

School of Archaeology  
Geography &  
Environmental Science



# Research Students Conference 2017



**Thursday 11th & Friday 12th May**  
Room G05, Miller Building  
& Sorby Room, Wager Building



THURSDAY 11<sup>th</sup> MAY 2017  
G.05 Miller Building

***Heritage and Creativity***

*Chaired by Carolina Rangel de Lima & Emily Carroll*

- 10.00 Adam Sutton
- 10.20 Sara Wilson
- 10.40 Monica Palmero Fernandez
  
- 11.00 COFFEE IN THE SORBY ROOM
  
- 11.30 Owen Humphreys
- 11.50 Matthew Fittock
- 12.10 John Ford
  
- 12.30 Poster pitches
  
- 1.00 LUNCH IN THE SORBY ROOM

***Prosperity and Resilience***

*Chaired by Harriet Robson*

- 2.00 Abu-Bakar Massaquoi
- 2.20 Rebecca Emerton
- 2.40 Azin Wright
  
- 3.00 COFFEE IN THE SORBY ROOM
  
- 3.30 Aliko McDonald
- 3.50 Noor Jalilah Jumaat
  
- 4.10 Poster pitches
  
- 4.30 POSTER SESSION & DRINKS RECEPTION  
IN THE SORBY ROOM

PROGRAMME

FRIDAY 12<sup>th</sup> MAY, 2017  
G.05 Miller Building

**Food & Health**

*Chaired by Sascha Valme*

10.00 Harriet Robson  
10.20 Charlotte Scull  
10.40 Mitchell Miranda  
11.00 Candace McGovern

11.20 COFFEE IN SORBY ROOM

**Environment**

*Chaired by Kirsten Lees*

12.00 Kirsten Barr  
12.20 Brian Chirambo  
12.40 Anna Freeman

1.00 LUNCH IN SORBY ROOM

2.00 Richard Smith  
2.20 Sarah Jones  
2.40 Catharine Pschenyckyj  
3.00 Amudat Olatunde

3.20 COFFEE IN SORBY ROOM

4.00 *Alternative careers talk with  
Dr John Carson*

Having completed his undergraduate degree in Archaeology and Geology, a PhD in Tropical Palaeology, and a post-doc in GES, John now works as an Associate Editor at Nature Human Behaviour. His talk will focus on alternative career paths outside academia, but there'll be plenty of time in the Q&A session to ask him about publishing in Nature too!

7:00 CONFERENCE DINNER (RISC)

PROGRAMME

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# Revolutionary Ideas: The Potter's Wheel, Technology and Society in the Later Iron Age of Berkshire and Northern Hampshire

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Privately funded award

Among the upheaval of the Later Iron Age lie the beginnings of massive changes in the production of material culture. The late Iron Age (c.150/50 BC-AD 43) sees the introduction of a number of technical innovations that changed the ways that objects looked, were made and used. One of the best evidenced of these is the technique of wheel potting. Such an introduction begs many questions as to the social significance of technological change.

This talk, which details a small portion of the speaker's PhD research, will present new data on the introduction and initial phases of use of the potter's wheel, utilising radiographic analyses of 191 ceramic vessels from the case-study region of Berkshire and northern Hampshire. This data will be used to consider patterns in the techniques of wheel-use during the first centuries BC and AD. These techniques will then be put into their wider social and economic surroundings, considering in this context the significance of changing knowledge, skill, and apprenticeship relations as barometers of wider social change during the Later Iron Age of southern Britain.

ABSTRACTS

## 2 Relief-Patterned Tiles, A Case Study: The Production and Distribution of Roller-Stamped Flue-Tiles

**Sara Wilson**

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Privately funded award

My project is a characterisation of the ceramic building material from Roman Silchester through analysis of the form and fabric of brick and tile used within the town. Employing ceramic analysis methods more traditionally used for pottery, the study uses geo-chemical and petrographic methods to determine the range of fabrics, and potentially identify production centres or raw material sources. A fabric series for the material is used to assess changing production patterns through the life of the Roman town.

Relief-patterned flue-tiles are a distinctive form of Roman CBM and examples from the Silchester assemblage represent six of the published dies in the 1994 corpus (Betts *et al.* 1994). With the aim of understanding the organisation of the production and distribution of these roller-stamped tiles, where possible, all examples of each of the represented die types have been sampled. Geo-chemical and petrographic analysis of these fabrics is employed to ascertain if the groups of roller-stamped tiles were manufactured using the same raw material resources or, as suggested by Lowther (1948), they are the product of itinerant craftsmen moving between production centres.

## The Realm of Inanna/Ishtar in Early Mesopotamia

**Monica Palmero Fernandez**

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Aldous Huxley wrote, “all gods are homemade, and it is we who pull their strings, and so, give them the power to pull ours.” This idea stands at the heart of my research project, which aims to explore the configuration of gender in the divine world of Early Mesopotamia as part of state formation processes through the contextual analysis of archaeological, iconographic and textual data. The project centers around the goddess Inanna/Ishtar within the historical context of the 3<sup>rd</sup> millennium B.C. During this period, Mesopotamia was a melting pot of political, social and technological innovation that saw the development of writing and the rise of the first geographic empire in the region. For my PhD thesis, I am taking an interdisciplinary approach to trace the institutionalization of the cult of the goddess as the dynastic deity during the transition from a conflict-ridden city-state mode of government to an imperial one. For this purpose, I analyse three case studies in depth and substantiate the results obtained through a wider regional discussion. My current hypothesis is that her symbolic figure was systematically appropriated by the elite and, more specifically, by kings. Her identity and gender would have been configured through the repetitive consecution of rituals in newly built temples that contributed towards increasing segregation between official and private religious activity.

## 4 Roman Tools from London

### Owen Humphreys

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Funded by: AHRC CDA Studentship

The Museum of London contains one of the largest and best preserved collections of Roman metal tools in Europe. Together with those from other museums, and commercial units operating in the city, almost 900 have been catalogued. These tools were used in diverse industries as diverse as coopering, fine metalworking, leatherwork and gardening, offering a unique opportunity to study the working society of an ancient city.

However, tools are challenging artefacts to use in this way; they were rarely discarded, are often poorly preserved, and mostly without good archaeological context. These objects can nevertheless still be categorised by form and function, but this is as far as most archaeological work on tools has gone. In Roman archaeology, rare social interpretations have often been framed in the terminology of 'Romanisation', or focussed on tools as technical demonstrations of the skills of smiths. This PhD has sought to expand our understanding of working society in London by examining tools as evidence of past practices, framing discussion in the terminology of structuration and social constructivism.

## Pipeclay Figurines as Religious Expressions in Roman Britain

**Matthew Fittock**

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Funded by: Arts and Humanities Research Council

Compared to monumental statuary, little attention has been given to how smaller portable figurines reflect the religious beliefs and practices of the culturally mixed populations of the Roman provinces. This paper examines the pipeclay figurines from Roman Britain and asks how these objects reflect the daily religious lives of the people that lived here. Considering the distribution and contexts of pipeclay figurines and comparing them to Continental collections highlights the dynamics of trade, selection and cultural transmission. For example, it is now possible to contrast the differing 'consumption' patterns of common and rarer deities and how these reflect the different religious beliefs and practices of different social classes and groups. There are also interesting differences in the types and distributions of gods represented by metal and ceramic figurines that indicate differences in beliefs and use. A chronological evaluation of 'ritual material' from temples and burials will demonstrate how these competing beliefs and practices transformed over time. Overall then this paper will show that Romano-British people made active choices about the figurines and material practices through which they worshipped their gods and that these subtle differences impacted religious as well as social dynamics.

## Ringling The Changes: The Social Significance of Finger-Rings in Roman Britain

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Richard Hobbs (British Museum)

Funded by: Arts and Humanities Research Council

Finger-rings are one of the most common types of personal ornament from Roman Britain, yet they have been the subject of relatively limited research. They were not commonly worn during the Iron Age but became very popular during the Roman period with the spread and adoption of Roman material culture and customs.

Unlike many personal ornaments, finger-rings were worn by women, men, and children, and across all social strata. They can take many different forms from simple plain copper-alloy hoops to ornately decorated gold rings made using sophisticated techniques and precious materials.

These different forms of finger-ring satisfy a variety of personal, social, and even practical functions. As such, they can provide an insight in to the identities of their wearers and the customs of Roman Britain. By studying finger-rings and the contexts where we find them, my research explores the different ways in which finger-rings were used within Romano-British society.

# The Political Ecology of Adaptive Collaborative Forest Management in Sierra Leone: Paths, Prospects and Pitfalls

**Abu-Bakar Massaquoi**

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Funded by: Commonwealth Scholarship Commission

Adaptive Collaborative Management (ACM) has been extensively promoted in recent years among policy-makers and researchers as an interdisciplinary method to address multi-scale, multi-level society-environment dilemmas because of its strong emphasis on participation and learning. Yet, the concept of ACM is so broad, and documentation of its main achievements and shortcomings, and the key issues it faces in Forest Protected Areas (FPAs), are still at a nascent stage. For example, knowledge about how participation and learning in ACM shape the ability to deal with forest management challenges is limited. Similarly, relatively little data exists regarding the nature of participation and learning in ACM, as well as on the underlying influence of institutions and power relations. The situation is particularly worrisome because many scholars are proposing that ACM could provide a useful mechanism for reducing emissions from deforestation and forest degradation (REDD) in the context of global climate change governance. The thesis aims to contribute towards filling these gaps by exploring the paths, prospects and pitfalls of ACM-based governance practices based on two case studies in the Gola Rainforest National Park (GRNP) in Sierra Leone. Political ecology is used to frame the research because of its sensitivity to interactions between ecological, social and political domains and especially the role of power and institutions.

The results indicate that despite considerable effort and some success, significant shortcomings are evident. ACM-based governance practices in the GRNP scarcely resulted in the equitable distribution of benefits; shared decision-making; downward accountability; increased ownership, commitment and trust; and increased opportunities for knowledge co-production. Moreover, ACM practices did not sufficiently depoliticize governance at the landscape level, because they did not aggressively confront limitations of culture, gender and politics rooted in approaches to participation and learning. Furthermore, ACM practices provided a façade for a centralized forest governance process by adding some gloss on participation and learning, while preserving the original remits and political influence of the state and its affiliates. Altogether, the research demonstrates that ACM is difficult to successfully design and deliver in resource and capacity-challenged settings where decisions and actions often reflect participation and learning among stakeholders that have different capabilities, priorities, and levels of authority. Effective design and delivery under such conditions require new skills, behaviour and attitudes. Thus, true to political ecology, ACM is not immune from the messiness of hegemonic and entrenched power exercises often executed by institutions that shape decision-making and drive actions for participation, learning and benefit distribution in social-ecological systems. In the context of REDD+, ACM could reinforce or be undermined by problematic governance tendencies that affect its legitimacy and effectiveness at the landscape level. Therefore, this thesis recommends priority investments in designing and operationalising capable and adaptive policy and local institutions; increasing adaptiveness, legitimacy and accountability through collaborative learning; and improving access and allocation of conservation benefits.

Index words: Adaptive Collaborative Management (ACM), political ecology, participation, learning, power, institutions, Forest Protected Areas (FPAs), Sierra Leone, Forests, Prospects, Pitfalls

## Can We Really Use El Niño to Predict Flood Hazard?

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Funded by: NERC Scenario Studentship

El Niño and La Niña events, the extremes of ENSO climate variability, influence river flow and flooding at the global scale. Estimates of the historical probability of extreme (high or low) precipitation are used to provide vital information, for example to governments, forecasting services and humanitarian aid organisations, on the likelihood of adverse impacts during extreme ENSO events. However, the nonlinearity between precipitation and flood magnitude motivates the need for estimation of historical probabilities using analysis of hydrological data sets. We have undertaken this analysis using ERA-20CM-R, the first global river flow reconstruction for the twentieth century. Our results show that the likelihood of increased or decreased flood hazard during ENSO events is much more complex than is often perceived and reported; probabilities vary greatly across the globe, with large uncertainties inherent in the data and clear differences when comparing the hydrological analysis to precipitation.

# Soil- and Crop-Dependent Variation in Correlation Lag Between Precipitation and Agricultural Drought Indices as Predicted by the Swap Model

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Droughts have a devastating impact on agriculture and economy. At the same time, the global population continues to rise and the need for sustainable food production is becoming more and more pressing. In light of this, drought prediction can be of great value; in the context of early warning, preparedness and resilience.

Prediction of meteorological drought is associated with uncertainties around precipitation variability. As meteorological drought propagates, it can transform into agricultural drought. Determination of the maximum correlation lag between precipitation and agricultural drought indices can be useful for prediction of agricultural drought. However, the influence of soil and crop type on the lag needs to be considered, which we explored using a 1-D Soil-Vegetation-Atmosphere-Transfer model (SWAP (<http://www.swap.alterra.nl/>)), with the following configurations, all forced with ERA-Interim weather data (1979 to 2014): i) different crop types in the UK; ii) three generic soil types (clay, silt and sand) were considered. Agricultural drought indices including Soil Moisture Deficit Index (SMDI) and Evapotranspiration Deficit Index (ETDI) were calculated. The maximum correlation lag between precipitation and these drought indices was calculated, and analysed in the context of crop and soil model parameters. The findings of this research can be useful to UK farming, by guiding government bodies such as the Environment Agency when issuing drought warnings and implementing drought measures.

## Widening Participation in Higher Education - The Role of Parents How are the aspirations of parents/ guardians for their children shaped by their own educational, occupational, and social experiences?

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Funded by: University Access Studentship

Do you want your child to be a doctor? A lawyer? A  
scientist, like you?

Aspiration has been a prominent buzz word in educational  
policy and academic discourse for the past 15 years.  
Ultimately, it is the experiences of parents themselves  
which are significant in understanding why they have  
the aspirations for their children that they do. Within  
aspirations, a key topic of research has been role models,  
and the importance of role models in educational  
attainment.

The aims, methods, and results of this investigation  
into parent's aspirations for their children has been  
examined within a range of ideas. However, this paper  
focuses specifically on only one aspect - role models.  
In-depth interviews have facilitated a subtle and unique  
understanding which illustrates the desire of parents to  
emulate the parenting methods which their parents used,  
and the social, educational, and occupational experiences  
that they attribute to their own successes. This paper will  
highlight how role models are perceived and what this  
means for parents and their aspirations for their children.

# ABSTRACTS

- 12 The results of this research highlight other significant themes involved in the aspirations of parents for their children. Role Models sits within a theoretical framework which acknowledges, highlights, and enhances the broader thematic discourses in its field, such as widening participation and social mobility. As such, it aligns very well with the theme of Prosperity and Resilience.

## Exploring the Motivation and Place Attachment Among Outdoor Recreation Participants: A Case Study of Haldon Forest Park, Uk

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Funded by: Ministry of Higher Education Malaysia

Outdoor recreation is a voluntary participation that involves the interaction of people with the natural environment. The potential benefits obtained from this type of outdoor activity has led to increasing numbers of visitors in the countryside. Therefore, understanding recreational user's perspectives (motivation, place attachment, behaviour, and satisfaction) during the outdoor recreation participation can be useful for the forest management plan. Furthermore, a key motivation for this research is the relative lack of empirical studies and published research articles in the field of outdoor recreation in the United Kingdom.

A key objective of this research project therefore, is to explore the relationship between motivation and place attachment of visitors in outdoor settings. The research was conducted at Haldon Forest Park (Exeter, Devon) and employs a mixed-methods approach. A survey-based questionnaire was distributed between September to December 2016, followed by focus groups and photo-elicitation in April 2017. Structural Equation Modelling (SEM) and content analysis have been used to analyse these data. This research will generate original empirical data that provide a better understanding of humans' relationship with natural environments.

**Harriet Robson**

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Funded by: BBSRC Studentship & University Award

The world population is at 7 billion people, and climbing. Human food consumption is growing, and current farming practises are becoming insufficient at feeding the world. How can microbes help? Microbes are everywhere; they are the tiny forms of life which include bacteria and fungi. They are essential for the health and growth of plants. They provide nutrients to the plant; protect plants from disease, and breakdown organic matter in order to recycle nutrients. We can look more closely at the specific roles that microbes carry out, such as their importance within the carbon cycle. Carbon is drawn into a plant by photosynthesis. The plant feeds carbon to microbes in the soil via its roots. Microbes use it to grow and reproduce, and in doing so, the carbon is broken down and the cycle is completed, returning the carbon to the atmosphere as CO<sub>2</sub>. This provides an optimum environment for the plant to grow, and the cycle continues. Plants and microbes exist as individuals, but function seamlessly as part of one large ecosystem. Understanding these important soil functions further, may allow us to adapt farming practices to improve crop yield and sustainably feed our expanding population.

## Appetites of the Anglo-Saxon Body: Middle Saxon Diet, Virginity and Abstinence

**Charlotte Scull**

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& Professor C Woolgar (University of Southampton)  
Funded by: Arts and Humanities Research Council

Sex and eating are both bodily impulses that, in the Middle Ages, Christianity attempted to control. Sexual abstinence was promoted as a cardinal virtue and through classical antiquity the ‘impurities’ of sexual drive and bodily hungers were associated with women, while higher, spiritual callings were inherently male. This belief makes the bodily appetites of groups of celibate, religious women in the Middle Ages of particular interest. My wider PhD research explores the foodways of these women across the medieval period in a multi-disciplinary approach.

This presentation will focus on one particular dimension of my project: the meaning of food and self-denial specifically within middle Saxon religious houses. I will start by discussing Bede’s fetishisation of dead virgins in the *Historia Ecclesiastica*, and will place his perspective on the cult of female virginity within the context of other related literary and archaeological evidence. Particular focus will be given to references of sexual longing and sensory desire which portray how the cognitive interior was as important, if not more so, than the bodily exterior. This belief is central to perceptions of hunger, fasting and food in female religious life and I will integrate a range of archaeological approaches to present how the ‘sinful’ appetites of the Anglo-Saxon female religious body were truly perceived and controlled both in their ideological, and real world, contexts.

## A Study in the Interrelationships of Humans and Cattle in the Early Bronze Age Near East

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Funded by: US loans

The relationships between humans and animals in the ancient Near East has been a subject of study for several decades now with several studies produced discussing the wider topic of how humans domesticated and changed animals to suit specific needs, such as meat production and labour. Most of these studies only take into account the faunal remains from archaeological sites to develop a general economic animal profile of a specific region, and many do not consider the alternative of how such species changed the behaviour of humans during this period. There are a very few investigations that discuss both domesticated animal remains and iconography of such animals; however, the corpus of work does not address the complex interrelationships of humans and cattle in any real detail. This project examines the ways in which human and cattle populations transformed each other's behaviours within the Early Bronze Age.

The principle aim of this study is to determine the economic and social impacts cattle made on EBA society and if these impacts change depending on a particular site or region. The cultural regions of Anatolia and Mesopotamia were chosen to develop a general assessment of cattle culture in the Near East, with three archaeological sites chosen for each region. The data collected from these sites include identified animal remains and all material relating to or depicting cattle. Methods of assessment include developing a catalogue of all material from the selected sites relating

to cattle and determining possible use and importance, depending on the context in which the objects were found. The landscape immediately surrounding each site is also related to the species' importance, by evaluating if the land was suitable for cattle herding. By determining possible animal usage patterns and material representations, as well as examining the quantities and locations where these objects were unearthed, new insights are gained into how this species transformed human behaviour and in what ways this transformation took place.

## A Woman's World: Exploring the Morphological and Pathological Conditions Associated with Obstetric Dilemmas in an Urban Romano-British Population

**Candace McGovern**

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Funded by: US Financial Aid

Evolutionary morphological changes required to accommodate bipedal movement and a larger brain size, alongside various pathologies, make humans prone to an obstructed labour. This occurs when the fetus is unable to navigate through the pelvis during a vaginal delivery and can result in death for both the mother and neonate. Within archaeological populations the high frequency of reproductive age females is often attributed to childbirth related complications.

To establish the likelihood of a contracted pelvis the transverse and cognate measurements at the pelvic inlet, mid-plane, or outlet was collected from 136 Romano-British females between 10-45 years at death. The metric data was compared with pre-WW2 clinical literature based on the minimum size of a viable foetus. Within the sample, 14.7% (n=20) had at least one pelvic inlet measurement which would place the mother at risk for pelvic disproportion (CPD). Pathological and morphological changes such as sacroiliac osteophytes and sacralisation were noted and the youngest individual who could be expected to successfully undergo a vaginal birth was 14.08 years of age at death. Overall, this can provide a better understanding of the birthing process among archaeological populations and childbirth hazards.

## Common Crane on the Severn Estuary: Past, Present and Future

**Kirsten Barr**

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Funded by: Arts and Humanities Research Council

Common Crane (*Grus grus*) are a species ingrained in British history, with villages and landscapes across the UK named after this bird. Archaeological and historical evidence spans from footprints made by Mesolithic crane found in the authors research at Goldcliff in Wales to the first avian species protection legislation introduced in 1534. Common Crane have not bred in Wales for at least 400 years, they became extinct due to over-hunting and wetland destruction. In 2010 they were reintroduced to the Somerset Levels, the first breeding pair returned to Wales in 2016.

This research explores the archaeological evidence for Common Crane, the part played by humans in their localised extinction and new issues facing this species. Common Crane are experiencing the threat of habitat destruction, including the proposed M4 relief road and Severn Estuary Tidal Lagoons. The argument presented is that Common Crane were a previous native breeder and now that they have returned to Wales their breeding ground and habitat should be protected.

Archaeologists and nature conservationists can learn from the successful reintroduction of Common Crane, the positive effects they have in a community and the issues this species face from habitat availability, predation and human interference. The conclusions from this research indicate the possibility of native species such as White Stork being successfully reintroduced to the UK.

## A Critical Political Economy Critique of Redd+ Mechanism: A Case of Zambia

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Funded by: Commonwealth Scholarship Commission

This research is a critique of the UNFCCC recommended incentive based mechanism for addressing drivers of deforestation and forest degradation. The study argues that the incentive as suggested under REDD+ is both inadequate and with uncertainties on sustainability, access and flow. Using Zambia as a case example, the study found that REDD+ was faced with architecture and agency problems that prevented innovation and participation of key stakeholders in the identification of real drivers of deforestation and forest degradation and design of effective strategies thereof. Drawing on neo-Gramscian perspectives, the study concludes that in its current form, REDD+ was unable to meet its normative and precautionary ambitions of reducing greenhouse gas emissions from forests. There is reason to believe therefore that the REDD+ mechanism was supported and promoted for its cheapness on the part of financiers and its financial promise to the implementing poor developing countries.

Key Words: Incentive, Energy, Drivers of Deforestation and Degradation, Agriculture, REDD+, Zambia

## Zooplankton Grazing Has Only a Moderate Effect on Algal Dynamics in Rivers

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Algal blooms in rivers are often associated with foul smell, high concentration of toxins and fish kills. To predict them it is essential to understand all processes of their development and termination step by step. It was recently established that environmental factors such as: residence time, water temperature, light and nutrients alone do not completely explain algal dynamics. This study focused on biological control of algal development, mainly on zooplankton 'grazing' effects.

From March-October 2015 weekly surveys were carried out on the River Thames, UK. Zooplankton were enumerated and identified to species or genus levels from nine sites across the catchment. The zooplankton were dominated by rotifers, with a maximum of approximately 9000ind./l. Micro-crustaceans were generally found in larval stages and did not develop significant densities (maximum of 125Ind./l).

A series of laboratory and field-based experiments were undertaken in the growing season of 2016, to test the significance of grazing impact at four sites across the Thames. Data revealed a moderate to non-significant grazing effect throughout the spring-summer period, with indications of some zooplankton actually promoting algal growth.

Microscopic examination of fresh samples highlighted a rise in algal mortalities due to algicidal bacteria and fungal parasites. This is a subject for further investigation.

## Palm Swamps Versus Lakes as Fossil Pollen Archives – The Quaternary Vegetation History of Ecotonal Southwest Amazonia

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Funded by: NERC Scenario Studentship

The reconstruction of the palaeovegetation history of Amazonia and surrounding areas is important for putting into context the impact that current and future anthropogenic climate change may have on the region's vegetation. However, in contrast to mid-high latitudes, very little has been done in the tropics to look at the relationship between basin type and size with respect to pollen catchment and pollen-vegetation relationships. In addition, the paucity of suitable basins that contain long term fossil pollen records limits our knowledge of the spatial extent of any palaeovegetation changes.

Here we compare Quaternary fossil pollen records from a large lake (Laguna Chaplin) versus an adjacent small palm swamp (Cuatro Vientos) in ecotonal southwest Amazonia to improve the palaeovegetation interpretations in this region. By comparing fossil pollen records from these contrasting sites, which are located within the same tropical forest ecosystem, it will be possible to examine the extent to which the type of basin (i.e. large lake versus palm swamp) and the size of the basin (i.e. small versus large) influences tropical fossil pollen records. This may have wider implications for the interpretations of other lake, bog and swamp fossil pollen records across tropical South America.

# The Impact of Climate Variability on Bronze Age and Iron Age Societies in The Middle East

**Sarah Jones**

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Funded by: University of Reading Studentship

This presentation will focus upon one chapter of my PhD Thesis – attempting to identify and assess the character and impact of the Thera (or Minoan) eruption. This eruption had a significant impact on the Bronze Age cultures and environments of the Mediterranean, and may be the origin of the Atlantis legend. However, much of the information concerning the eruption itself remains controversial and areas of active debate, including: the date, magnitude and environmental effects. The majority of research on past volcanic eruptions has been obtained from ice, lake and marine core records, which are limited by both dating accuracy and chronological resolution.

This research uses a speleothem record from Uzuntarla Cave, NW Turkey. Speleothems can be dated accurately and absolutely by U-series techniques and layer-counting and are additionally suitable for multiple environmental proxy analyses, making them an excellent archive to investigate palaeovolcanism. Four techniques have been applied, including U-series dating; stable isotope analysis and pioneering trace element analysis (SR- $\mu$ XRF and LA-ICP-MS). Results and conclusions will be presented within the aims of identifying, dating and characterising the eruption of Thera and the potential impact that this would have had on the surrounding environment.

## Acidity Controls on Recent Changes in Carbon Cycling in Organic Soils

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Recent evidence shows clear recovery from acidification of soils in response to decreasing levels of atmospheric pollution<sup>3</sup>. This has been linked with the observed increase in dissolved organic carbon (DOC) concentration in terrestrial waters over the past 30 years, as DOC solubility increases with increasing pH. Litter decomposition is a major source of DOC and yet there is a lack of knowledge surrounding acidity effects on the decomposition of litter as a DOC source, in particular on DOC quantity and quality produced in upland moorland systems. The effect of acidity on the decomposition of different litters was assessed as part of an existing long-term pH manipulation field experiment. Litter bags were buried in different organic soil types, across two sites in contrasting areas of historical pollution (North Wales and the Peak District). The Tea Bag Index method was also used.

Decomposition was greatest in humic podzol compared to peat, as well at the undamaged site compared to the degraded site, suggesting a possible influence of the in situ pH gradient between the sites relating to pollution levels. However, there was little statistical evidence of a treatment effect from pH manipulation, possibly due to a lack of exposure with litter bag burial depth, or the experimental period was too short to see an effect.

## Soil Characterization Using Visible Near Infrared Diffuse Reflectance Spectroscopy (Vnir Drs)

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Funded by: Nigerian Tertiary Education Trust Fund (TETFUND)

Soil analysis whether for agriculture, pollution assessment/ remediation or resource exploration requires rapid procedures that are reliable and cheap. VNIR DRS involves multivariate calibrations that focus on finding relationships between one set of easy-to-acquire measurements and another set of measurement which is labour intensive, time consuming or/ and expensive. This aims at generating good relationships such that soil parameters can be rapidly predicted with comparable accuracy from the cheaper measurement.

Within this study, VNIR DRS has been demonstrated to be a viable approach to characterising organic carbon(OC) and extractible total petroleum hydrocarbons (ETPH) in soils with comparable analytical accuracies to conventional procedures. To investigate the generalization potentials of VNIR DRS for characterizing ETPH in soils, the effects OC content and type of petroleum pollution have on the predictive qualities of VNIR DRS models are being studied. This study further investigates the influences pre-processing techniques, regression tools and size of validation data sets have on the quality of predictive models.

This study suggests that VNIR DRS can be an important analytical approach for large scale soil monitoring / pollution assessment studies that do not require the highest degree of accuracy. It can reduce rigorous laboratory procedures and ensure that results are obtained in-situ.

# NOTES

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