re-fashioned, constantly modified, and needlessly reconstructed; such repetitive acts of attention show how monuments sustained memory. Communities had evolved new cognitive skills and cultural facility that enabled them to encode symbolic values in cultural actions and cultural artefacts. This lecture will explore how the ideas of cognitive scientists, psychologists and philosophers in the fields of ‘situated cognition’, ‘extended minds’, and ‘external symbolic storage’ can be applied to the first emergence of the ‘extended networks’ and ‘extended memory’ that framed time and space.

Quick, Quick, Slow: New Perspectives on the Tempo and Experience of Change

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This paper discusses the results and wider implications of two recent dating projects — on long barrows in southern Britain, and on causewayed enclosures in southern Britain and Ireland — carried out within a Bayesian statistical framework. Formal Bayesian modelling as opposed to informal inspection of radiocarbon dates (aka ‘eyeballing’) or formal summing provides prehistorians, in our view, with the best available methodology for achieving radically more precise date estimates. In the southern British case, the application of this methodology has given not only new perspectives on the overall dating and timing of developments within the first centuries of the early Neolithic, from the 41st to the 36th centuries cal BC, but a new sense of the very varying histories of individual monuments, and of the accelerating tempo of change. This is all discussed against two alternative perspectives in the current literature: on the one hand that monuments qua large, imposing constructions were normally destined to last, if not for ever, for a very long time, and on the other (often, broadly speaking, from a post-processual point of view) that monuments were rarely if ever finished projects or the outcome of single planned constructions. We challenge the discipline’s current attachment to the long term.
Temporal Perspective and Monumental Constellations of Inner Asia

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The monumental landscapes of the Bronze Age and the Early Iron Age Inner Asia are the most charismatic and enduring archaeological remains in this region. Frequently these sites are situated to take advantage of the underlying landforms as stages, backdrops and vistas that could be incorporated into their use. These underlying surfaces, constructed visual networks, and incorporated spaces create monumental landscapes that can tie together both sweeping mountain valleys and immediate locale places. These are not locales dominated by a single enduring structure, but those inhabited by constellations of structures frequently of different forms and types and rooted in different times and different socioeconomic contexts. Each monument in a complex of structures must have been built in relation to those already present around it and frequently following systematic patterns of formation, reformation and reinterpretation that were quite widespread. The experience of visitors to these sites would have ranged from personal participation in construction and use, through an informed reading of a structure, to a new reading of an unknown monument and its incorporation into, or exclusion from, the existing monumental regime in some way. This paper will discuss the biographies of several monumental constellations in forested steppe and arid regions of Mongolia and Xinjiang, China, highlighting their growth, reuse, remodeling and re-orientation into their surrounding landscape. The landscapes and sites discussed are founded mainly in the Bronze and Early Iron Age (3500-2600 B.P.), and exhibit reuse through the Early Medieval Period (1300-1100 B.P.) and retain importance up into the present day.
SESSION 6
DYNAMICS OF SOCIAL SPACE, SOCIAL RESISTANCE AND ITS REFLECTION AND PRODUCTION IN LANDSCAPE

Dynamics of a Pastoral Landscape: The Case of the Cornon Mountain in the Fiemme Valley (TN-Italy)

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On the limestone cliffs of the south-looking slopes of the Cornon ridge in the Fiemme valley, (Trentino, Italy), at an altitude between 1000 and 2000 m above sea-level, i.e. on the highest and most remote portion of the territories of a little cluster of villages (Tesero, Panchià, Ziano, Predazzo), thousands of shepherds’ inscriptions can be found. These were made with local red ochre between the second half of the 1700’s and the first half of 1900’s, by local goat-keepers and sheep-tenders engaged in the local short distance transhumance trail. Dates, signatures, initials, family symbols, herd accountancies, pictographs, sacred symbols are found, significantly concentrating among the steep trails to the highest pastures, where the flocks of sheep and goats were driven after the last shearing of hay. Between 2009 and 2010 two research campaigns, funded by the Autonomous Province of Trento (P.A.T.) within the framework of the APSAT project (http://apsat.mpasol.it/apsat/), were carried out on the Latemar-Cornon group aimed at surveying the writings, temporary shelters and objects left behind by the shepherds. On this, the research strategy was two-fold: on the one hand, a survey on the material evidence of 300 years of grazing activity, and on the other, a series of interviews with the last living shepherds. The surveys have shown that the writings are distributed from the cliffs just above the village up to an altitude of 2000 m, an area used in spring and summer grazing. So far, about 1600 inscribed rock walls have been discovered, totalling a number of over 10,000 estimated inscriptions, whilst some 53 structures have been identified. These can be divided into 3 broad categories: huts, smaller sheds and rock shelters. Finds consist of work implements (bells, files, blades, nails etc.), carved wooden objects (unused decorated spatulæ and knives) and tin cans for food, more recent and datable to the industrial period. Interviews with shepherds have allowed a better definition of the grazing economy in this part of the valley, shedding some light on the specific purpose of the temporary shelters and on the correct interpretation of symbolic meaning of the writings. If the inscriptions from the 18th and 19th centuries often refer to religion, in the 20th century we have several examples of political writings (UP LENIN, UP SWITZERLAND, UP AUSTRIA), and shepherds’ individual self-portraits, as if they were much more concerned with more secular aspects of life, gradually eschewing godly matters to turn to human ones instead. In short, this part of the mountain can be described as a “landscape of social resistance”, one in which certain selected individuals at certain specific times could assert, in a social world heavily loaded with the sense of inequality, their own right to graze and to exist as people by making use of an ostentatious display of their own writing skills.

Formation of Social Landscape: Lake Van in the Middle Ages

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The landscape of Lake Van, and in general of Eastern Anatolia, is a remarkable example of social landscape formation, as first outlined by Cyril Toumanoff, that ranges, from our knowledge, from the Iron Age to the Middle Ages and more, almost following a high degree of continuity. It’s own signature is the resilience of micro-regional networks even in larger-than-region assessment and their struggle against upper level authority not important if foreigner or insider. Common historical examples are Armenian Feudal Lords in the Middle Ages, fighting each other and occasionally rallying against Persian or Arabs or the Modern Age insurgence of both Kurds and Armenians under the Ottomans. But a lesser known and open air situation can be seen in the internal struggles of the Armenian Kingdom under the Arsacids and Araxiads, with signs of it even under Tigran’s Empire. The Iron Age is a similar sample, with a merging regional power, Urartu, that appears to deploy its ‘propaganda’ and power agency on a landscape made of nucleate local social entities, the heirs of Nairi ‘confederation’. This sentence is obviously a simplification of a much more complex situation still almost unknown due the lack of aimed researches, mostly on Nairi and out-of-palaces landscape assessment. Although last ten years studies aimed on the Early Iron Age, as for Belli, the publication of modern and exhaustive surveys, as for Marro and Ozfirat, as well as the continuing works on Ayans, have delivered a way of using new data in a more sociological oriented view of the Lake Van landscape to better outline the role of the environment in the formation and organization of local and regional power, as well as struggles and contrast between them. It’s a way that links more with a wider view of the diachronic landscape and that it’s related even with actual on-due and closed project in the wider Transcaucasia. My PhD research recently closed has aimed at such an asset using to avoid possible speculative asse-
tions, technological advanced tools like GIS, Remote Sensing analysis and a strongly theoretical implants. The flow work as well as the final results will be presented during the workshop.

The Milares Horizon: Two Case Studies for the Analysis of the Copper Age in Southeastern Spain

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The Copper Age in the Southeast of Spain is one of the most riveting phenomena in the Western Mediterranean. Since the nineteenth century, many researchers have concentrated their attention upon what is conventionally called “Horizonte Milares” or “Cultura de los Millares” (Millares Horizon or Los Millares Culture). The cultural material from lowland Almeria, extending into southern Murcia and eastern Granada, is referred to the Millares culture, after the eponymous site of Los Millares (about 3000-2400 cal BC) located in the middle Andarax valley. According to the huge literature known on this topic, the main indicators of the Millares Culture have been usually identified with the existence of generally fortified hill settlements, the construction of collective tombs (tholoi), the adoption of metallurgy, the use of opened pottery vessels and symbolic decorations, and the development of extensive trade networks involving exotic elements (Chapman et al. 1987). However, archaeological data make clear that a quite wide variability does exist between Chalcolithic sites in terms of settlement models and size, their localization in the landscape, some technologies and the subsistence strategies developed by the communities (Micó 1991). This complexity of the observed phenomena has led to different interpretations. In particular, researchers from the University of Granada propose the presence of a markedly hierarchical society (Molina and Cámara 2005; Molina et al. 2004), whereas other authors consider the power of the elites as restricted to a limited leadership (Gilman 1976; Ramos Millán 1998) or even the co-existence between unequal and equal social relations (Chapman 2003). A noteworthy model is also the definition of the Los Millares society as a dual production system (Risch 1995; Castro et al. 1998).

As seen in the overview of the workshop, this session aims to highlight the reinterpretation of the archaeological sources as well as the investigation of social landscapes. Hence, we consider the Copper Age in Southeastern Spain as a particular social space where the environment is integrated into territories and landscape (Castro et al. 1998). The idea is to explore the construction of the social landscape from two different points of view: the pottery and the macroolithic evidence. We present a critical analysis concerning the social and economic implications of Chalcolithic pottery and macroolithic production. These results were obtained from two projects recently realized in the scientific framework of the Spanish research group “ASOME – Arqueoecología Social Mediterránea”. Both projects have highlighted interesting aspects about the economic organisation of Chalcolithic communities based on technology, spatial distribution of artefacts, decorative patterns, typological similarities and exchange dynamics between settlements. The archaeological record comes mainly from two of the most important sites of the III-II millennia cal BC called Gatas (Almeria) and Cerro de la Virgen (Granada).

The ensemble of archaeological data presented in the former projects clearly reflects the socio-economic aspects of each of the prehistoric contexts mentioned above. In order to achieve this purpose our analysis focuses on (a) the evidences of production, consumption and distribution of the natural resources employed in the manufacturing of pottery and macroolithic artefacts, (b) the means of production needed to transform them and (c) the role these final artefacts played in the economic organisation of prehistoric communities once they began to be used. Important aspects for the comprehension of the socio-economic structures are, on the one hand, the different types of raw materials, which informs us about the exploitation of environmental resources and the raw material supplying systems and, also, about the intrinsic nature of the future artefact. On the other hand, the morphology and the dimensions of the instruments are related to how they worked during their use life. Finally contextual evidences, like spatial location, associations with other work instruments and infrastructures or production remains are directly associated to the interpretation of the socio-economic aspects of the historic contexts studied. Those aspects will help to better define the social changes occurred at the end of the Iberian Copper Age and the transition to the Early Bronze Age (Argaric Culture), when significant innovations and social reorganization took place.

A Survey of the Equidistances and Alignments of a Composite Landscape: “The Motte” (Fortified Villages and Tumuli) in Central Veneto

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This paper deals with the (temporary) results of a study started about 20 years ago about landscape, in its wholeness and complexity. It concerns the phenomenon of the so called “motte”. By this term we include landscape artefacts generally termed by a number of different names, such as castellieri (fortified villages), barrows, motte-and-bailey, well aware they may be chronologically differentiated. In particular, in the region of the Veneto (northeastern Italy), the word “motta” is used
to identify low hillocks as well as every little variation of the altimetry of the ground, in the vicinity of some meters, but even clearly visible in mainly plain areas. This term is used regardless of the specific function of each of these artefacts. The research concerns an almost totally plain area of about 1500 square kms (in the provinces of Padua, Venice, Vicenza and Treviso) and it has been carried on with the use of toponymy, aerial photography, historical cartography, historical records research, and ground tests. Thanks to these analyses it was possible to identify about one hundred sites belonging to the “motte” domain. Eighty per cent of them had already been destroyed or engulfed within strongly urbanized regions. Cartographical and GIS analyses allowed us to observe that some of these landscape artefacts (at least 25) are strongly interconnected with one another. They outline a very composite landscape from the functional and chronological points of view, whose appearance appears very strong, however, and shows a very precise and interesting series of equidistances and alignments. The most common distance between two sites is, in fact, 7.8 km (rounded off to some dozens of meters). When we consider alignments on rather long distances (around dozens of kms) we can see that they are very precise: in many cases, couples of sites can be joined with a straight line that also intercepts precisely sites collocated in the middle of the continuum. In particular, we can see at least three areas characterized by the presence of a mutual link system and equidistances arranged to define geometrical complex structures that cannot be considered accidental. Moreover, these alignments are so precise that the people who created them should have had some reference points: land markers such as mountains or astronomical elements (the sun or other stars). Unfortunately, for most sites we still have not chronological dates and precise typological studies, but potsherds coming from surveys allow us to date them generally at least from the end of the Middle Bronze Age. Only two of the sites have been partially studied with stratigraphical excavations and they have been dated from the Middle to the Late Bronze Age. Without further analyses, it is not possible to prove that the sites we found belong to the same period but we can reflect on some questions about equidistances and alignments. For example: is this an organized landscape created to solve either economical or military needs (landscape of power, exploitation strategies, landscape knowledge)? Was it, by contrast, created for ‘superstructural’ reasons, i.e. social, cultural and religious control? Can we speak of a hierarchical structuring of the landscape due to the presence of dominant centres? We hope that such questions will find some answers in the near future, with further stratigraphical excavations and the continuation of the research.

“Hadza” “Flux” and “Fusion” as Products of Social Resistance – Changes in Social Organization of an East African Forager Society and the Effects of “Borders of Ignorance” on Archaeological Research

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The 1960s were a turning point in ethno-archaeological research. It seems to be the last decade that is characterized by common research interests of archaeologists and social anthropologists. The milestone of this transdisciplinary aligned anthropological research was the conference “Man the Hunter” having a disproportionately high influence on subsequent archaeological forager research. Taking the conclusion of the British Anthropologist James Woodburn for an example, this contribution shows the process of creating scientific myths in terms of Kristiansens “borders of ignorance”. Woodburn, like Colin Turnbull, was inflating the results of his field trips under the impression of the 1960s political development (flower-power, etc.). On the other hand, he did not pay extensive regard to the German research of Kohl-Larsen of the 1930s. The German ethno-archaeologist observed a different form of social organization that was based on territoriality and borders. Actually, Woodburn’s concepts of “flux” and “fusion” as main concepts of Hadza social organization, which he had developed since the mid 1950s, were not the output of an “original affluent society” but of a dramatic social change caused by expansive land-taking of farmers and the influence of social changes caused by “economic modernization”, as the German Ethologist Eibl-Eibesfeldt pointed out some decades ago.

“Returning to the State of their Antiquity”: Pueblo Landscapes of Resistance to Spanish Colonialism in 17th Century New Mexico

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Few topics occupy the attention of historical archaeologists today like that of resistance. In recent years, the prominence of practice theory (and the concomitant emphasis on the role of agency in social life), the rise of household/domestic archaeology, and growing interest in the archaeology of enslaved and colonized peoples have combined to focus heretofore unprecedented attention on resistance among subaltern peoples. Yet resistance is also an inherently difficult topic to study archaeologically; while it is often manifested in concrete acts, it can just as easily yield inaction (the “passive resistance” identified by James Scott).

This fact has beguiled recent studies of Native American opposition to European colonialism, which have
tended to focus on individual artifacts, features, or classes of material culture when attempting to identify resistance in the archaeological record. Far less attention has been paid to indigenous resistance as it is manifested in archaeological landscapes. This paper attempts to reverse this trend by examining the ways in which Pueblo resistance to Spanish colonialism shaped and was shaped by the changes in cultural and physical landscapes that occurred in 17th century New Mexico. The landscapes of the ancestral Pueblo world changed radically during the tumultuous 1600s, first as a result of initial colonization and the resulting depopulation of indigenous peoples, and again after the Pueblo Revolt of 1680, when the Natives of the northern Rio Grande ousted the Spaniards from their lands in one of the most successful Indian revolts in the history of North America. This paper will examine the roles played by violence, conversion, social memory, and nativism in structuring Pueblo settlement during this era. Through an investigation of shifting site locations, architectural layouts, and a ritual landscape of “mnemonicons” (places of visitation, commemoration, and history), I hope to address larger questions concerning the possibilities, problems, and benefits of examining resistance at larger spatial scales.

**Upheaval and Resistance in the Hallstatt World: Facts and Narratives**

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Only very few other periods of Middle European Prehistory have been as often claimed to have been periods of great social unrest as the Early Iron Age (Hallstatt period). Accordingly, a number of archaeological findings have been identified as hints towards troubled times; these include the plundering of grave mounds and the destruction of sites like the Heuneburg, both very visible markers in the landscape. However, despite the fact that a fair amount of scholarship and research energy have been invested into this archaeological period, so that it can be considered very well studied, in the past these facts have been interpreted quite differently, as S. Rieckhoff has recently shown by comparing the narratives of W. Kimmig and L. Pauli. In my paper, I want to reconsider the available data usually claimed to belong to acts of resistance and upheaval and include further material which has not been taken into account yet.

**Getting Ready for Combat: Soldiers, Violence, and the Spatial Dimensions of the Western Front, 1914-1918**

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The paper takes the situation on the Western Front in the First World War as an example to prove the paradigm that spaces and social structures are interwoven and alterable. Here, the scientific concepts “space” and “violence” are anchor points to understand the history of the war 1914-18 and the percussions it casted forth even long after the struggle had ended. It marked a period of transformation and transition – with good reason it was termed as the “great seminal catastrophe” of the 20th century (George F. Kennan). Within this frame space is conceived as a changeable historical entity which affects the being and conduct of humans. Violence is understood as social action, where structures of power come into play and social order is established or abolished. With these methodological premises the paper approaches the history of the Western Front. Was violence mirrored in the spatial dimensions of the front line and in the structures of society? After methodological reflections regarding “space” and “violence” I will discuss this question in three steps: 1. Setting up the spaces of the Western Front: Basically, the spatial conceptions and mental maps of the military leaders determine the employment of equipment and troops. On the battlefield itself artillery, machine-guns or barbed wire create zones of great danger. This spatial layer is superimposed by the tactical regulations which determine the deployment of troops, their movement, operations – and the nature of violence. It becomes clear that a complex network of shifting spaces emerges out of modern warfare. 2. Social consequences of dynamic spaces: These developments had implications for the soldiers in the front line. Now waging war meant persistent learning and training in order to be in the picture of the spatial dimensions of the battlefield. But because of these complex spaces the military realized that only increased drill will ensure that the soldiers can enhance their capabilities and sustain in battle. Subsequently, it extended the surveillance and training of the soldier’s bodies in order to create a type of soldiers with body control and rigour. 3. Bio-politics as a paradigm of modernity: The national technologies of power went further stating that certain skills are not learnable, some voices claimed that the soldierly capabilities had to be part of the combatant’s “nature”. Not everyone could fight in war. Only experts with instinctive skills could make an excellent army. This meant that warfare in the future was a part of bio-politics (Foucault), where the citizen’s bodies have to be brought under close control of governmental power. Thus, with the dynamic spaces of the Western Front a few were set apart from the rest of the military society. The image of this human vanguard rooted in biological knowledge. After the war
had ended it was transferred on whole societies, where it caused levels of violence hitherto unknown.

Reading against the Grain: A Critique of Regional Settlement Studies in Mesopotamia

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For more than half a century, regional settlement studies have played an important role in the understanding of Mesopotamian (pre-)history. At the same time, they have implicitly fostered a view of Mesopotamian history that is focused on “success”: how did states, empires and other centralized political organizations shape or reshape the landscape through their (attempts to) control people and resources? In this paper, I take a critical approach to the history of settlement studies in the region and point to some alternative directions that open up spaces to consider resistance.

Indicators of Social Dynamics Expressed in Architecture and Landscape Design during the Late Bronze Age in the North Caucasus

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Space, socially constructed and lived, is one of the key concepts in the recent debates in cultural sciences. They focus on the way societies used space and expressed themselves in space especially using architecture. The present study reflects on the development of Bronze Age societies in the high mountains of the North Caucasus with an exceptional spectrum of preserved settlements sites. Here, starting in the 16th century BC, we can trace the process of mobile groups settling down at permanent locations. They start to build monumental stone architecture, which reflects extremely well the social and economic transformations during the next 500 years.

The process of (re)settlement start with simple house-types and a lined settlement conception, and end with complex double-roomed buildings around a central place, which reflect closed communities with a strong local identity. The shift in settlement layouts reflects on one hand changes in the economic system. The architecture show that more and more animals could be kept in direct vicinity of the sites, and the settlements themselves become adapted to effective herding management. Simultaneously different economic aspects were put under one roof in the development of a Wohn-Stallhaus.

The economic aspects, yet, are only one side of this process. The architecture demonstrates a shift from individually conceptualised clusters of joint settler groups with an inheritance of a mobile lifestyle towards corporate communities with standardised settlements, very strong social regulations and a precise localisation. This is marked by three steps: first, settlements with small houses, few common areas to keep animals and a lined conception of settlement which can be increased by new members; second, ring-like clusters of complexes varying in the number of living-houses and the size of enclosures for animals, and third the development of a settlement layout with a large central place and rows of identical Wohn-Stall buildings outside. Magnetometry studies and soil analysis show that not only the visual aspects in the architecture of these later were regulated, but that space was used identically by all settlers!

In the case of the Late Bronze Age societies on the mountain plateaus, space during all phases of development was used to express the social regulation of its epoch. Small independent groups underwent a period of economic and social differentiation in more and less potential households. At one point this process was stopped and corporate identities were formed, which suppressed all expression of differences. All inhabitants of the community now lived in the same multi-functional houses in the same way. At the end of the Late Bronze Age this settlement system collapsed and the settlers had to move down into the valley. They also had to change their basis of subsistence fundamentally, since the agricultural part in the economy increased and herding became less important. However, the corporate social system did not change. During the Early Iron Age the corporate identities of villages are expressed very definitely in the style of ceramic decorations and standardised burial costumes. No vertical hierarchy is reflected in theburials, even if one can feel that social differences had existed. Thus, while the economic basis as well as the inhabited territory changed fundamentally, the social organisation developed against another economic background and in another landscape remained unchanged.

Resistance and Revolts as Social Praxis: An Archaeological Approach

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While power and its political use have been central issues of the different liberal traditions of thought in social sciences since the 19th century, less attention has been devoted to the role played by resistance in the historical process, and its relation to revolutionary change. Instead of understanding resistance and revolutions as transitory moments of political weakness or ill-functioning social organisations, it is equally possible to argue that they represent implicit phenomena of any power structure. Marx and Engels explained class struggle as a dialectic response to certain property relations under state systems, but society has the means to contest any other forms of power and economic exploitation. From this perspective, power structures would not only imply, but
they rather require social resistance to become durable, as unlimited (totalitarian) domination is condemned to its self-dissolution. While resistance sets the social and political limits of power, technology marks its physical and ecological limits.

We can further distinguish between latent, successful and unsuccessful resistance. If latent resistance is an intrinsic part of the exercise of power and economic exploitation, social contest becomes disruptive to the dominating structure when it achieves its targets, as well as when it fails to do so, though in completely different ways. While successful opposition overcomes power in order to try to reinstall a previously known political organisation, though never fully achieving it, unsuccessful resistance produces a feeling of anger and impotence in front of an unchanging and increasingly intangible political structure. The uselessness of specific reactions to power leads to attempts of a total attack on the established political structure and a revolutionary overturn and destruction of a specific social reality.

If resistance is a phenomenon of power itself and revolution an outcome of failed resistance, than our approach to political organisation and practice can no longer restrict its focus on the immediate appearances of power and economic exploitation (e.g., monumental architecture, means of violence, ceremony, etc.). The effects of resistance and revolt are less visible but just as perceptible in the reality that surrounds us, as the mechanism of domination. In this presentation, I would like to discuss these concepts further and analyse their archaeological implications. Finally, some case studies from different (pre)historic situations will be presented in order to explore the heuristic value of such an approach.

**Landscapes and Resistance: Aspects of Balance and Unbalance in Archaeological Interpretation**

Almut Schülke

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(How) can social resistance be discussed in archaeological studies of landscapes and social space? My paper tries to explore the term “resistance” by presenting concepts of resistance used in the social sciences and by discussing their application to the archaeological data of landscapes and places. The focus will be directed towards the ambiguity of material culture as a possible expression of both power and powerlessness, and on aspects of balance/unbalance in archaeological interpretation. To illustrate my argument I will use case-studies analyzing the transition from the Mesolithic to the Neolithic in Southern Scandinavia.

**The Ancient Kabyle. Social Transformations and Reflection on the Landscape**

Ivanka Slavova

*Sofia University “St. Kliment Ohridski”*

This paper is an attempt to summarize the archaeobotanical analysis of the study site in the framework of all the results from the long archaeological research of the ancient Kabyle (Southeast Europe, Bulgaria, near Yambol town). The archaeobotanical data has been collected during the last two years. It represents mainly the necropolis of Kabyle from the Roman Age and a little part of the Hellenistic Age. The material is charred and it is extracted from the sediment by dry and wet sieving. It shows the exploitation of the wood and the main used plants by the society in the region. The research gives additional information to the archaeological evidence collected during forty years (1970-2010) of regular and emergence excavations on the territory of the ancient city, its necropolis and other structures in its hinterland. The results obtained by these analyses will be used to reconstruct the paleoenvironment and human influence over it from 1000 BC to 1000 AD, comparing the paleoenvironmental evidence with the archaeological and historical resources, the data from archaeo-zoological and previous archaeobotanical researches. They altogether will help to recover the use of plants and animals in everyday life, rituals and the course of shaping the landscape by the society. The presentation will emphasize the crisis moments of each period, as a factor for social transformation and its reflection on the landscape which is a result of the changes. From the rise of the city form of life till its collapse a lot of ethnic groups (Thracians, Hellenes, Romans, Bulgarians, etc.) passed Kabyle’s hinterland. Each of these groups brings with itself a specific culture, which is visible in the everyday life, different rule forms, economics and so on. Depending on the stage of social development, these societies left fingerprints on the landscape of the study region and exercise a direct influence on the surrounding environment. Interpreting the data of archaeological excavations and comparing the different periods of the region could assist in drawing the scheme of environmental assimilation for each social group. This information will be compared with present conditions of the landscape which is going to fulfill the picture how the human factor models the landscape and visa versa. The large evidence collected from different periods of life in the ancient Kabyle gives an opportunity for detailed analysis of the relationship between human and landscape and human influence over it. Studying the different periods of city life, the main moments of the history of the micro region will be traced: settlements before the appearance of the city structure, origin, development, decline and collapse of the city, the life after the city.
SESSION 7

SIGNAL SYNCHRONIES AND ASYNCHRONIES: TOWARDS SUPRAREGIONAL PATTERNS IN INTERDISCIPLINARY PALAEO LANDSCAPE RESEARCH

The Resilience of Syrian Protohistoric Communities to Climate Changes: High Resolution $^{13}$C AMS and $^{14}$C Analyses

Valentina Caracuta and Girolamo Fiorentino
Laboratory of Archaeobotany and Palaeoecology, University of Salento

The assessment of paleorainfall is considered fundamental to understand the influence of short-term climate fluctuations on ancient human communities, especially in those areas characterised by critical environmental conditions such as the steppe of the Near East. The relationship between natural resources and human adaptation has long been investigated by studying plant remains from archaeological deposits. Climate change has been found to be the main driving force for the modifications in plant cover. The present work aims to extend the archaeobotanical approach by using carbon isotope analysis of ancient plant remains to infer paleorainfall trends. Given that $^{13}$C plant has been found to be influenced by local environmental parameters, we tested the isotopic response of modern plants to the main regional climate-forcing agents by sampling plant communities along a rainfall gradient in Syria and measuring the $^{13}$C values by IRMS techniques. In addition, we analysed the carbon isotope composition of 38 samples collected at Ebla and Qatna, two proto-historic sites in north-western Syria, by means of AMS techniques to determine their $^{13}$C and $^{14}$C values. The qualitative reconstruction derived from the carbon isotope data thus obtained enabled us to identify changes in paleorainfall trends over a period of fifteen hundred years, from the middle of the 4th millennium to the middle of the 2nd millennium BC, and test the response of local human communities to short-term climate changes.

Synchronisation of Pollen Records and Identification of Over-regional Pollenstratigraphical Patterns during the Neolithic in Northern Germany (poster)

Ingo Feeser and Walter Dörfler
Institute of Pre- and Protohistoric Archaeology, CAU Kiel

In the context of the DFG Priority Programme “Early Monumentality” (SPP1400) detailed palynological stud-
of certain wood species. Beyond this, a view on the whole composition brings information about the selection of wood and the openness of the landscape. (2) A synchronous approach researching a larger geographical area for one time period. Different types of archaeological sites are compared (like settlements, burial mounds and enclosures). For the Neolithic time the comparison of several sites is possible. This shows that the influence of the human activity on the surroundings of sites opens the landscape, which promotes light demanding species (like Pomoideae/fruit trees and Corylus/hazel). Other regions might show a particular wood composition – like the settlement Wolkenwehe which is situated in a fluvial fen system, where Alnus/alder wood was predominantly growing. Overall these two different analyses in combination allow us to get a more detailed view on general and special developments of human wood usage in man’s interaction with resource availability and palaeoenvironmental preconditions.

Human Activities and Natural Factors in the Creation of Roman Age Landscapes in Southern Italy: Interpretation Problems

Daniela Moser1, Oliver Nelle2, Gaetano Di Pasquale3
1GS "Human Development in Landscapes", CAU Kiel, 2Institute of Ecosystem Research, CAU Kiel, 3Università degli Studi di Napoli Federico II

The landscape, in the past as nowadays, is the result of the interaction between anthropogenic activities and natural factors. To study and reconstruct the ancient landscapes a good understanding of this human-environment interaction is needed. A synchronous approach based on the analysis of different sites in a supra-regional scale is useful, together with a diachronic analysis of the data, to verify the extent of certain environment or landscape changes. An interdisciplinary approach, based on the combination of archaeological records and palaeoenvironmental and palaeoclimatic data can also help to understand the importance of human activities or natural factors in generating landscape changes. With the application of archaeoanthracological and pedoanthracological analysis on some sites and soils of Southern Italy (Campania, Calabria and Puglia regions) and with the study of palaeoenvironmental and archaeological research carried out in the same area we try to understand if some change in the landscape of this area of the Italian peninsula happened just before, during or just after the Roman Age and if we can ascribe this changes to climatic factors or to the anthropic influence. However, a fundamental question is whether it is possible, for the Roman time, which is characterized by a very strong human impact on the Italian peninsula, to distinguish between human and natural processes in the creation of landscapes.

Detecting Supra-Regional Patterns: Challenges and Approaches

Oliver Nelle
Institute of Ecosystem Research, CAU Kiel

The detection of supra-regional patterns of landscape dynamics and change is a way to disentangle natural vs. human impact on the environment, one of the big challenges of palaeoenvironmental research. For scenario-building of past processes with the aim to contribute to models of future global change, it is necessary to better understand whether climate or other natural processes caused landscape changes, or whether humans were the main factor. This can only be approached by a real interdisciplinary cooperation effort. The introductory talk aims to formulate points for discussion during the session.

Holocene Woodland Dynamics and Land-Use History of the Westensee Morane Region, Northern Germany, Based on Three Pollen Records

Mykola Sadovnik1,2, Hans-Rudolf Bork3, Marie-Josée Nadeau4, Marie-Josée Gaillard4 and Oliver Nelle1
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The main focus of this multidisciplinary project is to improve understanding of interaction between natural processes of the woodland dynamics and human impact. Changes of vegetation resulting from human impact are reflected in three pollen records by the occurrence of pollen grains of anthropogenic indicators. Micro- and macrocharcoal fragments were counted to reflect local fire events. Loss-on-ignition analyses were used for estimating organic and carbonate content in peat sediments. The chronological modelling of the AMS measurements of the cores and creation of the Age-Depth models are carried out with the software Oxcal 4.1.6, which is intended to provide radiocarbon calibration and analysis of archaeological and environmental chronological information. The archaeological records from the study area were analysed using GIS techniques. Applications of the LOVE (LOcal Vegetation Estimates) and REVEALS models for estimating local vegetation composition within the relevant source area of pollen from small sites allow the analysis of the forest and landscape development of the area in the past and a comparison with the current forest situation. Three high resolution Holocene pollen profiles from the research area are presented. The Brunsrade mire (core MDK) has characteristics of transition mire in a closed woodland area, disturbed by drainage and peat cutting along the edges of the mire. We generated a firm conclusion about the development of the mire and the
vegetation of its vicinity over the last 6000 years using lithostratigraphy, pollen analysis, micro- and macrocharcoal analysis, archive materials and GIS techniques. The study at “Kraenberg” (core KRM) focuses on the reconstruction of land use and forest history with special emphasis on the period of the Neolithic. The study site consists of five megalithic graves. The graves are arranged in a more or less straight line and are located in the closed vicinity of the mire. The morphology of the area adjacent to the graves was investigated. The magnetogram revealed unknown anomalies and remains of the mound fill and of the stone kerbs surrounding the graves. By combining the pollen record with AMS radiocarbon dating and archaeological data, we are attempting to identify whether local woodland clearance took place as a result of the first human impact and the construction of the megalithic graves and when that happened in the study area. Our data show that the forest in the surrounding area had been opened possibly in connection with the construction of the megaliths ca. 3500 BC. The archaeological material from the study site indicates that human impact in the area took place in the Neolithic, Bronze Age and Iron Age, which is corroborated by the pollen record, suggesting that human impact in the study area occurred periodically from the end of the Atlantic period. The Lunsee lake core (LNS-1) represents an undisturbed sediment record since the late glacial and, therefore, provides a complete pollen record covering the Late Glacial and Holocene periods. High resolution pollen analysis allows reconstructing the local vegetation history and landscaping development especially during the Neolithic, Bronze Age, Iron Age. In addition, the sediment core provides a complete record of the immigration of Fagus in the adjacent area, a period which due to intensive peat cutting is rarely possible to analyse in peat sequences from the investigated mires.

**Synchronous and Asynchronous Signals from Annually Laminated Lake Sediments- Results of Palaeolimnological and Palynological Investigation in Northern Germany**

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Synchronous deposition patterns of varves of Lake Belau and Lake Poggensee (northern Germany) detected by comparative microscopic examination of the fine structure of the annual layers allows the reconstruction of weather and climate history during the Funnel-beaker culture period. The comparison of these sequences also provides evidence for the asychronic onset of anthropogenic activity in the catchment areas of the lakes. Palynological analyses on several sequences from northern Germany challenges again an old question: Has the “Elm-decline” been a synchronous event? The dating and synchronisation of the sequences are carried out by radiocarbon dating, teprochronology and the varve chronology itself (see also abstract Feeseer & Dörfler “Synchronisation of pollen records and identification of over-/ regional pollenstratigraphical patterns during the Neolithic in northern Germany”). A phase of longer and more rigorous winters from BC 4100-3900 (6050-5850 cal BP) could be assigned by the detection of the synchronous occurrence of stagnation indicators such as winter layers, Chrysophytes (golden algae) and the development of very small Diatom blooms. This phase could reflect a well known climatic event of the northern hemisphere (Bond event 4, about 5.9 cal BP) documented in marine sediments. The high temporal resolution provided by annual lamination enables a further zoning of these cooling oscillation already proven in many climate archives. In both sequences (cal BP 6030) a short, warm and dry phase (about 30 years) is detected, which is indicated by calcite precipitation, frequency of green algae blooms (Phacotus), changes in Diatom assemblage and layer-thickness. Subsequently, a high resolution reconstruction of the weather conditions during the Funnel Beaker time in northern Europe has been established. The onset of settlement and land use activity by the Funnel-beaker culture period is reflected by asynchronous inputs minerogenic matter into the lakes (soil erosion): In Lake Poggensee at ca. 3850 BC, and in Lake Belau at ca. 3500 BC. Because of the high resolution, alternating high and low-input phases in the sediments have been detected, each with a duration of 20-25 years. By integrating with high-resolution pollen data it should be proved, whether these are indicators for land use cycles (clearing-reforestation) with a duration of observed intervals. Based on the comparison of pollen diagrams from the region covering the “Elm-decline” the question about the synchrohonic character of this marker horizon widely used in pollen diagrams from Northern Europe is discussed.
SESSION 8

NATURAL OR ANTHROPOGENIC - DYNAMIC AND MOBILITY OF FAUNAL LANDSCAPE

Mobile Landscapes, Settled Landscapes: Pastoral-Urban Interaction at MBA Acemhoyuk, Turkey
Benjamin S. Arbuckle
Baylor University

In this paper I explore the relationship between the palace-economy of a Middle Bronze Age center, Acemhoyuk, and its pastoral periphery.

The relationships between Anatolian political centers and their pastoral peripheries have rarely been addressed and when they have they are often modeled as highly asymmetrical with local herders dutifully adopting production strategies aimed at providing meat for urban markets. Using a combination of zooarchaeological data and ethnographic parallels, I suggest that pastoral groups on the Konya Plain were much more independent and sophisticated in their decision making, responding to complex local and regional markets for commodities, and that there is little evidence to suggest that the palace at Acemhoyuk was able to exert much in the way of control over the pastoral periphery.

Mobile Pastoralism in the Zagros Mountains during the Iron Age: A Multidisciplinary Approach (poster)
Silvia Balatti
GS “Human Development in Landscapes”, CAU Kiel

The mode of production characterized by the movement of domestic animals, especially ovi-caprines, beyond different ecological zones, seems to have been a typical phenomenon widespread in the Zagros Mountains from the Neolithic time until nowadays. Several studies by Prehistory archaeologists, zooarchaeologists and anthropologists testify a continuity of herd exploitation and mobility through the centuries, as strategies of environmental adaptation in the area. Unfortunately, with regard to the historic periods the archaeological evidences and the bioarchaeological data concerning the region are still scanty. The most important remains from the Late Bronze and the Iron Age are represented by cemeteries. This lack of information may be due to a change in the way of life of the mountainous people towards a higher level of mobility, which is always difficult to detect in archaeology. This phenomenon could be linked with the new technologies and the social organization based on ethnic affiliation and villages which followed the decline of the palatine system in the Near East between the Late Bronze Age and the Early Iron Age. In regards to this, the Assyrian reliefs and written sources referring to the Zagrosian area provide important information. To take an example the breeding and utilization of mounted horses (and less frequently of Bactrian camels) seems to become fundamental for the economy as well as for the military potential of the people of the Zagros.

Neolithic Migrations in the Eastern and Southeastern Territories of Romania: Metric Variations in Cattle (Bos Taurus) Populations (poster)
Luminita Bejenaru, Mariana Popovici, Simina Stanci
University “Alexandru Ioan Cuza” of Iași

Animal populations and their migrations can be recognized using metrical characters, and thus the measurement of skeletal remains is important in recognizing the interference of animal movement. Our study aims to describe the Neolithic migrations in the eastern and southeastern territories of Romania in terms of cattle size and morphology. For this purpose we considered the archaeozoological samples proceeding from the following Neolithic cultures: Starcevo-Cris, Vinca, Hamangia, Boian, Precucuteni, Cucuteni, and Gumelnita. We used relevant measurements (GL, GB, Bp, BFp, Bd, and BFd, following Driesch, 1976) recorded on different anatomical elements (humerus, radius, scapula, tibia, calcaneus, metatarsus, and metacarpus). The statistical results show variability on radius, humerus, metacarpus and metatarsus in Vinca, Precucuteni, Cucuteni, and Gumelnita Cultures. On the background of a prehistoric progressive gracilisation, the osteometric data suggest two robustness impetuses of cattle, in the Early Neolithic (Starcevo-Cris Culture) and in the Late Neolithic (Precucuteni and Cucuteni Cultures), as resulting in the higher values for Bd, Bp, BFp, and BFd recorded on metacarpus, metatarsus, and tibia. This study was supported by the Romanian research programs CNCSIS-PN II-IDEI 2116/2008 and POSDRU/89/1.5/S/49944.

Free as a Bird: Exploiting a mobile wild resource in Scottish island landscapes
Julia Best
Cardiff University

Birds are some of the most mobile animals known to man, with certain species travelling great distances during migration and others covering large areas to feed. Man’s interaction with these mobile creatures in the past can tell us much about their perception and use of the landscape around them, including the wild resources being exploited, seasonal activities and species, and the
range of habitats being utilized. In small, discrete coastal landscapes (especially small or marginal islands) birds and in particular seabirds can be an important resource providing meat, eggs, feathers, oils and fats. This paper explores the zooarchaeological evidence for bird exploitation in Scottish island archaeological sites. The mobility of particular bird species and their resultant presence or absence in these areas at certain times of the year dictated how they were used by the human populations. Therefore the role of seasonal resources will be explored focusing on the importance of seabirds coming to land to breed during the summer months, with particular attention to the temporally and geographically persistent capture of the Northern Gannet (Morus bassanus). The role of resident species and winter visitors will also be discussed within the context of their liminal and marginal location, where other resources may be limited. The paper will also consider trends and patterns which have been identified through a collation of the Scottish island avian data, highlighting in particular temporal changes in the species chosen for fowling. This allows consideration of the impact that human populations have had on bird species, including the decline and extinction of the Great Auk (Pinguinus impennis) and past changes in the breeding distributions of species such as the Northern Gannet. By considering the archaeology of birds in conjunction with other evidence, the marginal, mobile and changing landscapes of faunal resources in the Scottish islands can be explored further.

Worldviews in Transition: The Impact of Exotic Animals on Iron Age/Romano-British Landscapes

Frazer Bowen
Department of Archaeology, University of Nottingham

Cultural geographers have long accepted that animals play an important role in the construction and perception of landscape but such beliefs are yet to be embraced by landscape archaeologists who seldom give consideration to bioarchaeological data beyond the occasional economic or environmental reconstruction. In an attempt to highlight the value of animal remains for landscape research, this paper examines the Iron Age/Romano-British transition from a bioarchaeological perspective, focusing on the landscape change brought by the exotic species introduced around AD43.

Drawing upon scientific studies (in particular evidence from DNA and isotopic analyses) this paper argues that the establishment of exotic animals altered patterns of landscape organisation with the arrival of new spaces, such as parks and animal reserves (vivaria and leporaria) which were unknown in Britain before the Conquest. In itself, the use of bioarchaeological data to highlight the widespread existence of Roman game reserves is important since these have received little attention from landscape archaeologists due to the difficulties of their detection. Beyond this, however, this paper proposes that the arrival of these species and spaces impacted on the way that people engaged with, traversed and experience their world. Indeed, the very concept of ‘wild animal enclosure’ indicates a Roman worldview fundamentally different to that seen in the Iron Age period, when people seemingly negotiated with the wilderness and wild things rather feeling they had the right to bring them to order.

Late Medieval Attitudes to the Natural World: A Zooarchaeological Exploration (poster)

Frazer Bowen, Richard Easton, Katie Gibson, Zoe Knapp, James Westoby
Department of Archaeology, University of Nottingham

Across Europe the later medieval period witnessed a dramatic upsurge in hunting and wild fowling, particularly amongst elite groups. Whilst this situation has been considered in terms of shifts in social structure and dietary practices, little attention has been devoted to examining its significance from a landscape perspective. This is true despite the fact that hunting and fowling necessitates that space is engaged with and perceived in very particular ways – not all of which are deemed appropriate for all members of society. This collaborative paper will contextualise new results from Woking Royal Palace in Surrey to highlight how zooarchaeological data, in particular those relating to wild animals, can provide new insights about how social groups of different status and gender created landscape through their interaction with wild animals, both native and exotic. Zooarchaeological data cannot, however, be examined in isolation and this paper will integrate evidence from cultural geography, history and iconography to demonstrate how later medieval hunting reflects a fundamental transformation in landscape perception and attitudes to the natural world.

A Changing World? Hunters and Gatherers in Transition. A Case Study from the Site Neustadt in Ostholstein, Northern Germany

Aikaterini Glykou
GS “Human Development in Landscapes”, CAU Kiel

Along the Baltic coast of Northern Germany, the transition to farming and pastoralism occurred at the end of the 5th millennium calBC and its origins lie in a hunter-fisher-gatherer culture, known as Ertebølle culture, distributed across northeast Denmark, south Sweden and Northern Germany.

The coastal sites of the Ertebølle culture in northern Germany are nowadays underwater because of the rise of sea level after the last Ice Age. The site is an ideal example of such a submerged coastal hunting and fishing station. Among the finds 13,000 bones from mammals
and birds, 10,000 fish bones and a wide range of tools from bone, antler and wood are preserved. The fauna spectrum consists mainly of wild animals, while a small amount of domestic animals exists. Cattle confirmed by DNA analyses belongs according to the \(^{14}C\) dates to the oldest domestic animals in the north. Although the occurrence of domesticated animals may indicate a forthcoming change in the economy, it cannot confirm already established pastoral practices.

Seal hunting was of a great significance. The predominance of harp seals and the occurrence of their pups indicate a new local breeding population in the southeast Baltic in the proximity of the site. Though palaeoclimatic observations based on “exotic” species such as mud turtle indicate that the climate was warmer than today, which is in accordance with the middle Holocene thermal maximum, the occurrence of harp seals gives evidence of particularly cold winters. A palaeoecological and palaeoeconomical evaluation of faunal data combined with pollen analysis aims to reconstruct the living conditions, use of the landscape, hunting methods, tool traditions and to establish the degree of contact between forager groups and how climatic changes may have affected the subsistence of the last hunters and fishermen in the North.

It is suggested that the Mesolithic economy was stable; small regional groups were part of a larger network system, which allowed for material change and further interaction. These groups exploited the natural resources of their region and were not particularly mobile, as it is shown on the broad exploitation of sea mammals in Neustadt. Hence, an exchange of food surplus or any other goods such as furs, skins and blubber might have taken place.

Regional and Local Landscapes of Vertically Transhumant Pastoralists in Southeastern Turkey

Emily Hammer
Harvard University

This paper will examine how environment, topography, and landscape knowledge have oriented and shaped the movement of vertically transhumant (mountain-to-plain) nomadic pastoralists herding sheep and goat in southeastern Turkey over the last 500 years. The discussion will focus on movement at two spatiotemporal scales: the broad regional scale of the annual transhumance cycle and the local regional scale of everyday household movement between campsites, pastures, and water sources within a single season. Ethnographic, historic, and remote sensing (digital elevation models and multispectral satellite imagery) data will be employed to examine the possibilities for, changes in, and consequences of movement between highland summer yayla and lowland winter kıskak pastures. The Hırıblemperden Tepe Archaeological Survey has recently documented winter camping patterns likely dating to the last 500 years along the Tigris River in southeastern Turkey, including both campsites and the surrounding natural and anthropogenic landscape features relating to herding activities. The relationships between these features and campsites, combined with the conclusions of other ethnographic and ethnoarchaeological studies, allow us to hypothesize how camping groups organized and moved through their local landscape during the course of a single season.

Shepherding Herds, Conserving Pastures: An Ecological Approach to Herd Management, Using Oxygen Isotope and Dental Microwear Analysis in a Case Study

Elizabeth Henton
Institute of Archaeology, University College of London

The creation of degraded landscapes has been one reason put forward for the collapse of many large PPN mixed agricultural settlements in Southwest Asia, and has stimulated research questions on Neolithic land management in successful, long-lived settlements. Influenential models have been proposed; highly integrated intensive garden farming near the settlement, reliant on manure from small herds grazed around field edges and on fallow plots; and extensive, non-manured agricultural lands where herders separate seasonally to graze larger herds elsewhere on more distant pastures. These models describe economies where the integration of herding with farming differs, and suggest different social attitudes towards animals, towards the mobility of sections of society, and towards the exploitation of the landscape. In order to investigate herding practices in mixed agricultural communities, it is first useful to model how herders might have maintained herd security in each system. During their life-history, herd animals have changing food and protection requirements, whilst grazing and fodder resources also vary in their seasonal productivity and susceptibility to degradation. The splitting and moving of herds is a major, year-round herding strategy, designed to conserve resources as much as to maintain herds and meet product goals. Highly contextual evidence, with tight temporal resolution, can approach seasonal off-site management of different herd parts. Oxygen isotope analysis of tooth enamel offers an insight into birth seasonality and into the ensuing fallow herding environment. From the same tooth, dental microwear gives evidence of seasonal diet just before death. Taken together, these data allow aspects of the seasonal management of breeding, fallow and slaughter herds, as well as their landscape food resources, to be interpreted. Thus, the landscape as taskscape might be elucidated. Any matches and mismatches revealed between a notional suite of optimal practices and those actually in place provide the interpretative basis for approaching the ritual, social and environmental tensions operating on herding decisions. The case study presented is Çatalhöyük (7400-6200 cal.

ABSTRACTS: SESSION 8
The Role of Animals in Burials in Siberia
(on Selected Examples from the 9th to 3rd Century BC)

Karina Iwe
GS "Human Development in Landscapes", CAU Kiel

To gain a better knowledge about the role of animals in the burial ritual of Siberian prehistory we are going to analyse the evidence of animals in burials.

Besides the faunal remains we can also focus on the Animal Style which is one of the most significant traits of prehistoric cultural complexes located in the Eurasian steppes and forest steppes during the Iron Age.

Which animals can be found in the burials as faunal remains? In addition, which of them can be recognized as depictions in the same burial context? Which animals appear only as depictions? Which different sets of practices can be connected to both categories (faunal remains, Animal Style)? What kind of social and ritual aspects are involved in these activities, and furthermore, what multivalent information such as value systems, clan identification, religious beliefs etc. are connected with these rituals?

Mitochondrial DNA Provide Insights on the Origins of Goats (Capra hircus), Pigs (Sus scrofa), Cattle (Bos taurus) and Java Deer (Rusa timorensis) from Mauritius

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¹Durham University, United Kingdom; ²Royal Belgian Institute of Natural Sciences

Located in the southwestern Indian Ocean, Mauritius remained unsettled until the late 16th century when Dutch sailors officially claimed the island and introduced a number of plants and animals. Among the latter, goats (Capra hircus), pigs (Sus scrofa), cattle (Bos taurus) and Java deer (Rusa timorensis) are now found in abundance on the island and Java deer play an important part in the country’s economy. Little is however known about the geographic origins of these animals and in order to investigate these questions, we extracted and sequenced mitochondrial DNA (mtDNA) from 35 archaeological bone samples (11 goats, 9 deer, 6 cattle and 9 pigs) recovered from the excavation of Fort Frederik Hendrik, Mauritius.

Some of the results correlate with historical records, but other results suggest possible unrecorded introductions from other geographical areas. As suggested by documentary sources, a European introduction of the goat is likely but we argue that the animals were probably introduced from Southern Asia. The origin of the pigs is more conclusive with all working samples pointing towards a European origin, corroborating with the historical sources. The possibility of a second introduction from Southern Asia is however considered based on morphometric studies. The cattle appear to confirm historical records with an initial introduction from Madagascar. mtDNA analyses have also revealed the possibility of a maternal taurine origin but have not excluded a possible paternal zebuine origin. This has been widely observed in cattle breeds distributed throughout South Africa and Madagascar.

The introduction of European cattle is also supported by the results. Finally, the Java deer have been attributed to the Rusa clade but this particular species, as well as other Southeast Asian deer species, have been underexplored, thus restricting the inferential powers of our results. This study shows the value of mtDNA as a tool for reconstructing the geographic origins of animals.

Mobility, Husbandry and Feasting: An Integrated Approach to Understanding the Role of Fauna in Late Bronze Age Landscapes in Southern Britain

Richard Madgwick
Cardiff University

This paper examines the role of animals as both a symbolic and dietary resource in the use of landscapes in the Late Bronze Age of southern Britain. Research centres on middens sites, a group of unusual mounds specific to this period. These are vast accumulations of cultural debris, some of which cover an area of 3.5 hectares and comprise many millions of animal bone fragments. Middens frequently have only sparse associated settlement evidence and as such are likely to represent central places, on which communities from the surrounding landscape and perhaps beyond converged. Periodic feasting and depositional events may have taken place, perhaps linked with increased wealth and intensified animal husbandry. These sites are intrinsically multifaceted social spaces, representing a fundamental re-orientation in prehistoric communities’ tasksapes and provide the richest dataset for understanding the role of fauna in shaping landscape use and experience during the Late Bronze Age. Animals
were clearly central to the practices involved in the accumulation of these focal points in the landscape, not only due to the vast quantities of faunal remains contained in middens, but also the way in which faunal signatures contrast markedly with contemporary settlement sites. This is most evident in the higher proportion of pig remains, but one midden, the site of Llanmaes exhibits a truly exceptional pattern in being dominated by remains of the right forequarter of pigs. This paper presents results of a combination of zooarchaeological research and dietary (δ15N and δ13C) and migratory (Sr) isotopic analysis in reconstructing the role played by fauna, particularly pigs, in midden accumulation and in the use and experience of the landscape.

Faunal Remains as a Proxy for Human Response to Climatic Fluctuations

Richard H. Meadow and Ajita K. Patel
Peabody Museum, Harvard University

A 4200 calBP abrupt climatic event, attested in proxy records that include ice, lakebed and seabed cores, indicates changes in the Mediterranean westerrlies and monsoon rainfall with significant effects in Asia particularly in arid and semi-arid zones. Following upon an optimal period with greater and more predictable rainfall, this event would have especially affected populations that had previously moved with their animals into what at the time seemed good grazing zones where limited agriculture may also have been possible. A shift in rainfall, from one bad year in five to three or more bad years in five is likely to have severely stressed animal herds and led to habitat tracking to better watered zones where possibilities for conflict with existing populations would have become increasingly likely. The manifestations of responses, however, can be expected to have varied markedly from group to group depending both upon the environmental and social conditions at particular localities and people’s perceptions of those conditions, although the latter are difficult to evaluate in the absence of relevant written records.

Both landscape and site-focused approaches to the study of human responses to abrupt climatic change are essential, but both need to be anchored by multi-proxy research on individual archaeological sites that bridge such events with either continuous or discontinuous occupation. One such site is Tell Leilan in northeastern Syria, located in a traditional dry-farming zone that was directly impacted by the 4200 calBP event and was abandoned for about three centuries before being resettled in the early second millennium BC. Comparison of the faunal remains from before and after the abandonment indicates a change in animal exploitation patterns between the two occupations. Interpretation of this change is not straightforward, however, given the number of cultural and taphonomic filters that faunal collections pass through. Using the Leilan faunal remains as an example, discussion focuses on the possibilities and limitations of using faunal remains as indicators of human responses to changing environmental conditions.

Where the Wild Things Are? Deer in the British and Irish Isles

Jacqui Mulville
Cardiff University

This paper reviews the evidence for the timing and methods of deer management on the off-shore British islands and Ireland, and further examines how insular environments impacted upon, or were affected by, deer populations. The resulting deer diminution and its causes are discussed (island dwarfism versus poor nutrition) and the nature of the human-cervid relationship described. The off-shore islands demonstrate an atypical enduring relationship with deer which does not appear to conform to traditional hunter-prey exploitation models. Using zooarchaeological information and other archaeological data the nature of deer exploitation on islands is explored – in particular the significance of the enduring exploitation of new born red deer calves on Scottish islands. The potential for this evidence to generate new debates on wild animal interactions and management on islands, and in general, is discussed.

The Microenvironment of Bronze Age Aegean: Minoan Commerce and the Spread of Micromammals through the Lenses of Geometric Morphometric Analysis

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Human intervention on insular faunal landscapes is usually understood as the direct extinction of endemic species by overexploitation or indirectly by land clearance and introduction of allochthonous species, either domestic or commensals. The introduction of commensal rodents, the commonest one being the house mouse, (Mus musculus sp.), are now regarded as one of the main causes for the erosion of the insular biodiversity, threatening the diversity of its faunal landscape. The proposed paper will present data on commensal rodents from the Bronze Age Aegean, namely from the islands of Thera and Crete, and will try to investigate how the marine states of the Minoan period helped in the spread of the house mouse on the Aegean islands. Additionally, possible origins of those Bronze Age house mice will be tracked through the results of geometric morphometric analysis on rodent lower molars. This analysis included comparison
between first lower molars of both Pleistocene endemic and recent wild and domestic mice of the genus Mus from the broader Aegean region and the fossil Mus first lower molars from the Minoan sites. The results showed possible survivors of Pleistocene Mus minotaurus in Bronze Age Crete as well as a possible convergence in the insular syndrome between Thera and Cyprus. Finally, the role man played in the change of the microenvironment within and around settlements by the introduction of commensals will be discussed by comparing the endemic or local species that were eliminated or vanished by the arrival of the house mouse.

Changing Climate, Changing Landscapes, Changing Mobility: Human Response to Fluctuating Resource Availability at the Pleistocene-Holocene Transition in the Northern Adriatic
Suzanne Pilaar Birch
University of Cambridge

Climate and sea level directly affect the seasonal density and distribution of animal species by constraining habitat size and access to primary producers (plants) on the landscape. This has implications for human decisions regarding what to eat, where to live, how long to stay there, and when to move. Three upland cave sites located on the Istrian Peninsula and in the Kvarner Gulf of modern day Croatia (Vela Špilja Lošinj, Pupičina, and Nugljanska) are presented as case studies. As a result of global climate fluctuations and sea level rise, drastic changes in the regional landscape and environment occurred during the period spanning the gradual transition from post-glacial foraging lifestyles at the end of the Pleistocene to the introduction of pastoralism in the early Neolithic (c.12,000-7,000 years BP). What effect did these changes have on human diet, mobility, and overall landscape use? The tangible loss of landscape and terrestrial resources that accompanied sea level rise could have resulted in dietary specialization, which required increased residential mobility as human groups followed herds of large ungulate species moving inland. Conversely, would dietary diversification, which may have occurred as people included both terrestrial and newly accessible marine species in their diet, result in decreased mobility? Are these two scenarios mutually exclusive, and how do they change through time and with climatic variability? Faunal analysis is used to establish the changing role of prey species in the diet over time. Stable isotope analysis of ungulate teeth is then used to identify migration patterns and determine what parts of the year economically important terrestrial species were locally available, or whether they were migrating at all. In addition, stable isotope analysis of archaeological shell is used to discuss season and duration of site occupation. The combination of multiple techniques and a broad time span give the study scope to address the effects of mobility and seasonal availability of animal populations on human mobility and diet within a specific landscape in response to known environment-altering climatic events.

Continuity, Adaption and Innovation – Livestock Economy of the Roman Mediterranean Provinces (poster)
Anja Prust
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Agriculture and trade decisively characterized the ancient Roman economy. The rising expansion of the Empire facilitated the exploitation of new regions and estates; thus the entire Mediterranean region was settled and cultivated since the 3rd century BC. During the Roman occupation, the superior Roman methods in agriculture and stock breeding spread over the whole Empire. Goods from the homeland and from new established Provinces were traded intensively. As a consequence, the increasing exchange network influenced local and supra-regional economic systems. Information concerning the effect of Romanization on livestock economy is rare. By documentation and investigation of zooarchaeological finds, the significance and spreading of productive livestock regarding economic, environmental and socio-cultural conditions can be reconstructed.

This project focuses on a supra-regional comparison of faunal assemblages from different Roman Mediterranean sites over a period from the 3rd century BC to the beginning of the 5th century AD. One of the main goals of comparing the data is to find remarkable similarities and distinctions regarding the distribution of species, the exploitation methods as well as temporal and spatial continuity and discontinuity. These aspects might enable comments on local and regional patterns of livestock economy, the adaption of Roman husbandry methods and the spread of new exploitation strategies.

A Sense of Place: Early Medieval Marine Fishing and Landscapes
Rebecca Reynolds
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The levels of consumption of fish in England and along other areas of the southern North Sea have changed regularly throughout history. Explanations for these fluctuations have tended to focus on economic and environmental reasons, but social and ideological reasons focussing on changing worldviews – perceptions of animals and the landscapes they inhabit – have rarely been touched upon. Similarly the study of seascapes is a well established discipline within anthropology and landscape archaeology;
however few studies have examined the significance of creatures (e.g. fish) that inhabited these spaces and how they affected the perception of place. This paper will attempt to redress this imbalance – zooarchaeological fish data, fishing material culture and concepts and theories of liminal/marginal landscapes that are the sea and estuaries will be used to explore another potential side of the emergence of marine fishing in the early medieval period. Could the lack of fish remains from early Anglo-Saxon sites and then the shift to the appearance of fish remains in the middle Anglo-Saxon period be due to a change in perception of these creatures and their habitats? Could the dangers of the sea and its creatures have added an extra dimension of challenge to fishermen? Did this create an appeal to elites who also began hunting wild land creatures at the same time period?

**Holocene Landscape Creation by Nomadism in Tibet**

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The vegetation of southeast Tibet is dominated over an area of about 400,000 km² by a dense turf built by the Cyperaceae Kobresia pygmaea. With a growing height of only 2-3 cm K. pygmaea is well adopted to the intensive grazing of domesticated yaks. The yak herds are the livelihood of the Tibetan nomads. In many parts the dense Kobresia turf inhibits the successful establishment of tree seedlings. The Kobresia turfs are mostly understood as the natural vegetation, but our palynological and geomorphological data lead to an alternative assumption (Schlütz und Lehmkühl 2009). To reconstruct the landscape history peat profiles were acquired inside the pastures to get sufficient amounts of pollen grains from insect pollinated grazing weeds. At the recent western limit of trees in the Nianbaoze Mountains (4200 m asl.) the Holocene started with an open landscape dominated by pioneer shrubs along braided rivers followed by the spreading of conifers (Picea, Juniperus, Abies) and a successive closing of the vegetation cover by Poaceae and Cyperaceae before 8300 years ago. First signs of nomadic presence appear as early as 7200 cal yr B.P. During a cooling phase starting 5900 years ago the natural vegetation was transformed by nomadic grazing to Kobresia pygmaea pastures rich in Bistorta macrophylla. Synchronous changes in grazing pressure in different regions point to the establishment of the recent nomadic migration routes at least already 2200 years ago. Fluvial sedimentation documents an increase of erosion and slope wash starting at around 4,000 cal yr B.P. probably by stronger grazing influence. Periglacial mass movements indicate cooling periods starting at around 2,000 cal yr B.P. and demonstrate increased surface activity especially during the Little Ice Age. Near the later capital of Lhasa at Damxung (4250 m asl.) a first phase of strong grazing appeared already 8500 years ago, while the final formation of Kobresia pastures falls in the same time as in the Nianbaoze Mountains (Schlütz et al. 2007). The anthropozoogenetic influence increased with the first Tibetan kingdom (Yarlung Dynasty) some 1500 years ago, the pastures became rich in Asteraceae. While over thousands of years the nomads inhibited the spreading of forests by promoting dense Kobresia turfs, the stronger grazing destroyed the turfs locally and opened the way to the spreading of juniper trees. From our evidences the Kobresia turfs are not natural mats but are in wide areas man made pastures. Against the background of a very long grazing history, modern Tibet must be seen as a cultural landscape with possible transregional consequences. The transformation of a natural vegetation rich in Poaceae potentially much richer in forests into Kobresia pastures must have modified to a certain degree the role of the Tibetan Plateau as a “hot plate” in the monsoon system. From this point of view our data point to a nomadic (!) Anthropocene starting at least about 6000 years before the modern industrial Anthropocene.


**Limits and Possibilities of the Actualistic Principle in Palaeoecology**

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It is widely accepted that wild horses are characteristic for open, even steppic landscapes. In this way they are used as indicator species for such environments by palaeoecologists and archaeozoologists. On the other hand remains of the wild horse Equus ferus are quite regular in European Holocene faunal assemblages. Are these records actually suitable palaeoecological indicators for the opening of the Holocene primeval woodlands? Or must it be assumed that the mid-Holocene horses had adapted to the canopy forests reconstructed by the palynologists? Limits and possibilities of the actualistic principle in palaeoecological studies will be discussed and illustrated using the example of the distribution history of wild horses and of several other species.
Fantasy Zoology or Zoology’s Wonder? Remnants of Animals, Which Are not There, There Were, but They Should not Have Been There (poster)

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Among the thousands and thousands of bones recovered in archaeological excavations, sometimes being lucky the archaeozoologist might find a “pearl”. In the present study, the precious things are the animal finds considered for various reasons exotic. Here three seemingly alien animals are presented: a beaver (*Castor fiber LINNÆUS 1758*), a cheetah (*Acinonyx jubatus Shreber 1775*) and an Asiatic elephant (*Elephas maximus LINNÆUS 1758*) whose remains, found in Upper Meso- potamia between today’s eastern Turkey and northern Syria, raise different questions on their rather surprising presence in these regions. The beaver lived 5000-4000 years ago on the Anatolian highlands, Upper Euphrates and its tributaries as suggested by the findings at the prehistoric sites of Zeytini Bahce and Değirmenettepe. But does its presence at Tell Beydar, among the offerings in a pre-Akkadian tomb reveal that the beaver was autochthonous also in the Khabur Basin or does it show links or even exchanges between different regions? The find of a cheetah jaw fragment in the EBA levels at Arslantepe could represent an interesting zoogeographical discovery, although largely present in adjacent areas (i.e. Persia and India, Arabia and Africa) no other appearance in Anatolia has been recorded so far. Its presence hints to a possible hunting trophy. But even though this is not the case, it implies an interesting issue concerning the use — a formidable weapon for an elite hunting — of this animal and its origin. The last finding refers to the remains of an Indian elephant jaw recovered at Değirmenettepe. If doubts about the provenance of the first two animals might persist, the elephant is certainly allochthonous in the Malatya Region and suggests possible socio-political or economic relations behind its move and maintenance requirements.

Mobile Farmers: Long Term Human Ecodynamics and Changing Faunal Landscapes in Medieval Norse Greenland

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The first agriculturalists that settled in Greenland were the Scandinavian Norse. They were a highly mobile society, particularly successful due to their seafaring capabilities. Greenland has been settled from Iceland, as part of the long Scandinavian expansion into the North Atlantic, and finally North America. The Norse continued their agricultural way of life centered on animal husbandry in the new environments, previously untouched by animal domestication. The set of domestic animals brought from Europe, fit to survive in this sub-arctic environments, have contributed to a creation of unique landscapes that are currently being studied by a multidisciplinary team. In Greenland, the Norse settled in environmental zones that were able to support limited agriculture based on animal husbandry of grazing animals (sheep, goats and cattle). This had a large impact on the local environment and landscapes, however as Greenland was much different than Iceland (or other homelands) the environment had an equally large impact on the Norse Society. The Greenlanders successfully exploited new, previously not encountered, and largely mobile natural animal resources for ca. 500 years. The survival of the colony depended on the export of walrus ivory, which had to be obtained in a communally organized hunt ca. 600 km north of the settlements. Reindeer stocks were available locally, however their numbers varied with locality and time periods. The Greenlanders organized a communal, large scale hunt of migratory harp and hooded seals in the spring. These animals, migrating in large numbers (whole Western N. Atlantic stock) to Northwest Greenland for winter feeding reached the Norse settlements in the outer fjord regions, which were quite a distance away from the majority of the Norse inland farms. The timing of the migration was dependent on the sea ice conditions, which in turn was dependent on the climatic conditions that changed ca. 1250 AD. The management of the wild resource use was equally important to the survival of the Norse as farming (that was also the cultural identity of this society). All these factors had to be taken into account when scheduling these activities, as it had to fit within the labor cycle of the farming society. The Norse also made use of locally breeding harbor seal stocks, and the archaeological evidence indicates a long period of human management of this wild resource. The manipulation of it depended on the seal biology (easily affected by climatic variations) which is visible in the zooarchaeological record from Medieval Norse Greenland. The human Ecodynamics in medieval Greenland were highly dependent on the interaction with the animal world, and of primary importance in contribution to the creation of the landscapes in this marginal environment. The data in this paper is derived primarily from archaeology, zooarchaeology and isotopic studies, supplemented by spatial analysis.

Last Hunter-Gatherers and Early Herders of Europe: When Mobility, Seasonality Patterns and Land Uses Break the Rules

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In collective representations of prehistoric societies, hunter-gatherers are often viewed as intrinsically mobile
communities, travelling over large territories according to the local availability of seasonal resources. Conversely, early farmers are perceived as necessarily sedentary and attached to small, delimited territories intensively exploited. Several examples, drawn from European late Mesolithic and Neolithic demonstrate that this paradigm is inapplicable to this part of prehistory. Research on the management of edible resources in late hunter-gatherers from coastal areas of western and northern Europe have revealed that these communities had probably a very restricted mobility and exploited a very broad range of resources in relatively small territories. Quite the opposite, Neolithic farmers had in a number of cases an important mobility, at different scales. The colonisation which underlies the Neolithisation process itself in an important part of Europe can be seen as a form of unidirectional, long term and non seasonal mobility, involving humans, together with plants and animals. This large scale mobility can be traced by way of tools such as molecular phylogeography; the resolution power of which has been enhanced in recent years by aDNA analyses. There are other examples of Neolithic mobility, at smaller scales, outside or beside the Neolithisation process, sometimes connected to domestic herd seasonal movements. These can be reconstructed by way of isotopic analyses, allowing tracing of human and animal movements within the landscape via the evolution of isotopic signatures in hard tissues such as tooth-enamel. Mesolithic and Neolithic communities not only differ in their mobility patterns but also in the way they use the land: in coastal areas for example, there is a strong contrast between the Mesolithic exploitation of a multiplicity of natural environments for edible resource collection and the selective Neolithic use of some of these same environments for husbandry purposes: marshes, meadows and woods can be used for fodder production, as well as the intertidal zone (seaweed can be used to supplement animals at winter time), small islands as animal enclosures... Through a review of the late prehistoric in Europe and basing on zooarchaeological examples this paper will intend to document the major shift in land perception and use provoked by the Neolithisation process.

Adaptations to the Eurasian Landscapes: An Ancient DNA Approach to the Domestication of the Two-Humped Camel

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During the Bronze Age, Central Asia was characterized by a number of historic-cultural innovations. The domestication of the two-humped camel particularly has forwarded remarkable progress in cultural and economic development for ancient human civilizations in the steppes of Eur-
SESSION 9
QUANTIFICATION AND MODELLING IN GEO- AND ECONOMIC ARCHAEOLOGY

A Multicriteria and Multiobjectives GIS Model to Locate Archaeological Sites in the Landscape: The Case Study of Eastern Lessinia

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This paper proposes a predictive theoretical model to simulate an ancient landscape in the eastern Lessinia (Verona, in north-eastern Italy) during the Bronze and the Iron Age. The aim of this study is to calculate and visualize, using GIS tools, the optimal locations for settlements considering some environmental factors that could have affected human decisions. The project starts with the study of the archaeological landscape and the analysis of environmental features of archaeological sites and allocation settlements strategies. The possible landscape is composed by several parameters and this research considers some of these environmental variables in connection with the archaeological sites: longitude, latitude, altitude, slope, solar radiation, land use, intervisibility, distance from the water, euclidean distance from the nearest neighbour archaeological site, cost distance from the nearest neighbour archaeological site (based on the optimal pathway to move from an archaeological site to another) and the morphology of the location. The statistical analysis is done for each variable on each chronological phase: these statistics are used to weight the environmental variables with the Pairwise Comparison. Exploiting the spatial distributions of existing sites, in relation to the environmental variables, it is possible to construct GIS plausibility maps with Multi Criteria Evaluation (MCE) in IDRISI GIS™. These suitability maps are used to predict the presence of unknown archaeological sites and they could be a powerful tool for Cultural Heritage Management. The problem of this predictive model is that the weight of the environmental variables is based on the statistical analysis but also on the personal expertise of the operator and so, for the choice of a location, they are more or less important in a subjective way. In this case the topographic factors such as slope, altitude and morphology are considered more important and in second position the resources such as water and land use. To confer objectivity to the method, the results of the prediction are tested by two means: 1- for the statistical analysis and to construct the model only the category of archaeological sites called “settlements” was used because the informations about these were more precise, but there is another category of archaeological sites called “sporadic materials” that could be probable settlements of Bronze and Iron Age. The positions of these “sporadic materials” are intersected with the plausibility maps: the majority of them falls in a high value of probability. 2- a second operator considers some of these environmental variables and weights them personally. To obtain the plausibility maps he used the same technique (Multi Criteria Evaluation, MCE) but a different way to deal with and to weight the variables (Fuzzy analysis). The results are absolutely comparable. This GIS methodology is useful for an archaeological survey because it gives a preliminary presence probability of ancient settlements in a landscape and it permits one to orient the research to those locations with high plausibility.

Combined Geophysical Prospection of Neolithic Large-Scale Buildings

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In the frame of the DFG priority program “Early Monumentality and Social Differentiation – On the origin and development of Neolithic large-scale buildings and the emergence of early complex societies in Northern Central Europe” and with participation of the working group around Prof. Johannes Müller geophysical measurements were conducted on Stone Age sites in Schleswig-Holstein and in the Altmark. The use of different geophysical methods aims at investigating the composition of these sites and thus giving information for the planning of extensive archaeological excavations. A challenge for geophysics on burial sites is the steep dipping topography on small scales and the rough surface with peaking stones. Inhomogeneous stone settings complicate the guidance of the antennas and sensors. This affects the special density and quality of the acquired data. Strong contrasts in electrical properties between stones and soil produce strong anomalies, but are complex for modelling. The sites with enclosures have a flat surface, but the contrast between weathered wooden constructions and surrounding soil is weak. For measurements ground penetrating radar (GPR) and geoelectrics were used. With a 400 MHz GPR antenna profiles with distances of 10 cm were measured. The geoelectrical measurements used a dense electrode spacing of 50 cm and a combination of dipole-dipole, Wenner and Schlumberger configurations. The results of these high resolution measurements reveal stone settings, ditches and pits of Neolithic monuments that can be observed to a greater depth. They can also give information about geomorphology and botany. The filling material and the moisture in the ditches and pits absorb the electromagnetic waves. This results in energy gaps that are visible in radargrams and timeslices. In geoelectrics they are indicated as zones of lower elec-
trical resistivity. Stone settings have high electrical resistivity and reflect the energy of electromagnetic waves. The combination of geophysical methods, archaeological excavations and mathematical modelling allows us to apply our experience, which is gained on small-scale sites, on larger areas.

From the Socio-Metabolic Toolbox: A Simple Model to Cross Check Data and Assumptions on Historical Communities’ Nature Relations

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I will present a very simple model developed in collaboration with F. Krausmann and B. Smetschka to simulate – or, more humbly, to check the plausibility – of a number of assumptions (or selective data) on certain historical situations: quantitative relations of urban centres and their hinterland, required and available labour time for major construction work in a certain period, size of required land by land cover for certain populations, probable amounts of food import, and the like.

The socio-metabolic paradigm relies on a correspondence to the systemic notion of organism in biology: As an organism functions so as to reproduce its cells and itself as a whole, a society ultimately has to reproduce the metabolism of its human population. There needs to be a sustained supply of nutrition, fuels and freshwater, and there need to be waste and sewage systems that take care of the discharges. The more complex a society becomes, the more it needs to organize energetic and material flows not just for sustaining its population biologically, but to sustain a number of intermediate biophysical structures that have a role in social reproduction: animal livestock, built infrastructure, consumer durables... Material flow analysis was developed as a methodology to quantitatively describe the metabolism of modern economies. By now, this methodology is sufficiently elaborated to use the standard indicators both for contemporary societies and for historical cases to describe the physical scale of a society’s (or community’s) material metabolism depending upon typical socio-metabolic profiles in terms of per capita energy and materials use.

Next the relation between metabolic input and territory has to be considered. Assumptions about the density of critical resources (such as food for humans) allows for an estimation the territory a population of a particular size must be able to utilize. By the same token, we may know the size of a territory, and estimate the size of the population. Finally, population density may be given for a certain area – then we could use our toolbox of metabolic profiles to estimate the resource density this implies. Which way ever we turn it, we learn something about the distances that need to be covered to link resources and people.

In a further step, we deal with transport as a crucial constraint. This rests upon the obvious assumption that the material quantities must somehow get from their original location in nature to the human settlements where they are further processed and consumed. So from the information contained in the metabolic profiles we know the amount and composition of materials mobilized from the environment and transported to human settlements, and we have some clues as to the distances that have to be covered. This takes us several steps towards being able to estimate the core transport indicators Freight Lifted (FL) and Freight Moved (FM). What we need in addition is assumptions about the transport behaviour of specific material flows. And finally, we need to make assumptions about transport technology to know how much can be transported at a time, over what distance, at what speed and at which energetic and labour time cost. Building upon these endogenous interlinkages, one can use varying exogenous parameters (such as yields, working time, technologies, diets) to check on the plausibility of assumptions, generate missing data and explore possible constraints.

A Quantitative Approach to the Environmental History of the Gulf of Patras Region (W-Greece) – (poster)

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To decipher the environmental history of the Gulf of Patras region, the Prokopos Lagoon (38°09N/21°23.5E) at the footslopes of the Black Mountains and the Etoliko Lagoon (38°29’N/21°19’E) on the North shore of the Gulf serve as excellent geocharchives. This makes the area, in combination with the geographic features of the surrounding landscape and the available historical record, very valuable for an interdisciplinary study approach. Situated in a transitional zone between land and sea, the sedimentary record of near coastal lagoons is a valuable tool for the reconstruction of past climatic and environmental changes in coastal areas. Shaped by a function of marine and climatic factors, sedimentary processes in the hinterland, topography, geology and human influence, coasts are rapidly changing regions and can migrate laterally and vertically in short periods. These changes caused by natural climatic or human impacts are recorded in lacustrine or lagoonal ecosystems as they respond immediately to environmental changes and preserve the disturbance in their sedimentary record. In March 2010, 3 sediment cores (PRO3, PRO4, PRO5) up to 4 meters length were retrieved in a transect across the Prokopos Lagoon. A first characterisation of the sediments shows...
a predominance of dark, shell- and organic-rich sand which is overlain by a homogeneous, dark grey, clay gyttja. Besides changes in colour, grain size, and content of macroremains, alternating layers of fine and medium sand were identified pointing to rhythmic change in sedimentation patterns. The presence of incorporated peat lenses indicates lake level changes and hence changes in the spatial extension of the Prokopos Lagoon. To validate the established stratigraphy, the sediments are analyzed following a multi proxy approach combining geochemical and geophysical analyzing techniques. Major elements were determined at 1 cm resolution using an Avartech X-ray fluorescence scanner. It is planned to calibrate these primarily only qualitative measurements with the help of quantitative (conventional) XRF analyses on single samples taken at several depths from the cores. Magnetic susceptibility measurements which were conducted with a Bartington MS2E-Sensor on all cores from Prokopos and Etoliko, allow the identification of alternating sedimentation patterns due to their magnetic properties. So far, only one core of the transect, PROS, has been examined in more detail. Further interpretation of the geochemical stratigraphy of all the cores is currently in progress. A preliminary evaluation of the geochemical stratigraphy of core PRO5 shows correlation with the lithology: Parallel to the onset of the gyttja a nutrient-rich organic mud, commonly deposited in lakes and ponds, an increase in the counts of Cl and Br is detected. These geochemical salinity indicators point to saltwater intrusions and the establishment of fully lagoonal conditions. This transition from sand to gyttja appears in core PROS in a depth of 1 meter and was $^{14}$C dated to 4328-4233 cal BC (PRO4/056-KIA42939) giving a first chronological hint of the onset of the lagoonal conditions. However, in core PRO4 the beginning of the gyttja sedimentation was found at a depth of 56 cm and is $^{14}$C dated to an age of 1612-1726 cal BC. For resolving the chronology of the development of the lagoon, further $^{14}$C samples are currently in preparation.

**Holocene Environmental and Cultural Dynamics in the Karst Polje of Stymphalia – Preliminary Results**

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Known from the ancient Heracles myth of the Zeus’ son slaying the Stymphalian birds, the mountainous region of Stymphalia (22°27’E/37°51’N) is an ideal site to study the environmental history of the area by combining the climate archive of lake sediments with the historical and archaeological record of the nearby ancient settlement of Stymphalos. Above all, we aim to distinguish the natural versus human-induced environmental change and compare the results to other regions in the Northern Peloponnese. At Lake Stymphalia a 15.52 m long sediment core (STY-1) was retrieved during a first field campaign in March 2010 using a piston coring device on a floating platform. Lithological characterization showed that the sediments consist of either clay and/or carbonate mud with silt, sand, and gravel-sized intercalations. 70 sedimentary units were distinguished based on logged parameters such as grain size, sediment structures, components, Munsell sediment color, unit boundaries, and post-depositional features. The upper part of the core (sections 1-9, 0-8.68 m) is characterized by mostly light gray to gray clays/carbonate mud similar to the clay/ carbonate mud units in the lower part of the core and therefore interpreted as open water facies. Fine- to coarse sand units represent debris flows from the adjacent slopes and/or input from torrential rivers. Reddish gray, grayish brown and brown clay units with gastropod shell fragments (possibly land snails) concentrated in the upper 4 sections of the core might reflect intense erosion of red soils (terra calcis, terra rossa) in the catchment area. Post-depositional features include Fe-oxidation of units indicated by a rusty sediment color. Organic content is low throughout the core. Therefore, radiocarbon dates on bulk sediment samples were determined. Sample KIA-42324 from the lower part of the core (15.02 m) was dated to 42140 +1380/-1180 years BP resulting in a Pleistocene respectively Palaeolithic age. Sample KIA-42912 from a black debris layer from the upper part of the core (1.495 m) was dated to an age of 1608-1570 cal BC. This fine (clay sized) black debris layer might be of volcanic origin as it is indicated from magnetic susceptibility by high magnetic mineral content. Further environmental analyses include geochemical (i.a., X-ray fluorescence, loss-on-ignition, CNS). A high resolution AMS $^{14}$C age model establishes a detailed time series of the climate variables. The climatic and environmental variability of the ancient Arcadian region, as it is documented in the lacustrine sediment core STY-1, is connected with human- and regional development in the karst polje of Stymphalia. Surveys from 1982-1984 and excavations from 1994-2008 by H. Williams and colleagues (University of British Columbia, Canada) argue that Stymphalos most likely was (re-)founded in the 4th century B.C. Historical sources such as Pausanias in his “Description of Greece” (ca. 160-175 AD) specify settlement activity in ancient times at Stymphalos. Hence, the spatiotemporal patterns of land use and water management and the effect of climate on the environmental development of the region are reconstructed. Focusing on the balance between sustainability and exploitation, important questions of this project are: How did the different cultures, i.a. Mycenaens, Classic Greeks and Romans, manage the water resources? And how sustainable was the agricultural land use?
Sediment Fluxes and Budgets during Holocene: Quantification and Modelling

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In a number of basinal and upland settings in SW Germany, millennial-scale cultivation activities have been changing the physical environment, which provides opportunities to study intersecting natural and human dimensions of sustained landscape change. Tillage and human-built structural elements control subtle but steady fluxes of particulate matter (sediment). As a result, the soilscape stratigraphy and pattern as well as the meso-scale surface topography have been changed through localized erosion and colluviation of hillsides and alluvial aggradation on valley floors implying an irreversible transformation of basic properties of the soil resource, landscape topography, and landscape ecology.

A variety of studies from central Europe and the U.S. have been using the sediment-budget approach to detail and quantify human impact on soil- and riverscapes and for a range of historic to present-day timescales. The sediment budget approach provides a formal framework that allows to highlight functional properties of and interdependencies between system elements in coupled human- natural systems based on the quantification of sediment fluxes. For example, hillslopes, hillside hollows and valley floors can be defined as basic system components, which are interconnected by unidirectional sediment fluxes in the down-cascade direction. Quantities of sediment flux are calculated by coupling estimates of input, storage, and output terms of related system components. A case study from the 10-sqkm Rockenberg catchment in a central German basinal setting serves to illustrate the quantities, the spatial pattern, and temporal discontinuities of the fluxes of particulate matter for a 5000-year period since the late Neolithic Era. Here, the quantification of sediment production (input term) and storage (storage term), and delivery (output term) each system component relies on field-based point data. The amount of anthropogenic sediment production and sedimentation at a point is determined by comparing the stratigraphy of the present-day soilscape against an initial condition prior to human disturbance. Data processing in a GIS yields a spatially distributed sediment budget and specifies quantities and rates of sediment fluxes as caused by human activities.

The results highlight the functioning of different landscape units by highlighting whether these act predominantly as producers, storages or conveyors within the defined system framework. The results also point toward the overall significance of human control by governing the spatial and temporal properties of sediment flux. For example, the observed near-random pattern of soilscape truncation and burial refers to a spatial scale-linkage of hillslope-scale natural controls and subscaled, temporally variable anthropogenic controls of sediment redistribution. The latter refer to the contemporary field systems, which—thus—highlights the significance of social, technological, and legal controls for physical processes of sediment transfer and topographic change in landscapes used by humans. Rates of on-place sediment turnover were found to be 5 times higher than the rates of effective sediment export resulting in a long-term positive sediment budget. In other words, for the period of the last 5000-years human-induced soil redistribution also generated a ubiquitous cover of fertile soil sediment that—eventually—can be interpreted as more beneficial to agricultural biomass production than the pristine soil stratographies. Similarly, the results also showed that long-term anthropogenic effective erosion is about 6 to 7 times higher than natural erosion, but still 4 to 40 times less than rates of soil loss that are commonly reported as harmful. At the temporal scale, based on physical age dating there are indications that the Medieval socio-agricultural transformation and associated large-scale landscape management had the greatest impact on rates of sediment transfer from hillslopes to contiguous valley floors by converting the internal system connectivity. As a side effect, a new hydro-ecological quality of valley floors established, which—in turn—allowed for the intensification of valley-floor land use. The basic message here is that a causative understanding of physical sediment redistribution in coupled human-natural systems at a time requires firm information about the contemporaneous historical, technological and social condition.

To evaluate the long-term agency of tillage activities at much larger spatial scales of 102 to 103 sqkm, the concept of using a pristine soilscape model as a reference can be employed to derive sediment budgets based on data modeling of available digital soil data scaled 1:50000. When referenced to a systems-based watershed concept, however, a pilot study revealed basic inconsistencies of the primary soil data. Meaningful sediment budgets for anthropogenic soilscape change only could be approximated when re-interpreting the given data by rigidly applying expert knowledge of the field situation. While the derived estimates on anthropogenic sediment flux in basinal settings fit to our empirical data, there is a general failure for deriving consistent sediment budgets for upland subwatersheds. To construct a sediment budget of anthropogenic sediment flux for upland settings, an alternative data modeling approach uses a blend of automatic topographic landform classifications, land-use data, and near-subsurface stratigraphies that can be related to catenary sequences of soil stratigraphies as derived from field evidence. This approach yields consistent sediment budgets; the derived estimates of anthropogenic sediment flux lie in the expected range of values.

To conclude, a blend of classic stratigraphic methods and GIS-based data evaluation techniques serves to deliver spatially distributed sediment budgets, estimates of flux between budget elements, and information on temporal changes in rates of production, storage, and de-
livery. The results shed light on the long-term functioning of anthropogenic sediment fluxes in and its effects on coupled human-natural systems. For the presented examples from SW Germany, this includes insights into the relative importance of socio-agricultural versus topographic controls in different basinal to more sloping upland environmental settings. On the whole, the majority of sediment-budget studies on human impact on agricultural landscapes from central Europe and the U.S. stresses the importance of social-agricultural controls and for the observed human-induced landscape change. The increasing availability of quantitative field data opens new perspectives on further developing methods of short-term process modeling of soil erosion toward analyzing long-term spatial effects of soilscape evolution and hillslope topographies that consider artificial structural controls on watershed connectivity and the differential functioning of hillslope and valley-floor landscape elements.

Quantitative Reconstruction of Palaeoenvironment during Late Holocene Based on Colluvial Layers Sequences

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The landscapes of Northern Germany have been subject to various anthropogenic factors that significantly influenced their development. For this reason former anthropogenic influence should never be ignored when analyzing the present situation and making prognosis for the future. Climate has been recognized as one of the main important factors affecting palaeohuman behavior and cultural landscape development. There have been plenty of attempts to reconstruct palaeoenvironmental situations by methods of different sciences, from history and archaeology to geology and soil science. The properties of soil profile and colluvial deposits serve as a powerful tool for geoarchaeological reconstruction of palaeoenvironmental conditions. The sequence of colluvial layers, their morphological properties, presence of structural disturbances in the profile carry important information on palaeoclimatic conditions and give a better understanding of ancient societies. This has been analyzed for the area in the vicinity of Albersdorf (Schleswig-Holstein, Northern Germany) using a four-dimensional approach of landscape analysis. The area has been abandoned from a agricultural land use some 10 years ago. The research has been carried out under supervision of Professor H.-R. Bork at CAU Kiel. Nowadays, magnetic susceptibility is being used as an indirect indicator of environmental development in the past and at present. The field data allowed us to establish the connection between the values of magnetic susceptibility and the size of the catchment area. Also, the possibility of magnetic susceptibility application has been analyzed for podzolic horizon identification, its fragments were morphologically determined in windfalls. These traces of podzolic horizon were compared with the material from a reference site Dieksknoell, where for the first time a thick podzolic horizon was found. Quantitative characteristics of the podzolic material have confirmed morphological observations. This helped making hypothesis on former land cover of the region. The study of statistical properties of distribution of colluvial layers has shown low spatial distribution of accumulation process, which is still at its initial stage due to comparatively smooth relief and relatively small catchment area. Calculation of the mean of soil erosion rate is 6.55 t ha-1 a-1, which is a typical representation of the study area. It was revealed on the basis of quantitative analyses of the properties of colluvium and soil horizons that few horizons are missing in the soil profile in comparison with a reference site. This fact can be related to human activity (clear-cutting and/or agricultural land use) as well as by natural factors (e.g. erosion during Little Ice Age).

Geophysical Investigations in Elaia – Harbour City of Ancient Pergamon

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For four years geophysical fieldwork has been accomplished in Elaia, the harbour city of Pergamon in the western part of Turkey. The project is supervised by F. Pirson of the German Archaeological Institute (DAI) in Istanbul. The intention of this multi-discipline project is to prove the position of Elaia as the main harbour of Pergamon in the Hellenistic Age. Within these last years several geophysical methods were used to explore as much of the antique city as possible. With geomagnetic measurements 75 hectares were investigated and various structures have been located. In addition georadar and geoelectric measurements were carried out at places with special geomagnetic patterns, to get more details about the structures, e.g. at parts of the city wall, at some bigger buildings and magnetic anomalies in the inner part of the city. Especially information about depth is most important for further interpretation of the data. In Elaia substantial moles, wharfs and buildings have been discovered on the modern coastline with the geophysical measurements. Due to sea level changes and aggradations in the last millenniums some parts of the antique Elaia are nowadays located in the Mediterranean Sea or covered by alluvium. For following the structures of the harbour facilities from the land into the wetland and the sea special adjustments had to be made for the different geophysical methods. The main aim here is to verify the extent of the harbour structures (geomagnetic) and to collect more detailed information about the depth of the
River-Lake Interactions in the Middle Orkhon Valley (Mongolia): Sedimentary Analysis and Implications for Local Landscape Evolution

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Ugii Nuur is a mid-sized lake (approx. 30km²) located in central Mongolia (47°44'N and 102°46'E), which is temporarily fed by the Chögshin Orkhon Gol ("old Orkhon"). Drainage patterns on the deltaic interface between river and lake indicate a strongly varying hydrological influence and thus water balance of the lake. This varying hydrological influence is generated by meandering and braiding of the old Orkhon and the adjacent Orkhon River. In addition to the fluvio-geomorphic controls on the water balance of Ugii Nuur, changes in climate and river discharge contribute to lake level variability. Ugii Nuur provides an important sedimentary archive of historic and prehistoric landscape evolution in the middle Orkhon Valley. We hypothesize, however, that inferring climatic signals from this record is affected by uncertainties owing to the complex fluvial dynamics of the old Orkhon and Orkhon. Hence, a major aim of this study is to assess the river-lake interactions in the middle Orkhon Valley and to evaluate their significance for palaeoenvironmental reconstructions. This part of the Orkhon Valley is a key area to investigate questions of human-landscape interactions and to address geoarchaeological research as the historic urban centers Khar-Balgas and Kharakhorum existed nearby from 744-840 and 1220 – 1260 (Shiraishi, N. (2004)). Several drilling cores, taken in 2009, provide an insight in the historic development of latest Holocene lake level evolution. The cores originate from a transect in the delta perpendicular to the lake shore providing information about historic lake level changes. The outlet region of the lake is investigated by another drilling core. Applied methods include the description of the cores, grain size analysis, carbon determination, and ICP-OES measurements to quantify elemental concentrations. A chronology of the sedimentary history is provided by 30 AMS-C¹⁴ datings covering the last 6000 years. A multivariate statistical approach is applied to distinguish lacustrine and fluvial sediment compositions. This allows us to reconstruct historic lake levels and to differentiate lacustrine and fluvial phases. Finally we discuss our results with regard to a lake sediment core of Ugii Nuur that provides a continuous record of palaeoenvironmental conditions of the entire Holocene (Schwanghart et al., 2009). In the end we gain a better understanding of (late) Holocene landscape evolution in combination with an increased knowledge of the role of mankind. References: Schwanghart, W., Frechen, M., Kuhn, N. J., Schütt, B. (2009): Holocene environmental changes in the Ugii Nuur basin, Mongolia. Palaeogeography, Palaeoclimatology, Palaeoecology, 279, 160-171. Shiraishi, N. (2004): Seasonal migrations of the Mongol emperors and the peri-urban area of Kharakhorum. The International Journal of Asian Studies, 1, 105–119.

Central Places of the Historic and Prehistoric World – An Attempt to a Holistic Explanation of the Formation of Prominent Places

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An interdisciplinary research approach of the Excellence Cluster TOPOI investigates prominent prehistoric and historic locations with regard to their significance for the respective hinterland. The investigation is based on an expanded “Central Place” concept, which was originally introduced by Christaller (1933). This definition of the geographer Walter Christaller focuses on the homo oeconomicus and the tertiary sector of an economically oriented and hierarchically organized system of settlements. In the given archaeological context Central Places are understood as locations that offer central functions to their hinterland – such as reign, trade, security, craft and ritual. Given the lack of approaches to describe hierarchies or settlement systems in a regional and comparative perspective, it is the aim of the project to explore the meaning of Central Places and their hinterland to gain insights into the structure of those systems in prehistoric and historic societies. The natural factors characterizing the location of Central Places are investigated. Spatial analysis based on the topography and topological features are applied to selected Central Places, their hinterlands and the surrounding regions. The selected sites are located in the Mediterranean region: the imperial resi-
dence Felix Romuliana (Serbia), Pergamon (Turkey), the Tell of Aleppo (Syria), and the Nabataean capital Petra (Jordan). All sites are well-known as Central Places in different cultures and time periods. In a first step, a spatial modelling is used to determine parameters that characterise the focussed space. Based on this, the differences between centre, periphery as well as region are illustrated and quantified to delineate the influential sphere of the Central Places. In a second stage the characteristics of individual Central Places are compared to gain insights into the different properties and corresponding processes that formed the environs of each site. The final step of the approach is to synthesise the characteristics of the investigated Central Places to identify those parameters that can be applied as natural factors towards a more holistic understanding of Central Places.

Comparative Studies of Soil Magnetic Susceptibility on Archaeological Targets

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Magnetic susceptibility quantifies the degree of magnetisation under application of a magnetic field. In soils the magnetic properties are being changed by many natural processes such as sedimentation, heating and the existence of relevant magnetic bacteria. Additionally anthropogenic activities such as clay burning, smelting or perturbation of soil horizons have a high influence on the magnetic susceptibility. Measuring this quantity can give information about appropriate processes taking place in soils. The popular frequency domain meter EM38 (Geonics Ltd.) is used in archaeology and soil sciences to continuously determine the apparent electrical conductivity and apparent magnetic susceptibility of the topsoil in vertical and horizontal loop configurations. The apparent magnetic susceptibility is related to the inphase component (IP) and the apparent electrical conductivity is related to the quadrature component (QP) of the secondary to primary electromagnetic field of the EM38. The IP values are indirectly depending on the real soil magnetic susceptibility because of theoretical assumptions of the EMI device. Hence, it is not possible to derive the magnetic susceptibility directly from EMI IP measurements. The directly measured magnetic susceptibility was observed with different probes in drill holes and at the laboratory on soil samples taken from different depths along the profiles using the Bartington MS2 susceptibility meter system. The measurements were conducted at two different archaeological sites: on the Dieksknöll excavation site close to Albersdorf and on the remnants of the circular hillfort Margarethenschänze near Neumünster. Mapping and profiling IP data were compared to the values of the magnetic measurements, apparent electrical conductivity as well as the magnetic susceptibility. Hence, the susceptibility data reveal a difference between measurement points at magnetic anomalies and non anomalous contrast points supposed to be undisturbed soil. On the anomalies the magnetic susceptibility rises from the surface down to a depth of about 0.50 m linearly from 20·10^-5 SI at the topsoil to more than 100·10^-5 SI (on gravel layerings even higher than 300·10^-5 SI). The magnetic susceptibility on the contrast points rises from 20·10^-5 SI to a maximum of about 100·10^-5 SI at 0.25 m and declines to a constant value of 50·10^-5 SI beneath 0.50 m depth (redesop horizon). In contrast, there are no constant but more inhomogeneous values at the anomaly points beneath 0.5 m. Additionally charcoal and ash samples with values of about 60·10^-5 SI show no significant difference to normally stratified soil. A comparison of all methods leads to an analysis whether a relation between the different methods is detectable. Based on processed susceptibility data synthetic IP values were calculated and compared to the measured results. Further investigations are focussed on the capability of the magnetic susceptibility and IP data to resolve anthropogenic influenced soil horizons and to characterise archaeological features.

Miletos – Geophysical Investigation of an Ancient Mega Polis

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The ancient city of Miletos (W Turkey) is an excellent example for the strong influence geological conditions may exert on both rise and descent of an urban society. And it is an example for how geophysical investigations on both large and narrow scales can help archaeologists to decipher the past. For geophysicists the particular challenge in prospecting large antique city areas is to cover kilometer-scale investigation areas with measurements of some 10 cm spatial resolution and with a positioning accuracy in the centimeter-range. The site conditions and archaeological questions found at Miletos are typical for many other antique settlement places. On the one hand, there are conditions complicating or even hindering excavations or, more generally, archaeological progress based on classical inspection methods, for instance: • Huge extent of urban areas with unknown city boundaries and outskirts, • badly preserved or sparsely distributed remnants of buildings and constructions covered in the subsurface, • unknown position, extent and depth of archaeological targets, • shallow groundwater table, and, of course, limited budgets. On the other hand, and in spite of these unfavorable conditions, there are a number of important questions which can be solved in a relatively economical way by near-surface geophysical prospecting. In case of the Miletos site we were confronted, for example, with the following tasks which could be solved by a combination of magnetic, georadar,
Analysing Measurements with Spatial Autocorrelation – A Case Study from a Neolithic Flint Mine

Georg Roth
University of Leipzig

The paper addresses a key concept for the investigation of spatial (raw) data, Spatial Autocorrelation (SAC; “Räumliche Erhaltensneigung” in German). Put simply it answers the question, are there any significant relations (similarities or dissimilarities) between measurements that are related to separation distance and angle (Fortin/Dale 2005).

The data originates from mining heap strata at the neolithic chert mine of Abensberg-Arnhofen (Roth 2008). Surface layers of the 43rd century BC were reworked by mining activities thereby mixing knapping debris into the sandy gravels. In an excavation the artefacts per square were counted.

Restudying the artefacts counts concentrated on SAC. Global Moran Test proved the presence of a positive autocorrelation required for interpolations. Further correlogram analysis revealed possible sizes of artefact concentrations. The next step introduced anisotropic methods like bearing correlograms which exposed significant angular correlations hinting at mining directions. In the second level of investigation local indicators for spatial autocorrelation (LISA) were applied. Thus areas of significant measurement similarities vulgo statistically significant artefact concentrations could be identified.

The case study and work in progress proved SAC to be a promising analysis for archaeological spatial data of all kinds from soil chemistry to exchange networks. Most of the analysis was done with the freely available software PASSaGE (Rothenberg/Anderson 2011).

The Interpretation of Dung Layers

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The dwelling mounds found in the northern coastal marsh zone of The Netherlands and Germany are known to contain thick layers of green-brownish organic material. Although there seems to be a broad consensus that these layers are to be identified as dung layers, it is recognized that their composition varies greatly, even within one layer. Moreover, some layers qualified in the field as dung layer may in fact be organic packages of hayed material or a mixture of faeces and other plant material. The archaeobotanical research of these so-called dung layers serves two objectives. Firstly, samples from dung layers can be used to reconstruct (parts of) the ‘natural’ vegetation in the vicinity of the mound under study. Secondly, an evaluation of the composition of the samples can be carried out in order to reconstruct animal husbandry practices, like grazing, hay foddering and stabling practices. A precondition for both types of analysis is an adequate insight into the taphonomical processes that play a role in the composition of the dung layers. With regard to the reconstruction of the vegetation, samples taken from layers of hayed material proved especially valuable in past research (e.g. at Feddersen Wierde), for they are found to be more or less ‘pure samples’ of a single vegetation community. Samples taken from dung layers often turn out to contain a mixture of hay, dung and ruderal vegetation, but ‘true’ dung samples have been successfully identified in the Netherlands also. This paper focuses on the relationship between standing vegetation, animal husbandry practices and the composition of dung samples. A yet to be conducted experiment will be presented, dealing with the foddering of cows with hay cut from carefully mapped relevées on Dutch salt marshes. Reduction of the archive will be explored by analysing the seed contents in several stages of the experiment. Finally, a comparison of the modern samples with the archaeological samples will be carried out.

Integrating Archaeological Theory and Predictive Modelling

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Free University of Amsterdam

Archaeological predictive modelling has been used successfully for over twenty years as a decision-making tool in cultural resources management. Its appreciation in academic circles however has been mixed because of its perceived theoretical poverty. Within archaeology, a sometimes strong aversion is found to using statistical, correlative procedures for predictive modelling, as these methods preclude any understanding of the reasons why the current spatial patterning of archaeological materials came about. They may therefore lead to inaccurate
predictions, and most experts therefore agree that predictive modelling has arrived at a point of necessary reflection and evaluation. So far, it has largely neglected the social and cultural dimensions of past landscapes. Input is commonly derived from correlations between archaeological sites and natural landscape features. The result is a rather static way of modelling, in which the human factor remains unexplored. Furthermore, issues of temporality have been addressed uncritically or insufficiently. To maintain its value for archaeological research, therefore, predictive modelling needs new methodologies, concepts and theories.

In this paper I will discuss the issue of integrating current archaeological theoretical approaches and predictive modelling. I will try to lay out the background to the issue, state the case for integration of archaeological theory and predictive modelling, and suggest a methodology for doing so by focusing on the process of theory-based modelling, rather than on the resulting models and the uses they are put to. I will suggest a practical methodology for doing so based on cognitive archaeology, middle-range theory and palaeo-economic modelling. While the prediction of site distribution patterns can in this way be tackled reasonably successfully using ‘processual’ methods and theories like site catchment analysis and environmental determinism, I will also discuss what might be gained by including newer theoretical approaches like the role of agency and social memory. These newer and ‘softer’ theoretical viewpoints are usually not specified in a way that might result in a quantifiable, and thus testable hypothesis concerning site distribution – which is ultimately what is needed, not only for purposes of heritage management, but also for establishing the validity of the theories used.

Geophysical Survey on the Island of Föhr

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Due to clearly visible vegetation anomalies on aerial photographs a geophysical survey was carried out on the island of Föhr, Germany. Geomagnetics were used to cover large areas in short time revealing settlement structures, probably from Migration periods. Several longhouses (burnt and non-burnt), a large amount of pithouses, some wells and ditches were found. Even single postholes inside the longhouses are visible in the magnetic data. Some of these anomalies were further investigated by ground penetrating radar, electromagnetic induction, geoelectrical and magnetic susceptibility measurements to get more information about depth extent and material. Verification and interpretation of results came from shallow drillings and geophysical modelling of structures.
SESSION 10
NOVEL TECHNOLOGIES IN BIOMOLECULAR ARCHAEOLOGY

ZooMS, Zooarchaeology by Mass Spectroscopy: Rapid Identification of a Fragmentary Zooarchaeological Record
Matthew Collins
BioArCh, University of York

With up to a thousand alleles per locus, the major histocompatibility complex (MHC) contains the most polymorphic genes in vertebrates. MHC genes have crucial functions in adaptive immune defence and in mate choice resulting in an ever-changing target in the evolutionary arms race with parasites. However, the maintenance of this enormous polymorphism is an evolutionary puzzle. A proposed form of balancing selection found some suggestive support from field observations, but an experiment solving the puzzle is missing. Would specific MHC resistance alleles against current parasites increase in frequency over generations? Here, we show in six experimental populations of stickleback fish, each exposed to one of two different parasites, an adaptive allele frequency shift over two generations. In each population, those MHC alleles that increased in frequency were the ones providing resistance against the respective parasite. Our findings have thus highlighted adaptive allele shift as evolutionary significance of MHC polymorphism.

Adaptive Allele Frequency Shift Maintains Standing Genetic Variation at MHC Genes
Christophe Eizaguirre
Leibniz Institute for Marine Science, Department for Evolutionary Biology of Marine Fishes, Kiel

Our findings have thus highlighted adaptive allele shift as ones providing resistance against the respective parasite. Those MHC alleles that increased in frequency were the ones providing resistance against the respective parasite. In each population, to one of two different parasites, an adaptive allele frequency shift over two generations. In each population, those MHC alleles that increased in frequency were the ones providing resistance against the respective parasite. Our findings have thus highlighted adaptive allele shift as evolutionary significance of MHC polymorphism.

From Rockshelter to Lakeshore – Ancient DNA from Horse Remains in Switzerland
Julia Elsner
Institute for Prehistory and Archaeological Science, IPAS

Horses have played a major role in the development of societies. Their integration into the community did not only provide another available source of nutrition, but also a means of transport which allowed people to travel faster and further than ever before. The range of wild horses was very wide during the Pleistocene and the Holocene, and at least three subspecies have been described morphologically in Eurasia. The distribution of these subspecies is not known exactly, further complicating the identification of domestic horses by size only. Phylogenetic networks reveal a very complex picture of modern horses, indicating rather recent and multiple domestication events of the species. However, since the genetic variability of ancestry populations is unknown, it is not possible to distinguish indigenous wild equids from imported domestic horses. Horse bones and teeth in Switzerland were recovered from various sites, the earliest investigated in my continuing PhD project Genetic Signatures in Wild and Domestic Horses (Equus sp.) During the Last 40,000 Years in Switzerland dated to late Pleistocene. Sites include Palaeolithic feedlots of wild predators, caves and abris, Neolithic lake shore dwellings, and refuse pits and deposits from ritual contexts in Celtic and Roman times. One aim of this project is to assess genetic diversity of regional wild populations via maternally inherited mitochondrial markers. Assuming the absence of local domestication, changes in mtDNA patterns can be used to identify the time period when the first domestic horses appeared. A challenge is to use waterlogged preserved material from Neolithic lakeshore dwellings. These sites are of special importance for the reconstruction of early animal husbandry in Switzerland and archaeobiological remains are usually very well conserved. However, waterlogged conditions are considered unfavourable for DNA preservation, although some exceptions exist. A third focus lies on other genetic indicators for domestication, such as coat colour.

Dietary Effects on Radiocarbon Dating
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Radiocarbon dating is an indispensable tool in Archaeology, representing the most widely used method for the establishment of absolute chronologies. These chronologies are often anchored on the radiocarbon dating of human bone material. Reservoir effect is the expression used to denote the presence of a 14C depleted signal within an aquatic reservoir. The 14C depleted signal enters the
aquatic food chain and aquatic fauna will be radiocarbon dated significantly older than its real age. An aquatic diet will imply that humans will also incorporate a reservoir effect signal. Though reservoir effect is well known in marine contexts, accumulated evidence is showing that it can also be very relevant within a freshwater context, revealing varied and occasionally very high values. Furthermore, traditional $^{13}$C isotopic values are incapable of identifying a freshwater diet. The current paper will discuss strategies, namely the use of isotopic signals, for identifying and quantifying an aquatic diet and hopefully reservoir effect. Emphasis will be given to a multidisciplinary approach whereby isotopic information is obtained not solely from bone collagen but also from other bone components (e.g. apatite, aminoacids). The presence of reservoir effect does not only represent a problem but also provides the opportunity, when chronology can be independently established, of quantifying the aquatic diet component.

Sulphur $^{34}$S Isotopes as Geolocation Tracer? First Results from Champ-Durand Causewayed Enclosure

Frederick Feulner
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The Neolithic causewayed enclosure of Champ-Durand (Vendée, western France) on the edge of the Marais Poitevin salt marsh area was in the focus of multi-isotope studies, funded by the European Union FP7 Initial Training Network “LECHE – Lactose Persistence and the Early Cultural History of Europe”. Cattle bones and teeth were analysed in order to get information about the social catchment of causewayed enclosures and to resolve the question whether cattle was raised locally or transported from afar.

The use of carbon $^{13}$C and nitrogen $^{15}$N isotopes to discriminate between certain food webs is well established in archaeology since the 1980s. Often used as a proxy for palaeoclimate, temperature and precipitation, oxygen 18O has become an indicator for seasonality and movement, while the analysis of strontium $^{87}$Sr isotopes for provenance can help to identify foreign isotope signatures.

Recently, the use of sulphur $^{34}$S isotopes in archaeological applications has been in the focus of research. As sulphur is passed on from the primary source with only little fractionation, the ratio can be used to estimate the approximate diet of the final consumer. Dietary input signals obtained from a certain food web (terrestrial, estuarine, marine) or from a distinct environment (e.g. sulphur enriched or depleted geology) can be used to assess the origin of the food. Using the isotopic information recorded in premolar, M1, M2 teeth and in mandible bones, which were deposited at various stages of life, it could be used to visualize different food webs or regions and hence movement, especially if deployed with carbon and nitrogen isotopes. The first results of the application of this method in this area, allow new insights on cattle husbandry, differing from expectations.

Animals and Isotopes: Palaeoenvironmental Isotope Modelling in the North Atlantic Islands

Jennifer Jones
Cardiff University

The coastal communities of the North Atlantic Islands have always had access to a rich and diverse resource base. Reconstructing the changing relationship between these populations and the sea represents a complex enigma for archaeologists. Stable carbon ($^{13}$C) and nitrogen ($^{15}$N) isotope analysis of human remains has been employed in an attempt to understand marine food consumption in specific time periods in the North Atlantic Islands. Valid interpretation of human isotope results relies on a detailed knowledge of typical values for the major species being consumed by humans and an understanding of background environmental carbon and nitrogen levels. Carbon and nitrogen values vary depending on the time period and geographical location in question as a result of environmental and climatic factors. To date North Atlantic island isotopic research has mainly centred on human values, with little emphasis on the analysis of faunal samples, which are integral to the valid interpretation of human results. This paper presents palaeoenvironmental models of carbon and nitrogen fluctuations for different periods in the North Atlantic Islands. Detailed sampling of the most commonly eaten food species for each time period from the Neolithic to the Medieval period has been undertaken to generate a comprehensive baseline of stable isotope results from which to interpret the human results. The faunal results will also be discussed in their own right, to understand their implications in terms of animal diets. Future research aims to develop the dataset will be discussed further in order to obtain a more thorough understanding of the changing relationship between North Atlantic coastal communities and the sea.

Experimental Evaluation of the Stable Isotope Method to Characterise Prehistoric Manuring Practices

Marie Kanstrup
Faculty of Agricultural Sciences, University of Aarhus

Animal manure has experimentally been shown to be reflected in soil and even more markedly in plant isotopic signature ($^{15}$N/$^{14}$N). At the Askov Long Term experiments early agricultural crop types such as naked barley, em-
mer and spelt has for two seasons been grown under
differently manuring treatments. The results from stable
isotope analysis of $^{15}$N and $^{13}$C of soil, grain and straw is
presented here. Isotopic analysis of archaeologically ex-
cavated ancient grains offers a new and direct source of
information regarding the beginning and onset of pre-
historic manuring intensity. This methodological tool is
promising regarding the interpretation of the archaeo-
botanical record and understanding past agricultural
practices and productivity. Evidence of manure effecting
plant isotopic signature is, however, based on studies of
fresh plant material. As prehistoric grains generally are
found in a charred stage it has been tested whether the
isotope ratio is affected by charring. Preliminary results
indicate that the degree of distortion caused by char-
ring is negligible. Charring does not seem to disturb the
isotopic signature in cereal grains significantly, which
holds good promise for the application of the method
in order to answer Agro-Archaeological problems, such
as the introduction of systematic human usage of animal
manure as fertilizer to enhance yield and productivity in
past crop production. The apparent importance of agri-
culture in prehistory substantiates the necessity of more
knowledge about the long term development within this
mode of subsistence in order to achieve a better under-
standing of societies beyond Neolithization. The effect of
manuring in plant isotopic signature ($^{15}$N/$^{14}$N) most prob-
ably also induces changes in the overall food chain. This
gives rise to further implications for the reconstruction
of prehistoric diets based on isotope analysis. New and
ongoing research aims at incorporating this methodolog-
ical approach when addressing archaeological problems
concerning dietary and agricultural reconstruction. The
wider implications of the method still remain to be fully
understood and appreciated for which reason further work
is needed to fine-tune and disseminate this new
approach.

What Makes us Human: Insights from
Sequencing Extinct Hominin Genomes

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A genetic comparison between modern humans and their extinct relatives could both address the relationship
between us and them and offer the possibility to identify
genetic changes that happened specifically on the hu-
man lineage. Furthermore, it may allow identifying and
understanding the evolutionary history of genes and po-
sitions in the modern human genome that experienced
recent positive selection after divergence of modern humans and their extinct relatives. Using a combination of
high-throughput DNA sequencing technologies and
multiple improvements in ancient DNA retrieval, library
construction and targeted library enrichments, the Leip-
zig laboratory has recently, in collaboration with several
groups, completed a first version of the Neandertal ge-
nome as well as a genome sequence of an extinct hom-
inin discovered in the Altai mountains in southern Siberia
named Denisovan. The analysis of both the Neandertal
and Denisovan genome revealed evidence of geneflow
between certain modern human populations and both
extinct hominins. From the analysis of the data we were
furthermore able to draw conclusions about diversity
within and among the extinct hominins and by scanning
the human genome for regions of positive selection us-
ning the Neandertal and Denisovan genome, we identified
several strong candidate genes involved in diet, cognitive
traits, and skeletal morphology that were potentially se-
lected on the modern human lineage.

The Domestication of Pig – An
Interdisciplinary Approach (poster)

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This study shows the reflection of population dynamics,
like mobility and migration, in archaeological evidence
from pigs. How did the domestication of the pigs take
place in Northern Europe? Did domestic pigs of Near
Eastern ancestry were definitely introduced into Europe
during the Neolithic or did local European wild boar were
also domesticated by this time?

First goal of this study was the development and es-
ablishment of extraction methods suited for extraction
of DNA from historical samples, the selection of suitable
genetic markers, and the establishment of sensitive, re-
liable and reproducible detection methods. PCRs were
established to amplify pig-specific DNA with high sen-
sitivity down to single molecules. Different primer pairs
were used to amplify and sequence highly variable re-

regions of the mitochondrial DNA like the dloop, cytb and

ND5 to determined specific mtDNA haplotypes. Further
on specific nuclear DNA was analysed to determine the
sex and the paternal haplotypes. The sequences were fi-
nally aligned and compared to those already deposited in
databases i.e. NCBI. In addition a SNP analysis was es-

ablished to determine the coat colour.

Further electron microscopy, isotope and morphmet-
ric analysis were carried out, in a research association
between, Munich, Durham and Kiel, to confirm the ge-
netic information.

The results of over 300 individuals from 25 Neolithic
sites shows that around 4800-4000 BC domestic pigs are
introduced in the archaeological sites in northern Ger-
many. The study points out that the oldest domestic pig
in the sample (4600 BC) has a “Near East” haplotype. All other domestic and wild boars show the same “European” haplotype.

In conclusion domestic pigs with a maternal “Near East” ancestor were introduced into central Europe together with the linear pottery (LBK) culture. After a short period the domestic pigs with “European” haplotypes coexisted with the “Near East” haplotypes in the LBK and the Chaseen culture. An explanation could be that populations of the Ertebølle culture adapted the idea of domestication and perpetuated it on the indigenous wild boar population. With the established methods it is possible to determine the sex and the coat colour of skeletal remains from pigs. The study shows the importance of multidisciplinary approaches to solve complex research questions.

The Last Megafauna Extinction
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During the past 50,000 years, two-thirds of all large-bodied mammalian genera went extinct. Despite decades of research, the cause(s) of this massive loss remain undetermined, although the relative roles of climate and humans remain the most debated, the answer is all the more critical given the current biodiversity crisis and global climate change. Here we combine past population genetics and species distribution modelling of six megafauna herbivores. We show that although climate was a major driver of population dynamics both before and after human arrival, species show idiosyncratic responses to climate change, habitat redistribution, and human encroachment. While reindeer and bison survived, the global extinction of woolly rhinoceros and the regional extinction of musk ox can be explained by climate alone; however, the ultimate collapse of mammoth and wild horse was likely caused by a combination of climatic and anthropogenic factors. In addition, we find a positive correlation between climate-driven changes in potential range size and changes in the effective population size of each species throughout the Late Pleistocene. This general pattern, observed over an evolutionary timescale, is particularly noteworthy given current concerns about how species will respond to predicted climate-mediated changes in available habitat and increasing human disturbance.

Microbiological Soil Analysis as Tool to Detect Functional Areas in Habitation Sites
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Soil studies in archaeology usually focus on differences in soil chemistry or micro-morphology. Soils, however, are likewise colonized with a high diversity of different microorganisms like bacteria and fungi. The microbial communities of soils are changed in sites inhabited by humans due to the anthropogenic addition of nutrition e.g., urine, faeces, hairs, bones or other organics during the period the settlements is active. Micro-organisms live of the added nutrients and energy sources because of their specific metabolic potential which are based on enzymes. Examples for such a metabolic process are ureases which convert urea into ammonium molecules, or keratinases which degrade keratin, the protein constituents of hairs or hooves. The spores of fungi and host-cells of bacteria can survive in soils, especially when the general biodynamic processes are slowed down like e.g. in high mountain environments. In a multidisciplinary project of the German Archaeological Institute (S. Reinhold), the Archaeological Institute RAS (D. Korobov) and the local heritage organization ‘Nasledie’ (A. Belsinkij) at Late Bronze Age settlements sites in the high mountain zone of the North Caucasus the potential of microbiological soil analysis to detect functional areas in these sites was tested. First, analysis of micro-fungi related to the keratin degradation was used to detect areas of increased keratin impact. Such can be found e.g. in areas where animals were stabled. Sterile hair was added to the soil samples and incubated over a certain period of time. The resulting colonies of keratinophile micro-fungi were than evaluated by quantities and length. This gave first ideas about the use of rooms and courtyards at the investigated site Kabardinka 2. A second method was than developed to localize such areas more precisely using microbiological indications for faces and urine. The urease enzyme segregate urea into carbon dioxide and ammonia. It is important in the nitrogen cycle of soils and enriched in areas where excrements are or had been present. From selected soil sondages the activity of urease was detected using the classical method of Kandeler/Gerber. An express-method was than developed using special buffer solutions to produce a colour reaction, which can be used as indicators of urease activity. This express-method allows handling large quantities of soil samples. Thus more than 1500 samples from test areas of nearly 6000 square meters were processed. Both methods were first time applied systematically at archaeological sites. They were employed on areas previously measured by magnetometry and later partly excavated. Thus the impact factors of the methods could be proofed and vertical sampling allowed to evaluate the change of microbiological indicators at various levels of...
the archaeological structures. The microbiological aspect in soil analysis thus proofed to be highly informative.

Reconstructing the Limfjord’s History: Radiocarbon Dates of Shells and Stable Isotope Values of Bulk Sediment

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The Limfjord is a sound in Northern Jutland, Denmark, connecting the North Sea with the Kattegatt. The complex interplay of eustatic sea level changes and isostatic land-rise caused the relative sea level of the region to fluctuate throughout the later part of the Holocene. Consequently, the region experienced periods mostly with freshwater/brackish conditions and others with predominantly marine conditions. The changes in relative sea level resulted in a landscape which at periods were characterised as a fjord (only one connection to the sea), sometimes a sound (more than one connection to the sea).

A multi-proxy approach has been applied on a sediment core from Kilen (a former fjord arm in the Limfjord, now a brackish lake) near the town of Struer to reveal the Limfjord’s development in more detail. In this paper, we concentrate on stable isotope measurements of bulk sediment and on radiocarbon dating of shells covering the period from c. 6000BC to c. 1000AD.

An age model for the sediment core, based on radiocarbon dating of terrestrial material, is constructed, assigning an age to each centimeter of depth. d13C values and C/N ratios of bulk sediment are measured. The correlation between these values verifies the assumption that the isotope values are mainly controlled by the source of the organic matter, either marine, brackish, freshwater or terrestrial. With d13C and C/N from different depths we can thus follow changes in the Limfjord’s environment. Another aspect of this study is the determination of the radiocarbon reservoir effect. A reservoir effect occurs when a sample’s carbon derives from a reservoir with a different, typically lower, 14C concentration than the atmosphere. Samples that initially contain less 14C than contemporaneous samples in equilibrium with the atmosphere (“terrestrial samples”) yield too high radiocarbon ages. The age difference between such a terrestrial sample and one from a reservoir with lower 14C concentration is called the reservoir age.

In the case of the Limfjord, two different reservoir effects have occurred through time, the marine reservoir effect and the hardwater effect. Upwelling of bottom water and mixing with surface water results in a marine reservoir age of c. 400 years in the seas around Denmark. The hardwater effect occurs in freshwater systems with a high content of dissolved minerals, with “hard water”. These contain considerable amounts of “14C-dead” carbon because the dissolved carbonates have infinite ages, compared to the 14C time scale. A hardwater effect of a few thousand years is possible. The total reservoir effect for the Limfjord is a combination of the hardwater and the marine reservoir effect. As the relative proportion of marine and fresh water varied with time, the reservoir age for the Limfjord is also expected to vary. Radiocarbon datings of shells, compared to the age model based on terrestrial samples, resulted in reservoir ages that differed from the model ocean by between -150 and +320 years.

In addition to using this information as an indicator for the Limfjord’s environment, our results may furthermore shed light on the magnitude of reservoir age corrections to be applied when dating marine derived archaeological samples in this region.

The stable isotope and radiocarbon data will briefly be compared to the results from ongoing multiproxy analyses, including lithology and physical parameters, diatoms, sedimentary pigments, macrofossils and foraminifera.

Palaeopathological and Molecular Differentiation of the Human Treponematoses – An Approach (poster)

Susanne Schwarz
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The aim of this study is to reconstruct the history of human treponematoses in Europe by combining osteological methods with molecular analyses. There exist four different treponema species, causing pathologies in humans, i.e. Treponema pallidum subsp. pallidum (syphilis), Treponema pall. subsp. endemicum (bejel), Treponema pall. subsp. pertenue (yaws) and Treponema carateum (pinta). Besides the latter, all strains can manifest in the skeletal system.

Skeletal material with visible lesions indicating a possible infection with treponematosis, will be analyzed further for aDNA. Genetic manifestations of diseases caused by microbial pathogens make it possible to prove their existence by analyzing ancient DNA (aDNA). In order to diagnose a certain infectious disease, one is looking for the presence or absence of a particular nucleic acid sequence that is foreign to the human genome by PCR. The presences of polymorphisms make it possible to differentiate between the three pathogenic agents causing syphilis, yaws and bejel. The selected sequences (tppl5, tprl and tprC) showing polymorphisms are borrowed from other published researches. The method chosen for this is Restriction Fragment Length Polymorphism (RFLP) analysis. aDNA samples amplified by Polymerase Chain Reaction (PCR) will be digested at specific regions by certain restriction enzymes. This results in restriction
fragments, which are then separated according to their lengths by gel electrophoresis. With this it will be possible to differentiate between the three subspecies of the bacteria *Treponema pallidum*.

Ancient DNA offers many opportunities but it also contains some difficulties and potential pit-falls, especially when used as the only method. Therefore a combination of both osteological and molecular methods will prove more informative when analyzing the presence and distribution of ancient diseases. Additionally, we might also gain a better understanding of the evolutionary process of pathogens in human populations.

**Exploring Collagen Damage in Archaeological Bone through a Non-Destructive Method in Mass Spectrometry**

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With collagen established as a remarkably stable protein in bone, radiocarbon dating, stable isotope analysis, and proteomics have become reliable tools for archaeologists. The latter, proteomics, is still a young addition, but due to femtomole sensitivity of contemporary machines a valuable one. In the extension of Zooarchaeology by Mass Spectrometry (ZooMS) we have devised a novel method, using a buffered solution to extract collagen without demineralization. This facilitates a non-destructive way to determine animal genera through indexed peptides with the possibility to revisit the same sample or examine worked bone artefacts without sample loss. In addition, the elutes of collagen with warm water may give insight into the degradation process of collagen. Our current hypothesis states that though minimal collagen in bone breaks down over time, sufficient material can be obtained through a mild extraction. The elutes consist of collagen that damaged through deamidation may be indicators of the preservation state of bone and possibly DNA. We will present the method and results of this approach to a new parameter for the indication of bone diagenesis.
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