

*"...scholarships for research and education..."*

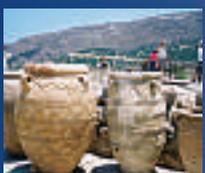


# Newsletter August 2009

The Leverhulme Trust



## Voices of the Cuban Revolution



New dating method



Fields of Brittonia



The power of meta-materials

## Director's note

A risk with patterns of research support is that they can reach a state of inertia brought on by the reluctance of the applicant community to leave well established (and well understood) procedures and by a hesitation on the part of the provider community to take resources from popular schemes to launch appealing but untried initiatives. But just as researchers should be encouraged to keep careful watch on opportunities around them for breaking free from established conventions of thinking, so agencies must be ready to seize the chance to test new modes of support where damaging gaps in provision become apparent.

The Trust has in recent years tried a number of such modes. The Research Leadership Awards of 2007 responded to a perceived early-career problem for researchers, namely, in the acquisition of team leadership skills. Twelve awards, each providing a team of two postdoctoral workers and two studentships over a five year period, were granted. The Embedding of Emerging Disciplines competition, recently completed, provides five years of support for the blending of current disciplinary concepts into new arrays seen as creatively responding to future intellectual and societal concerns. The effort was made, in launching the competition, to match the demands of application at each stage to the chances of success. The university community respected this ambition and responded vigorously and imaginatively to the challenge. Awards for the building of research/teaching teams in Agri-Health and in Metamaterials are announced in this Newsletter.

The attempt will be made to assess the contribution of each of these initiatives once they have had the chance to display their character within the real world of current academic ambition. The choice can then be made: either they are introduced as more regular parts of the Trust's portfolio of activity or they are abandoned in favour of alternative and more compelling opportunities for innovation.

The university community has played a central role throughout these developments, either in signalling the opportunities and needs, or in responding to the calls for applications, or in guiding the assessment process. The Trust is indeed grateful for this gracious consent to share in the search for the best of links between those engaged in the support of research and those engaged in its conduct.

**Richard Brook**

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More articles on current research can be found in the Awards in Focus section of our website:  
[www.leverhulme.ac.uk/news](http://www.leverhulme.ac.uk/news)

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## Building an Agri-Health discipline

In 2050, we will need to feed a human population of 9 billion people, most of whom will live in low and middle income countries. This will require doubling today's food production without substantially increasing the land we farm, while making use of less water and inputs. Will this challenging agricultural achievement guarantee a healthy diet for 9 billion people? If today's global health situation is any indication, the answer is "probably not". An estimated 112 million children in poor countries are underweight, and undernutrition is an underlying cause in more than one third of child deaths, a situation exacerbated by the recent food price crisis. At the same time, globalisation of energy-rich, nutrient-poor diets, stimulated by cheap cereals and fats, is causing a surge of malnutrition of another kind in developing countries leading, as it has in the UK, to rising obesity and chronic disease.



*Lemont was the first high-yielding semidwarf rice variety that matured early and had high milling yields (photo by David Nance).*

There is a disconnect between food production and health which we must address, and this will require coordinated advances in both agriculture and health research. However, agriculture and health research have been isolated for decades in disciplinary silos, and lack the shared language, tools and experience needed for this task. This is the challenge addressed by the Agri-Health project, recently awarded to the London International Development Centre<sup>1</sup> through the Trust's Embedding of Emerging Disciplines programme. Recognising that these global challenges need a new kind of disciplinary array the project sets out to build a unifying approach for understanding the relationship between agricultural production and population health, and the factors which drive them both.

The project will develop joint postdoctoral and PhD programmes between agriculture and health research groups from across specialist academic institutions. Research will be interdisciplinary, addressing scientific, economic and social dimensions of food production, diets and health. At one level, this research will address broad questions like "what would a healthy diet for 9 billion look like and what kind of future agricultural systems would we need to deliver it?" At another level research will address specific inter-sectoral problems, by which new research approaches and tools can be developed. For instance, how would we measure the specific health benefits of an agricultural innovation? Or how could we avert outbreaks of zoonotic diseases, like bird and swine flus, through measures that benefit both agricultural production and public health? As agri-health research approaches evolve and their applications spread, the project will build postgraduate training programmes that create the capacity we will need to address this challenge in future.

**Professor Jeff Waage**

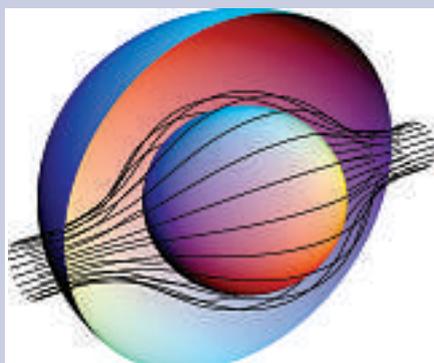
**London School of Hygiene & Tropical Medicine**

<sup>1</sup> LIDC is a collaboration between the six Bloomsbury Colleges of the University of London: London School of Hygiene and Tropical Medicine, School of Oriental and African Studies, Birkbeck College, Institute of Education, Royal Veterinary College and London School of Pharmacy to address urgent issues in international development.

# Metamaterials & the control of electromagnetic fields

In the last decade a new area of research has emerged. The stimulus has been our ability to produce materials with entirely novel electromagnetic properties. Known as 'metamaterials' for their ability to take us beyond conventional materials they give access to such remarkable effects as negative refraction. Spurred by the new opportunities theorists have produced exotic concepts which exploit the new materials: we can now specify how to make a lens whose resolution is limited not by the laws of nature but only by our ability to build to the stated specifications; we can guide radiation along an arbitrary trajectory so as to avoid objects causing them to be hidden from sight (see image); materials that are active magnetically in the optical range have been designed and manufactured. There has been a truly amazing amount of innovation but more is yet to come. Clearly, the field of metamaterials could develop into mould breaking technologies for a plethora of applications where control over light (or more generally electromagnetic radiation) is a prominent ingredient – amongst them tele-communications, solar energy harvesting, biological imaging and sensing, and medical diagnostics.

The concept is very simple: ordinary materials derive their electromagnetic properties from the constituent atoms and molecules. The macroscopic response we observe is an average over locally fluctuating fields and provided that there are many molecules within a cubic wavelength the average is well defined and we can speak of a collective response in terms of  $\epsilon$ , the electrical permittivity, and  $\mu$ , the magnetic permeability. In fact there are typically billions of molecules in a cubic wavelength even at optical frequencies.



*The power of metamaterials: light can be steered around a region of space by a metamaterial cloak returning the rays to their original path as they exit the cloak. Anything inside the cloak is completely invisible, whilst the cloak itself remains undetected.*

Changing the properties usually means altering the chemistry. For example we might add lead to glass making it more refractive. However there is another route. We can use structure to alter the response and provided that the structure remains sub wavelength the same averaging principles apply. This principle of function through structure rather than through chemistry defines the concept of a metamaterial. Because the number of structures is almost infinite the design possibilities are hugely extended.

We are an interdisciplinary team drawn from Imperial College London and the University of Southampton. Several departments are involved ranging from physics, to materials, electronic engineering, and medical imaging. Each of us is concerned with the impact of structure on properties which draws us together under the metamaterial umbrella. As well as expertise in the founding principles of metamaterials there is a substantial presence in experimental optics. The GHz region is also represented we are seeking to apply metamaterial concepts in the context of magnetic resonance imaging in the MHz region of the spectrum.

**Professor John Pendry and Dr Stefan Maier**  
**Imperial College London. (In cooperation with N.I. Zheludev, University of Southampton)**

# A revolutionary new method for the archaeological dating of fired clay ceramics

Pottery is found on almost all archaeological sites but there has, until now, been no way of directly dating such material. Contrary to popular belief, pottery cannot be dated using Carbon 14 (it does not contain carbon), and other methods such as thermoluminescence are not only very complex but also require soil samples taken from the vicinity of the pot at the time of excavation.

The physical basis of the new method is that fired clay starts to chemically combine with atmospheric moisture as soon as it is removed from the kiln. This results in an increase in mass that will continue over the lifetime of the material so that the older it gets, the heavier it becomes. This progressive increase in mass obeys a precise mathematical law (it is proportional to the fourth root of time) and effectively provides the material with an "internal clock".

The principle of the method is very simple: the mass of a ceramic object is the sum of its freshly-fired mass *plus* the mass of water with which it has chemically combined over

its lifetime. This chemically combined water can be removed by heating the material to 500°C. Following heating, the material once again gains mass in accordance with our  $(\text{time})^{1/4}$  law. We establish the *rate* of mass gain following heating and, from this, calculate the time that it would take for the material to chemically recombine with the same amount of water that was removed during heating. This gives the age of the material directly. We have established that the method works for material that is 2000 years old, and fully expect that it could be applied to samples of much greater age.

During the course of the work, however, a medieval brick of known age consistently dated to 66 years old. This mysterious result was explained by the brick having been found in Canterbury at a site that had sustained heavy incendiary bombing during WWII, the intense heat of which had "reset" the brick's internal clock. This result raises the intriguing hypothesis that the ceramics in Pompeii, having had their clocks reset during the eruption of AD 79, should all date to this time.



*Pots get bigger and heavier as they get older.*

Judging by the response from the archaeological community, it is clear that the new dating method will be able to address a diverse range of issues that are inaccessible using other techniques, in particular ceramics that can currently be dated only to very broad time brackets. The new method has the potential to become as important for ceramics as radiocarbon dating is for organic materials.

**Dr Moira Wilson**  
**University of Manchester**

Dr Wilson was supported by a 3 year Research Project Grant for £107,101 awarded in 2004.

# Compromise after Conflict

Compromise is a much used but little understood term; and yet it seems more and more relevant to twenty first century society. Our research is both conceptual and substantive, seeking to interrogate the term itself as well as undertaking empirical research to explore compromise as a social practice. We begin from the premise that compromise is no different in the settings in which it occurs but is easier to access in some locations than others. Our empirical focus is victims of communal conflict, where compromise operates in extremis, in the view that this throws into higher relief the processes that garner and sustain it.

Conceptually we envisage compromise to involve emotions, behaviours and relationships. Key research questions will be asked about each (which emotions, what behaviours, what sorts of relationship) as well as about the link between them (is it possible to separate feelings from the behaviours by which they are enacted, does it require reciprocity, is it necessarily interpersonal or can it adhere to groups). We also conceptualise compromise as being mediated within people's repertoire of stress responses by other affective-relational responders, particularly hope-anticipation, forgiveness-redemption and memory-remembrance. Thus we envisage that compromise is easier to

develop and maintain in a context where there is hope, forgiveness and shared memories.

We will be undertaking an ambitious programme of empirical research

*A house in the conflict zone in Sri Lanka.*



that consists of six linked projects, delivering cross-national, multi-method data, covering contemporary and historical conflicts. In the contemporary period the geographical spread covers arenas of conflict in Northern Ireland, South Africa and Sri Lanka, while historically we explore the cases of the US after the Civil War, West Germany after the fall of Nazism, Spain after Franco and the Lebanon after its civil war. We will be interviewing victims, organisers of victim support groups and general members of the public about their own feelings of compromise and reconciliation, as well as undertaking new social surveys on the topic.

We believe that the research will become part of its own subject matter by making a difference to the lives of victims. The research is designed as a form of public engagement. Public outputs will cover the full range of academic publishing and seminar workshops, as well as popular forms of writing and a radio/television series. The latter is the main form of public dissemination. We intend for the results to reach a wide audience as part of our commitment to life-enhancing public sociology.

**Professor John D Brewer and Professor Bernadette Hayes**  
*University of Aberdeen*

# Ancient DNA, cod and the origins of commercial trade in medieval Europe

Researchers at the University of Hull and the McDonald Institute for Archaeological Research in Cambridge have recently won a Leverhulme award to use ancient DNA from fish bones, found in medieval rubbish tips, to trace the early development of the trans-European trade in dried cod and the origin of today's large-scale commercial fishing.

The growth of trade in high-bulk staple products in medieval Europe underpinned both the rise of centralised kingdoms, urbanised market society and its concomitant environmental impact. Recent research in palaeoecology and environmental history has demonstrated the costs of expanding trade. An unprecedented consequence was the rapid expansion of sea fishing around 1000AD, with much of North-Western Europe cod being first fished during this period. The existence of this sea fishing revolution is now well established – in part through recent Leverhulme-funded research using zooarchaeology and stable isotope analysis, which has shown that a significant amount of cod consumed around the Baltic was imported from as far afield as Arctic Norway. These insights are possible because bone isotopic signatures of Baltic

Sea cod differ from North Sea and Arctic Norway fish, allowing their origin to be traced. However, isotopic techniques are less effective at distinguishing between potentially important fish exporting (e.g. Arctic Norway, Orkney, Shetland, northern Scotland) and importing regions (e.g. southern North Sea) in western Europe. It is crucial to determine whether long-range trade drove the early growth of North Sea fishing, since the importation of a basic staple food from distant waters clearly indicates a more profound economic and environmental imperative than local fishing. Fortunately, fish bones are also proving to be a viable source of ancient DNA, and genetic analysis offers a powerful tool for determining the origin of the more problematic North Sea samples.

A relatively new type of genetic marker, the SNP, is proving particularly promising for distinguishing between cod from different regions, potentially allowing individual fish to be traced back to their likely source population. SNP markers are also invaluable for investigating the genetic composition of highly degraded samples, such as our cod bones, since only small fragments of intact DNA are required.



*Cod and other bones from a medieval fishing settlement in Orkney (© Jennifer Harland).*

Hence, we will use zooarchaeological methods to assemble bone collections from local, non-traded cod, which will form the baseline genetic data for tracing potentially traded samples back to their original processing sites. Crucially, heads were typically removed during processing, before the dried fillets were traded, and thus skull bones can be assumed to be from local fish.

**Dr Bill Hutchinson, University of Hull**  
**Dr James Barrett, University of Cambridge**

# Patron of Exploration: *The Correspondence of Sir Joseph Banks*

When the 25 year-old naturalist Joseph Banks set off with James Cook on *HM Bark Endeavour* in 1768 he could not have foreseen that this would be the beginning of a career that would place him firmly at the centre of British scientific enterprise and exploration for the next five decades. Educated at Eton and then Christ Church, Oxford, and heir to extensive estates in Lincolnshire, Banks' early taste was for botany in particular, and for travel in pursuit of plants, animals and observation of other peoples and their way of life.

By the time of his return with Cook, Banks had amassed unprecedented Pacific collections of natural history and ethnography. Having settled in London by 1778 he was elected President of Britain's leading philosophical society, the Royal Society. A trustee of the British Museum, to which he channelled an endless stream of specimens, as well as a close friend of George III, whose garden at Kew he massively increased with new plant introductions, Banks went on to advise successive administrations on the business of discovery and settlement throughout the Indo-Pacific region.

Virtually no British expedition to the Indo-Pacific took place without his patronage or involvement. Over the years Banks developed links with government figures, naval commanders, naturalists, colonial officials, travellers, industrialists, inventors, philosophers and diplomatists, indeed with almost anyone and everyone who in some way or other shared his voracious interest in learning. Although a private individual, his ability to organise expeditions and to show how these might serve the national interest gained him the confidence of ministers who entrusted much of the planning of the principal missions launched from Britain through to Banks' death in 1820.

While their value to historians of science, empire, culture and literature has long been recognised, Joseph Banks' letters have mostly remained unpublished because his papers were scattered across the globe in the Victorian period. Compiled from a wide range of under-exploited archives, and judiciously chosen for what they reveal of the man himself, this major new edition of Banks' *Indian and Pacific Correspondence* will reveal for the first time the dazzling breadth and depth of Banks' correspondence by bringing



*Joseph Banks (after Joshua Reynolds).*

together in one series over 2000 letters to and from him. With full editorial apparatus and published by Pickering and Chatto, London, the volumes will be an indispensable resource for those studying Banks' career and also the progress of travel and discovery in the period as a whole.

Mostly unpublished, Banks' letters will tell the story of his involvement in such projects as the Pacific voyages of James Cook and their publication. They will show, often on a daily basis, how he emerged as a trusted adviser to the Admiralty and to government departments responsible for the foreign affairs of Britain at a time of enormous imperial expansion in the Indo-Pacific. Banks, for example, helped mount the breadfruit expeditions of William Bligh to transfer the breadfruit from the Society Islands to the West Indies in order to

increase food for plantation slaves. He suggested the settlement of New South Wales and promoted the interests of the new colony once it was established. Moreover, he supported the Macartney Embassy to China, launched in 1792, especially with its staffing and collections. Later on, he was pivotal in the planning and publication of the voyage of HMS *Investigator* under Matthew Flinders to survey the uncharted coasts of Australia, 1801–5. And he maintained important scientific links with the Honourable East India Company and India throughout this period.

**Mr Neil Chambers**  
**Nottingham Trent University**

Editor *The Indian and Pacific Correspondence of Sir Joseph Banks 1768–1820*, Pickering & Chatto, 7 vols. Vol. 1 Dec. 2008

# Voices from the Cuban Revolution

The voices of Cubans living on the island are largely absent from debates about the Cuban Revolution. This project redresses that silence. Drawing on more than one hundred in-depth life history interviews recorded from 2004 to 2008 with women and men of different walks of life, generations, racial, sexual and religious identities, and political views, the project aims to understand different people's sense of the achievements, limitations and failures of the revolutionary process.

What people remember, and are willing to talk about, is conditioned by political and personal circumstances. In Cuba, pressure to conform to the government's

divide in Cuba is generational. Cuban youth are highly critical of the status quo, and restless. For analytical purposes, I group the interviews into three strands: the revolutionary generation (Cubans who remember what life was like before Fidel Castro came to power in 1959); children of the revolution (Cubans whose birth coincided with the birth of the revolution); and the crisis generation (Cubans who came of age in the economic crisis following the fall of communism in Eastern Europe). Experts inside and outside Cuba contend that the young are pro-capitalist. Our findings reveal otherwise. Interviews with Cubans of the crisis cohort demonstrate that

The Cuban government was the facilitator as well as the main obstacle to the research. Official authorisation made a project of this magnitude possible, but it also drew attention to the sensitivity of the study. Twice, top-level politicians closed the project after they realised that people were speaking quite openly. However, in time they allowed the project to continue. Simultaneously, our research team of eight Cuban and two British scholars, working under my direction, learned how to minimise state control. The give-and-take demonstrated that Cuban leaders overseeing the project combined a degree of flexibility with realism.



Volunteer cane-cutters in the failed 10 million ton sugar harvest of 1970, Cuban magazine Bohemia (1969).

model of the good citizen encourages silence in the public sphere. However, in this project, many Cubans defied officialdom to describe the realities of life in the revolution. Oral histories tend to combine and conflate reflections about the past, present, and future. In Cuba, where the state sanctions a singular version of history, life histories necessarily complicate, and often contradict, the official story. This research project portrays the diversity of experiences and feelings about the revolution.

The project's findings confirm and contradict recent scholarship about the revolution. They lend weight to the view that now the most important social

they are anti-establishment, but not necessarily anti-socialist. Young narrators overwhelmingly call for a return to egalitarian policies. In short, they want to go back to egalitarianism, not to capitalism.

Other innovative findings concern gender and race. Almost every woman complains about machismo in the private sphere, and explains how the unequal division of household labour set back their career. Interviewees, regardless of racial identity, often repeat the official mantra that racism disappeared. However, many young Afro-Cubans defy taboos surrounding race, and describe ways that racism affects, sometimes blights, their lives.

The book I am completing, *Cubans' Voices: Lives in the Revolution*, is written for a broad audience. It will disseminate the research results to scholars, policymakers and readers interested not only in Cuba, but in the successes and failures of socialism.

**Professor Elizabeth Dore**  
*University of Southampton*

Professor Dore was supported by a 3 month Research Fellowship in 2008.

*Cover image: Lidia Limonta Mineto (left) and her friend, Eva, are retired seamstresses who live in Santiago de Cuba (image © Olisam).*

# Development of a rapid carbonate budget assessment protocol for coral reefs

There are currently major concerns about the health of coral reefs and their resilience to a wide range of environmental related disturbances. Changes in reef condition are often discussed in terms of *ecological phase shifts* – whereby reef communities undergo transitions to states of persistent low coral and high macroalgal cover – the relative abundances of which are widely used as a proxy for ‘reef health’. However, the existence of coral reefs and their ability to accumulate calcium carbonate is dependant not only on coral cover and coral carbonate production, but also other carbonate producing and eroding organisms and processes. Some add additional carbonate to the reef (for example calcareous algae) whilst others erode the reef substrate (for example fish and urchins that graze on corals). The relative rates at which these processes operate thus interact to control the net rate of carbonate accumulation on a reef – the balance between which can be determined quantitatively using carbonate budget approaches. A carbonate budget is the sum of gross carbonate production from all benthic carbonate producers (corals, calcareous algae), as well as sediment produced within or imported into the reef, less that lost through biological or physical erosion, or sediment export. The resultant net rate of carbonate

accumulation is a quantitative measure of the functional status or ‘health’ of a reef in terms of its ability to add carbonate to, or to maintain, its structural integrity – effectively determining whether a reef exists in a state of net accumulation, stasis or erosion.



*Corals are the primary carbonate producers in most reef environments, but rates of reef accretion are determined not only by coral growth rates but also by other carbonate producing processes, set against the erosional activities of organisms such as fish and urchins (image courtesy of Nick Hobgood).*

The relative roles of these carbonate cycling processes are, however, rarely considered in existing reef health assessments and standardised approaches to quantifying carbonate budgets do not exist. However, recent research has provided a conceptual framework within which to consider these different reef budgetary states and highlighted the potential to track temporal changes in rates of reef carbonate production linked to transitions in reef ecological states. In this context, the primary aim of this research network is to develop a field-based methodology for undertaking rapid carbonate budget assessments – effectively developing the foundations for a global network of systematic studies of reef carbonate budgets over space and time. The network is drawn from research partners in the UK, Australia, New Zealand, Canada and the United States and will undertake field-based development of rapid carbonate budget methodologies at sites in the Bahamas and Barbados, and utilise this work to develop a web-based budget assessment protocol for dissemination to other reef researchers and reef management organisations.

**Professor Chris Perry**  
Manchester Metropolitan University

## Pre-Columbian human land-use and impact in the Bolivian Amazon

Amazonia has long been considered one of the last untamed wilderness areas on the planet, still largely untainted by human activities. Although humans have lived here for many millennia, until recently the long-accepted paradigm was of the noble savage living in harmony with these ancient forests, existing as small tribes with little discernable impact upon them. In recent years, though, increasing archaeological evidence for sizeable and complex, Pre-Columbian societies (pre-European contact – 1492) within the Amazon lowlands, such as habitation earth-mounds and raised fields in the forest-savannah mosaic of lowland Bolivia, has challenged this virgin wilderness paradigm, pointing to larger scale human impacts than merely local-scale slash-and-burn agriculture. However, there is intense debate over the geographic scale of Pre-Columbian human impacts within Amazonia, as well as their ecological legacy. Some still argue for a predominantly virgin rainforest wilderness, whilst others consider the very notion of virgin forests to be a myth and instead argue that pre-1492 Amazonia was an intensively managed domesticated landscape or cultural parkland.

Resolving this issue has far-reaching implications. If pre-Columbian peoples actively altered forest biodiversity by selectively favouring economically important/edible species over others, then the conservation community needs to be aware that these ecosystems may not only be highly resilient to indigenous land-use practices, but the very biodiversity that conservationists seek to conserve may itself be a legacy of centuries or millennia of human intervention.

Analyses of starch grains and phytoliths from nearby earth-mound ceramics and raised field soils will reveal which plant species were cultivated and processed for food. A combination of GIS (geographical information system) and radar and optical remote sensing will provide detailed mapping of the study area, and reveal what proportion of forest is underlain by pre-Columbian raised fields.

Synchronous increases in charcoal, weeds, crops, fruit trees, and open ground, will demonstrate strong anthropogenic impact, whilst the reverse of these trends would signify the onset of forest recovery,

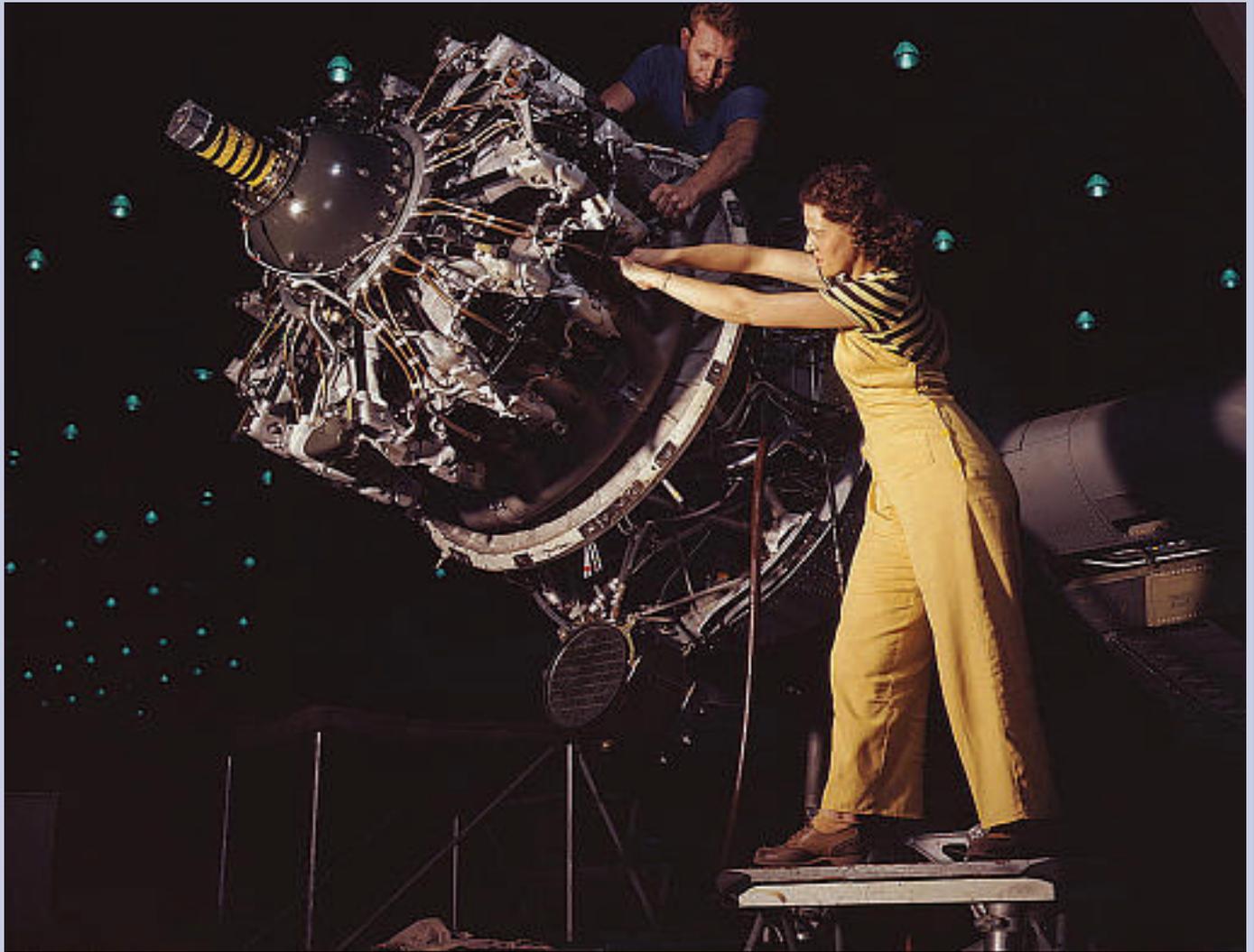


*Pre-Columbian ceramics excavated from a forested habitation earth-mound in the Llanos de Mojos, Bolivian Amazon (photo courtesy of Heiko Prümers (co-PI), German Archaeological Institute).*

especially if coincident with post-1492 indigenous population collapse. Cross-correlation with lake-level changes in the adjacent high Andes will enable human *versus* climatic drivers of forest change to be differentiated from one another.

**Dr Francis Mayle**  
University of Edinburgh

# Gender equality in relationship transitions



*Women are trained to do precise and vital engine installation detail in Douglas Aircraft Company plants, Long Beach, Calif. Alfred T Palmer, October 1942 (Library of Congress, Prints & Photographs Division, FSA-OWI Collection, LC-DIG-fsac-1a35357).*

More partnered women in affluent economies remain in employment for much of their lives. This greater gender employment equality, however, presents something of a paradox for families. On the one hand, given the greater uncertainty in men's employment in post-industrial labour markets, wives' employment provides additional family economic security. This should be good for family by reducing financial problems. On the other hand, researchers have long predicted that a wife's greater economic independence from a male breadwinner predicts far less stable marriages or relationships.

The cross-national evidence as to whether a partnered woman's employment is good or bad for a relationship is similarly mixed. So, too, is the nature of female employment across countries. Partnered Italian women are far less likely to be employed than those in Finland, Norway, Sweden or the United States. Married women in Australia, Belgium, France, the

Netherlands, and West Germany are likely to work part-time, although the quality of part-time work varies across these countries. Women in East Germany, Finland, Sweden, and the United States are more likely to work full-time. The gender wage gap varies substantially across countries, which affects not only women's absolute ability to be economically independent, but her relative economic equality with her partner.

The Gender Equality in Relationship Transitions (GERT) Network brings together sociologists, demographers, and economists from Australia, Belgium, China, East and West Germany, Finland, France, the Netherlands, Norway, Sweden, and the United States who are experts in their national datasets and familiar with the statistical techniques for analysing couples over time. The goals of the GERT Network are threefold. The first goal is to meet for a two-day workshop to finalise a harmonised model that will

work with the diverse national datasets. Each member of the network will individually pursue the second goal, analysing their national dataset in order that we might compare effects of partnered women's employment on relationship stability across countries. The selected countries represent a range of usual levels and type of female employment, allowing us to assess how the individual effects of women's work hours and wages vary in context. In doing so, we hope to highlight which factors reduce any negative relationship between partnered women's employment and relationship stability. The findings will be shared at a second workshop the following year. Final analyses will be incorporated into an edited volume that offers a more definitive statement as to whether economic independence or security matters more to modern couples.

**Dr Lynn Prince Cooke**  
**University of Kent**

# The Fields of Britannia: landscape transition in the Roman to medieval periods

One of the most distinctive features of the British landscape is its countryside characterised by an intricate pattern of agricultural fields. Archaeological and historical research has shown that in many areas the field systems of today were in existence by the late medieval period, but when and how these fields came into being is less clear. The 'Fields of Britannia' project will use a range of techniques to systematically explore for the first time how far these landscapes originated in the Roman period. This will form an important and innovative contribution to the current debate over one of the major formative periods in British history: the nature of the transition from Roman Britain to medieval England.

The contribution that the landscape of Roman Britain made to the medieval and modern countryside will be explored through four themes. The first will be to examine the relationship between Romano-British field systems (that have been dated

through excavation) and the overlying medieval and later field systems. In the far west of Cornwall, for example, we know that the present pattern of fields has remained in use since the Roman period, while elsewhere in Britain the Romano-British landscape was clearly abandoned in the early medieval period with later, medieval, field systems overlying their Roman predecessors unconformably. This project will explore which of these landscape histories was more common, and whether this varies in different parts of the country.

Another theme will be to explore the date of a distinctive type of modern field system whose clearly planned layout has led to the term 'co-axial' to be used to describe them. Circumstantial evidence suggests that some at least may be Roman in date.

In addition to these possible examples of Romano-British field systems that have survived in use, the project will also look at whether there was continuity or



*A landscape of continuity: this distinctive type of field system, seen here around the hamlet at Rosemergy in the far west of Cornwall, is Romano-British in origin and has remained in use ever since.*

discontinuity in patterns of land-use using 'palaeoenvironmental' evidence (plant and animal remains) preserved on archaeological sites and in natural deposits such as peat bogs (where the waterlogging has prevented bacterial decay of organic material).

**Professor Stephen Rippon**  
*University of Exeter*

## Small is beautiful Mesofossils and spores in Lochkovian ecosystem reconstruction

The colonisation of the land by plants transformed planet Earth not only because it involved the evolution of new groups of land plants such as bryophytes and the ancestors of vascular plants, including ferns, horsetails and club mosses and, ultimately, flowering plants, but also because of the consequences of their interaction with both ground and atmosphere. Their decaying remains produced humus-rich soils, which were new habitats for early land animals, while their roots, not only physically broke up rock, but, more importantly, together with bacterial and fungal decomposers, introduced carbon dioxide in solution that resulted in rock weathering and a draw down of carbon dioxide from the atmosphere.

Fossils of these early land plants are very rare and usually formed when plants were swept by floods into rivers and buried in sediment, eventually being converted into films of coal. Very different and far more informative are the fossils produced when ancient wild fires swept through vegetation, because these pieces of fossil charcoal show preservation of cells, as well as maintaining the three dimensional shape of the original plant.

Examples dated at approximately four hundred million years old, which are particularly noteworthy for their small size, have been found in the Welsh Borderland. They rarely exceed a few millimetres in length and indicate a previously undetected facet of early land vegetation – a short 'turf'. These charcoaled plants, probably produced by a smouldering fire, will form the nucleus of the research.

Because the vast majority of early land plants are architecturally very simple –



*Scanning electron microscope (SEM) photograph of Cooksonia, a representative of the earliest land flora; scale bar = 1mm.*

essentially clusters of branching stems with reproductive structures (sporangia) variously positioned – their affinities are largely detected from their cellular construction and their dispersal units (spores). Cellular preservation in charcoal is investigated using a scanning electron microscope, which can detect structures as small as a thousandth of a millimetre and produce beautiful three dimensional images such as those illustrated here. Preliminary studies have indicated great diversity in the charcoaled remains and have revealed plants related to vascular plants as well as plants close to bryophytes that are representative of the earliest land vegetation. We have also found remains of fungi and even possibly lichens, not to mention a number of more enigmatic forms that seem impossible to assign to any living group. Many discoveries in palaeontology are serendipitous, we simply do not know what we will find; this funding will allow us to screen suitable rock matrices in a systematic way and so increase our chances of making major advances in all aspects of an early terrestrial ecosystem.

**Professor Dianne Edwards**  
*Cardiff University*

# Grants agreed by the Trustees at their July 2009 meeting

The numbers in parentheses are the awards duration in months.

## Research Programme Grants

<b>Professor Stuart Lane</b> <i>University of Durham</i>	Tipping points: mathematics, metaphors and meaning	£1,674,345 (60)
<b>Professor John Brewer</b> <i>University of Aberdeen</i>	Compromise after conflict	£1,267,093 (60)

## Embedding of Emerging Disciplines

<b>Professor Jeff Waage</b> <i>London School of Hygiene &amp; Tropical Medicine</i>	The agriculture, food and health nexus	Approx. £3.5m (60)
<b>Professor John Pendry</b> <i>Imperial College London</i>	Metamaterials and electromagnetic fields	Approx. £4.8m (60)

## Research Project Grants

### Applied sciences (including architecture)

<b>Professor Dianne Edwards</b> <i>Cardiff University</i>	Small is beautiful: mesofossils and spores in Lochkovian ecosystem reconstruction	£150,513 (36)
<b>Dr Julian Padget</b> <i>University of Bath</i>	Formal techniques for sensor network design, management and optimization	£161,631 (36)
<b>Dr Simon Neil Daff</b> <i>University of Edinburgh</i>	Developing a strategy for the construction of bioelectronic nanodevices	£144,443 (36)
<b>Professor Adrian North</b> <i>Heriot-Watt University</i>	The impact of music on stress and immunity to illness among dairy cattle	£55,827 (12)
<b>Professor Mike Maher</b> <i>University of Leeds, Institute for Transport Studies</i>	Methods for optimization of noisy complex combinatorial problems in transport	£67,311 (18)
<b>Professor Perumal Nithiarasu</b> <i>University of Swansea</i>	Exploring the applicability of human body blood flow network models	£72,822 (24)
<b>Dr Kate Robson Brown</b> <i>University of Bristol</i>	Ant nest excavation behaviour: a novel investigation using micro CT technology	£51,618 (12)
<b>Professor Michael Todinov</b> <i>Oxford Brookes University</i>	High-speed algorithms for the output flow in repairable flow networks	£91,008 (36)

### Basic sciences

<b>Dr Martin Attfield</b> <i>University of Manchester</i>	Crystal growth of nanoporous metal organic framework (MOFs) materials	£138,826 (36)
<b>Professor Andrew Gilbert</b> <i>University of Exeter</i>	Symmetry and topology of magnetic fields	£114,730 (36)
<b>Dr Joshua Benno Edel</b> <i>Imperial College London</i>	High-throughput nanofluidic devices for rare-event bioanalysis	£155,334 (36)
<b>Dr Robert Asher</b> <i>Department of Zoology, University of Cambridge</i>	Evolution of developmental sequences in basal placental mammals	£110,454 (24)
<b>Dr Francis Mayle</b> <i>University of Edinburgh</i>	Pre-Columbian human land-use and impact in the Bolivian Amazon	£248,049 (36)
<b>Dr Andrew Cammidge</b> <i>University of East Anglia</i>	Fairground attraction – first steps towards new molecular machines	£138,244 (30)
<b>Professor Gareth Jenkins</b> <i>University of Glasgow</i>	Quest for the Holy Grail of plant photobiology: a UV-B photoreceptor	£233,639 (36)
<b>Dr Paul Downing</b> <i>University of Wales, Bangor</i>	TMS and fMRI investigations of the action perception brain network	£101,333 (24)
<b>Professor Stephen C Fry</b> <i>University of Edinburgh</i>	New cell-wall polysaccharides and enzymes that remodel them in charophytic algae	£227,879 (36)
<b>Dr Richard Pancost</b> <i>University of Bristol</i>	Lipids of geothermal organisms: survival strategies in extreme environments	£101,024 (24)
<b>Dr Rebecca Goss</b> <i>University of East Anglia</i>	Elucidating the intriguing biosynthesis of pacidamycin	£111,517 (24)

<b>Professor Wilhelm Huck</b> <i>Department of Chemistry, University of Cambridge</i>	Controlling stem cell shape and differentiation via surface engineering	£160,549 (36)
<b>Dr Tom Tregenza</b> <i>University of Exeter</i>	Sexual dimorphism and speciation: alternative outcomes of evolutionary radiation	£126,542 (36)
<b>Professor Mel Slater</b> <i>University College London</i>	The exploitation of immersive virtual reality for the study of moral judgements	£179,339 (36)
<b>Dr Nicholas Newton-Fisher</b> <i>University of Kent</i>	Social complexity, grooming, and the evolution of intelligence	£103,916 (36)
<b>Dr Ian Summers</b> <i>University of Exeter</i>	Mechanisms of mechano-transduction in pacinian corpuscles	£149,568 (36)
<b>Dr William Hutchinson</b> <i>University of Hull</i>	Ancient DNA, cod and the origins of commercial trade in medieval Europe	£209,013 (36)
<b>Dr Tim Albrecht</b> <i>Imperial College London</i>	Solid-state nanopores for protein mass fingerprinting	£106,442 (24)
<b>Professor Tim Lenton</b> <i>University of East Anglia</i>	Modelling evolution, ecology and biogeochemistry of marine microbial ecosystems	£249,917 (36)
<b>Professor Alfried Vogler</b> <i>Natural History Museum</i>	The beetle tree-of-life updated: an expanding resource for taxonomy	£229,406 (36)
<b>Dr Scott Cockroft</b> <i>University of Edinburgh</i>	Nanopore-based single-molecule biophysics: probing enzyme conformational dynamics	£76,380 (42)
<b>Professor Trevor Beebee</b> <i>University of Sussex</i>	Adaptive variation, “northern purity” and “southern diversity”	£78,181 (24)
<b>Dr Jo Saunders</b> <i>University of Swansea</i>	Interactions between verbal and odour memory	£94,719 (30)
<b>Dr Michaele Hardie</b> <i>University of Leeds, Faculty of Mathematics and Physical Sciences</i>	Targeted structures for new microporous materials	£96,450 (24)
<b>Professor Timothy H Clutton-Brock</b> <i>Department of Zoology, University of Cambridge</i>	The evolution of extended longevity and deferred senescence in cooperative mammals	£61,977 (36)
<b>Dr Andrew Carr</b> <i>University of Leicester</i>	Novel bio-molecular insights into dryland ecosystem dynamics	£92,504 (24)
<b>Professor Paul Gilbert</b> <i>University of Derby</i>	Well-being and its relationship to processing of threat and safety	£82,345 (18)

## Economics, business studies, industrial relations

<b>Dr Neophytos Lambertides</b> <i>Aston University</i>	Payout policy and default risk	£95,236 (24)
<b>Dr Mark Taylor</b> <i>University of Essex</i>	Job search in the UK 1990-2006	£58,450 (21)
<b>Dr Holger Breinlich</b> <i>University of Essex</i>	Channels of firm expansion and contraction: determinants and relative efficiency	£75,396 (24)

## Fine and performing arts

<b>Dr Yvette Hutchison</b> <i>University of Warwick</i>	Performing memory: theatricalising identity in contemporary South Africa	£140,826 (42)
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## Humanities

<b>Dr Andrew Reynolds</b> <i>University College London</i>	Landscapes of governance: assembly sites in England, 5th-11th centuries	£280,674 (36)
<b>Mr Neil Chambers</b> <i>Nottingham Trent University</i>	The Indian and Pacific correspondence of Joseph Banks 1768-1820	£162,941 (36)
<b>Dr Louise Sylvester</b> <i>University of Westminster</i>	Medieval dress and textile vocabulary in unpublished sources	£158,560 (36)
<b>Professor Peter Alexander Rowley-Conwy</b> <i>University of Durham</i>	Late-date 'rod' microlith sites and the British Mesolithic-Neolithic transition	£112,867 (24)
<b>Professor Stephen Rippon</b> <i>University of Exeter</i>	The Fields of Britannia: landscape transition in the roman to medieval periods	£241,419 (36)
<b>Dr Christine Wall</b> <i>London Metropolitan University</i>	Constructing post-war Britain: building workers' stories 1950-70	£147,682 (24)
<b>Dr Robert Lee</b> <i>University of Teesside</i>	Church and monarchy: religious and royal ritual in north-east England 1837-1953	£171,236 (36)
<b>Professor Seán McConville</b> <i>Queen Mary, University of London</i>	Archival preparation of interviews (1920-2000) for deposit in British Library	£61,299 (12)
<b>Dr Mahmoud Riad Nourallah</b> <i>University of Westminster</i>	Editing the hitherto-unpublished 1914-1918 diaries of Wilfrid Scawen Blunt	£55,365 (24)

## Law, politics, international relations

<b>Professor Sandra Halperin</b> <i>Royal Holloway, University of London</i>	Global development: the role of trans-local elites in Afro-Eurasia	£228,277 (36)
<b>Professor Hugh Bochel</b> <i>University of Lincoln</i>	Parliamentary scrutiny of the UK intelligence and security services	£96,879 (24)
<b>Dr Frances Pinter</b> <i>London School of Economics and Political Science</i>	How global civil society frames the intellectual property rights reform agenda	£43,292 (24)

## Social studies (incl. anthropology, geography, social psychology)

<b>Dr David Nash</b> <i>University of Brighton</i>	Societal responses to El Niño-related climate extremes in southern Africa	£193,063 (36)
<b>Dr Cheryl McEwan</b> <i>University of Durham</i>	Ethical production in South Africa: advancing a cultural economy approach	£180,722 (30)
<b>Dr Stephen Farrall</b> <i>University of Sheffield</i>	Tracking progress on probation: long-term patterns of desistance and reform	£191,346 (27)
<b>Dr Humphrey Southall</b> <i>University of Portsmouth</i>	Data models for actor-networks in historical GIS: workers and localities in C19	£85,794 (24)
<b>Professor Ian Loader</b> <i>Centre for Criminological Research, University of Oxford</i>	Culture in transition? An observational study of private police at work	£45,814 (12)
<b>Dr Michaela Gummerum</b> <i>University of Plymouth</i>	Do primary school children exchange information during group collaboration?	£42,521 (12)

## Education

<b>Dr Victoria Murphy</b> <i>Department of Educational Studies, University of Oxford</i>	The influence of second language learning on first language literacy skills	£63,314 (15)
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## International Networks

### Humanities

<b>Dr Josephine McDonagh</b> <i>King's College London</i>	Commodities and culture in the colonial world, 1851-1914: travel, technology and transformation	£80,875 (27)
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### Basic sciences

<b>Dr Simon Martin Hooker</b> <i>Department of Physics, University of Oxford</i>	International network on femtosecond x-ray sources driven by plasma accelerators	£124,961 (36)
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## Social studies (incl. anthropology, geography, social psychology)

<b>Dr Lynn Prince Cooke</b> <i>University of Kent</i>	Gender equality in relationship transitions	£25,675 (18)
<b>Dr Tom Slater</b> <i>University of Edinburgh</i>	Edge work: comparative studies in advanced urban marginality	£63,591 (36)
<b>Dr Mark Tranmer</b> <i>University of Manchester</i>	Multilevel network modelling group	£97,562 (36)

## Applied sciences (including architecture)

<b>Professor Chris Perry</b> <i>Manchester Metropolitan University</i>	Development of a rapid carbonate budget assessment protocol for coral reefs	£93,619 (24)
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## Artists in Residence

<b>Mark Adams</b> <i>Museum of Archaeology and Anthropology, University of Cambridge</i>	Photography	£11,000 (3)
<b>Anna Woodford</b> <i>University of Durham</i>	Creative writing/poetry	£12,500 (8)
<b>David Harradine</b> <i>University of Brighton</i>	Performance art/installation	£12,070 (9)
<b>Richard Talbot</b> <i>Roehampton University</i>	Performance art	£12,000 (10)
<b>Mariano Molina</b> <i>University of Leicester</i>	Visual arts	£12,311 (5)