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The Leverhulme Trust is an admirably rewarding place of work. However, when I first sat down at the Director’s desk in 2011, I did not foresee that one particular and pleasurable consequence of my employment here would be that, for so long at least as I occupied this post, I would have unrestricted access to the Trust’s in-house library – one of the most diverse and surprising collections of scholarly monographs that I have encountered during my almost four decades as an academic.

The book collection is often the first thing that visitors who are new to our building notice and comment upon. It has been acquired – one can only say willy-nilly – over many decades, through the generosity of our grant-holders, who have assumed (rightly) that Board Members and employees of the Trust might be interested to see some of the published outcomes from the research that we fund. The rise of specialist academic journals and recent explosion in online publishing seem scarcely to have diminished the steady flow of hard-copy books into the office. These are indeed gratefully received and often browsed or even borrowed by the Trustees and staff.

The quality and diversity of the volumes themselves is remarkable. Over the years, many have won prestigious scholarly or literary prizes, while others (especially the monographs on the visual arts and art history) are just gorgeous artefacts, wonderful things to hold and peruse. Some idea of the variety can be given simply by mentioning the books that I myself have borrowed and read most recently: Steven Mithen’s Thirst: Water and Power in the Ancient World (2012); Scott Anthony and Oliver Green’s British Aviation Posters (2012); Catherine Merridale’s Red Fortress: the Secret Heart of Russia’s History (2014); Stanley Prusiner’s Madness and Memory: the Discovery of Prions (2014), and Dave Goulson’s account of his life spent studying bumblebees (A Sting in the Tale, 2013). The research that is reported in each of these publications was wholly or partly funded by the Trust, so they are a testimony to the rich diversity of scholarly work that has been supported over the years.

Part of the fun in consulting the book collection is choosing which volume to read next. That element has been enriched since the office itself was refurbished a couple of years ago, because the removals company which stored the books whilst the redecoration took place first packed them all away in no particular order into unnumbered boxes, and then returned them to the new shelves in similarly random fashion. This plays havoc with my residual Calvinist sense of order, and seriously offends the professional sensitivities of a colleague who had an earlier career as a librarian, but since the chaotically-arranged collection offers good entertainment (though also some puzzlement) for visitors to the office we are inclined to leave well alone.

Professor Gordon Marshall

DIRECTOR’S NOTE

THE BIG READ

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For more profiles of current research and full awards listings, please visit the Leverhulme Trust website (www.leverhulme.ac.uk). To order additional copies of this newsletter, please contact Bahia Sheppard at bsheppard@leverhulme.ac.uk.

BUDGET TIPS – HELPFUL DOS AND DON’TS FOR PREPARING AN APPLICATION BUDGET

A majority of our schemes ask for budget information. We hope that the following tips are useful for potential applicants and university research offices.

• Do consult with your finance office at an early stage regarding costings, in particular for salary, National Insurance and superannuation costs.

• Do include inflation for all non-salary costs, e.g. technical assistance, consumables, travel costs. But don’t include inflation in the salary budget. The Trust will endeavour to cover inflationary increases subject to any maximum grant value.

• Do include salary increments, but don’t include estimates for future pay awards.

• Do provide a full justification/breakdown, where requested, for the items requested. Explain how the items directly relate to the research proposed.

• Do provide a breakdown when multiple costs are being included under the same heading, e.g. consumables, research trips. Provide details of the volume and numbers of units where appropriate.

• Percentage of time spent on a project and/or percentage of replacement teaching requested: do provide this as a percentage of time over the whole grant. Don’t confuse this with the percentage FTE (Full Time Equivalent), which in some cases is different.

• Do consult the Frequently Asked Questions on the Trust’s website and the help notes specific to that scheme.
Jo Gill’s study will be the first to evaluate the exciting and mutually stimulating relationship between modern American poetry and architecture; taking as its starting point Hart Crane’s assertion that “poetry is an architectural art”.

Modern architecture and modern poetry may seem to have little in common – apart, perhaps, from their shared propensity to provoke strong reactions in viewers and readers. My new study of Modern American Poetry and the Architectural Imagination, supported by a Research Fellowship, will argue that there is more to this relationship than meets the eye. Indeed, it will propose that the two fields emerged and developed in close tandem and in a spirit of often sympathetic engagement. By examining the work of a number of poets and architects, I aim to trace the process by which American poetry began to think and to see architecturally, just as architecture learned to imagine, and to express itself, in ways that we might regard as poetic.

The story opens in the early decades of the twentieth century – a time of transatlantic exchange and influence when American poets such as Gertrude Stein and T. S. Eliot immersed themselves in European culture while European architects including Le Corbusier and Mies van der Rohe were introduced for the first time to the United States via an exhibition in New York City of the so-called ‘International Style’. My research will examine the ways in which poetry and architecture were stimulated by and, in turn, responded to each other during this time of great social and technological change, as seen, for example, in innovative approaches to shape, line, perspective or ornament. As importantly, I am interested in how both disciplines – in sometimes wary dialogue – began to rethink their form and function.

Wallace Stevens’ question, in the first line of his 1918 poem, Architecture, speaks simultaneously for his own work, for American poetry more generally, and for the architecture of the new century: “What manner of building shall we build?”

The next generation of poets (including figures such as Elizabeth Bishop, Robert Lowell and John Updike) took up some of these debates. Writing at a time of rapid urban and suburban development – both in the United States and elsewhere, for example in the Brazil that was Bishop’s home for many years – they began to explore the public role of architecture and of poetry alike, using one as a lens through which to view the other. My research will refer to unpublished papers (manuscripts, plans, correspondence) from these and other poets’ and architects’ archives in order to map common ground. In the present day, a range of architects, including Robert Venturi, Denise Scott Brown and Daniel Libeskind, have drawn on the motifs and language of poetry in articulating their architectural vision; in like manner, contemporary poets have looked to the built environment for metaphors appropriate to their own poetics. The final phase of my research will examine the work of present-day poets and architects in order to arrive at an understanding of the extent to which these kinds of exchange have helped to shape the terrain.

Professor Jo Gill
University of Exeter
Research Fellowship

ABOVE New York City from Brooklyn Bridge © Jo Gill.
The ageing of British gerontology

Ageing, it now seems, is everybody’s business yet our understanding of ageing and older people often has very little basis in the body of gerontological research; a new project, led by Miriam Bernard and Mo Ray, looks at the evolution of this increasingly important inter- and multidisciplinary field.

Wherever we turn these days, older people are visible in the media, on television and radio, and in advertisements. Actors and celebrities are publishing their reflections about ageing at a rapid rate of knots; other public figures are writing or making documentaries about living with, or caring for, older family members – often with Alzheimer’s disease or other dementias; and the anti-ageing and beauty industry continually strives to persuade us to stave off the signs of growing older for as long as possible. However, whilst many gerontologists have always been interested in the relationship of their discipline to widespread cultural attitudes about ageing, much popular and societal understanding often has very little basis in the now speedily accumulating body of gerontological research. As yet, we have not consciously examined the evolution of this inter- and multidisciplinary field: a field which is fundamental to addressing what has been identified as one of the twenty-first century’s major societal and global challenges, namely ageing.

In this project, we will be looking critically at the ways in which gerontological knowledge in Britain has developed and changed over the past 40–50 years. Theoretically, conceptually and methodologically, there is no agreed consensus about what gerontology consists of, how it is best defined, or where its boundaries may lie. For some, the proliferation of terms, specialities and contributory disciplines which the study of ageing has spawned, calls into question the status of gerontology; for others, it is evidence of the dynamic nature of the field. This is precisely one of the reasons we feel it merits exploration.

In order to do this, our approach is not to try and review or synthesise gerontological research per se but to look, instead, at what we can learn from people who have been active in building the gerontological knowledge base since the establishment of the British Society of Gerontology (BSG) in 1971. In-depth, in-depth, in-depth, interviews will capture their thoughts, ideas and motivations as we ask them to reflect on the past, present and future of ageing research. The interviews will be contextualised, supplemented and integrated with a detailed examination of the archives of the BSG, enabling us to chart the growth of gerontology, examine shifts in disciplinary contributions and in thinking about, researching and theorising ageing, and identify who the key contributors and academic leaders have been over time. The project will leave a tangible legacy including a library of ‘talking heads’, as well as outputs such as a large-format ‘popular’ book, DVD and exhibition intended to engage the wider public. In so doing, we hope the project will help shed light on the gap between popular attitudes and academic understandings, challenge some of the all too prevalent, damaging but popular deficit and decline narratives of ageing, and inform future research directions.

Professors Miriam Bernard and Mo Ray
Keele University
Research Project Grant

Predicting solar energetic particle radiation at Earth and Mars

Far from being a quiet neighbour, our Sun can release enormous amounts of energy during events called solar flares and coronal mass ejections. A new project led by Silvia Dalla investigates how to forecast the radiation risk caused by energetic particles from these events.

Solar electrons and ions accelerated to very high speeds during flares and coronal mass ejections are called solar energetic particles (SEPs). They can escape the Sun’s atmosphere and propagate through space to reach the Earth and other planets. The radiation due to SEPs poses a health risk to astronauts, as well as being harmful to spacecraft instrumentation. An inadequately shielded astronaut may receive a dose large enough to cause acute radiation sickness, or even a fatal dose for a very big event. SEPs may also disrupt high frequency communications and GPS. As our reliance on technology increases, and to ensure safe space exploration, it has become vital to build space weather tools able to forecast the radiation risk posed by SEPs.

How do SEPs propagate through space to reach locations near Earth or Mars, and what will be their impact? My research aims to answer this question by developing models of how SEPs are influenced by the magnetic fields of interplanetary space, in their journey from the Sun. The physical processes taking place determine whether or not a number of particles sufficient to produce a significant radiation hazard will arrive at a given location in space.

I will be linking the results of sophisticated simulations of the magnetic fields in space with a new model able to trace the SEP trajectories all the way from the Sun to distances millions of kilometers away from it. From the SEP flux, radiation doses that would be experienced near Earth and Mars will be calculated. Therefore, in addition to advancing our understanding of SEP physics, the research will also produce a practical output with applications to operational space weather systems.

Dr Silvia Dalla
University of Central Lancashire
Research Project Grant

ABOVE Artist’s impression showing a Coronal Mass Ejection (CME) erupting from the Sun and travelling through space towards Earth (credit: NASA).
From the earliest Victorian hand-cranked films through to contemporary mobile digital culture, Bruce Bennett examines the history of cycling on screen and the influence on all aspects of life

Beginning with the first film shown at the very first film screening (on 28 December 1895), which shows several workers cycling out of the photographic factory owned by pioneering film-makers Auguste and Louis Lumière, the history of world cinema is full of bicycles. Cycling is a theme that has been explored in a wide variety of films over the last 120 years, ranging from slapstick silent comedies and children’s films, social realist dramas and art-house films, through to public information films and documentaries.

This project will trace this rich history of cycling on screen from Victorian cinema through to the present, exploring the shifting symbolic significance of cycling. A ubiquitous machine with which most of us have an intimate relationship from infancy onwards, the bicycle has always been more than a practical means of transport; cycling is also an expressive activity that is loaded with meaning. In different contexts, for example, cycling can be a sign of social class, a tool of environmental activism and political protest, or an expression of nonconformity and individual independence. Cinema offers us a crisply focused lens through which to examine the social and symbolic practice of cycling, and to explore the changing cultural and historical geographies traversed by cyclists. For instance, the celebrated Italian film, The Bicycle Thieves (De Sica, 1948) uses the bicycle as a symbol for the precarity of working-class life in post-war Rome, while Wadjda (al-Mansour, 2012), the first Saudi Arabian feature film by the country’s first female director, tells the story of a young girl who enters a competition to recite the Qur’an in order to raise the money to buy a bike in defiance of social disapproval of female cyclists. Hollywood blockbuster ET: The Extra-Terrestrial (Spielberg, 1982) offers one of the clearest depictions of the liberating potential of the bicycle with the exhilarating motif of children flying through the air, while the feature-length documentaries, Stars and Water-Carriers (1973) and Sunday in Hell (1976), by Danish director, Jørgen Leth, explore the machismo and punishing spectacle of professional cycle sport.

Cycling and cinema emerged at more or less exactly the same time in the late nineteenth century, and they epitomise the social and sensory reconfigurations propelled by the revolutionary transformations of industrial modernity. The cinema and the bicycle are both technologies of mobility that allow us to move (literally and virtually) much further and faster than was previously possible, altering our relationship with space and time. In media theorist Marshall McLuhan’s terms, they are examples of communications media, prosthetic extensions of the body that alter ‘the patterns of interdependence among people’ as well as ‘the ratios among our senses’. Thus, in tracking the tandem history of cycling and cinema this project also tells a story about the way in which lived experience in industrial and post-industrial society has been structured by media technologies.

My project will conclude by examining some of the latest developments in the ‘post-cinematic’ digital screen cultures of cycling. These include exercise bikes linked to video systems that allow you to embark on virtual rides around the globe, wearable HUD technologies such as Google Glass, GPS systems that allow cyclists to map their rides on screens, and, finally, the development of lightweight digital cameras that allow cyclists themselves to become filmmakers, editing and uploading their films onto sites like YouTube, bringing this history of cinema and cycling full circle.

Dr Bruce Bennett
Lancaster University
Research Fellowship

www.leverhulme.ac.uk
A visual economy of nineteenth-century photography from southern Africa

Christopher Morton’s study will examine the visual economy of nineteenth-century ethnographic photographs of southern Africa’s peoples, helping to explain later developments in their history and culture

In the nineteenth century, popular and scientific images of southern Africa circulating in Europe were drawn from a rather limited visual vocabulary. Travel albums compiled by European visitors might typically include the various sights of the sub-continent, such as Table Mountain in Cape Town, the gold mines of the Witwatersrand, or a Zulu family or chief in front of a beehive hut in Natal. More specialist racial type imagery was also produced for the anthropological market, which was then copied and circulated widely in scientific circles. Although some of these specific photographic histories are now well known, a more general understanding of the production, circulation, communication and exchange of photographs from southern Africa to Europe in the period as part of a visual economy is still lacking.

In my project I will investigate why certain types of imagery were produced, how they were disseminated to Europe and circulated through scientific and popular networks, and how this resulted in collections of photographs in museums and archives. The research will be carried out in a number of British and European museums and archives which serve as important sources of evidence. I will examine the sorts of knowledge established as a result of this historical flow of visual material, and how a better understanding of visual knowledge in the period helps explain later developments in southern African history and culture.

Histories of nineteenth-century ethnographic photography in southern Africa have pointed out that its human subject matter was mostly anonymous and driven by a Western desire to categorise racial and cultural types, ‘the stock in trade of colonial culture’. Whilst this characterises a dimension of the circulation and consumption of imagery in the period, what is less understood are the local relationships surrounding ethnographic image production. Inscribed in an 1865 album in the Pitt Rivers Museum, Oxford, for instance, are the personal connections between its Zulu subjects and its compiler, a Durban publican called Arthur Spring – an album that suggests we rethink the connection between the colonial consumption of imagery and the local circumstances of production. As part of this research I will take a copy of this album back to Durban to share with the local community and record their responses to it.

Whilst there is a wealth of historical writing on southern (especially South) African history, race, and culture, as well as specific histories of photography in the Apartheid period, this research will provide a new understanding of how regional photographic histories and the history of science in Europe are essentially connected through the same sets of visual data. As yet, we have little understanding of how these various microhistories connect and what their larger significance might be to our understanding of the image of southern Africa in a broader European consciousness in the period. Through detailed archival research, this study will bring these mostly separated histories into productive dialogue.

Dr Christopher Morton
Pitt Rivers Museum
Research Fellowship

Origin of high tropical biodiversity: a test using bryozoans

Shallow seas contain more types of animals in the tropics than anywhere else. But how has this extreme biodiversity arisen through geological time? Paul Taylor’s research will tackle this question by studying the fossils of coral-like animals called bryozoans.

Why do so many species live in the tropics? This question has taxed countless biologists over the years. Biodiversity is high both on the land – witness tropical rain forests – and in the sea, where coral reefs in particular abound with myriad species of fish, molluscs and countless other animals. Various theories have been proposed to explain high tropical diversity. For example, the tropics receive more energy from the Sun, which allows for a greater biomass and may permit more species to cohabit. Additional factors could be the large area of the tropics, as well as their stability over long intervals of geological time, while environments in higher latitudes suffered periodic glaciations.

Another striking aspect of tropical biodiversity is that the seas of the Indo-West Pacific contain significantly more species than those of other tropical regions such as the Caribbean. Data from the fossil record has the potential to help us understand how biodiversity in the tropics has evolved through millions of years of geological time and why the Indo-West Pacific is so rich in species.

The work of my group focuses on a phylum of colony-forming animals called bryozoans. Resembling miniature corals, bryozoans live on the sea floor and feed on plankton. Most species have chalky skeletons, which preserve very well as fossils. Thousands of bryozoan species inhabit the tropics today but very little is known about their fossil history. For instance, only 20 fossil bryozoan species had been recorded from rocks spanning 65 million years in Indonesia, whereas our recent research has revealed the presence of 123 species in rocks spanning 18 million years in one region (East Kalimantan) alone.

This new research project will study the fossil bryozoans collected from rocks in various sites across the ancient tropics dating back to the Miocene Epoch (up to 25 million years old). Co-applicant Jeremy Jackson (Smithsonian Institution), research assistant Emanuela Di Martino and I will use the taxonomic data obtained to track tropical diversity increase and show how the present-day difference between the Indo-West Pacific and elsewhere has arisen. Detailed studies of the varied ecological groups of bryozoans, coupled with palaeoenvironmental analyses, will provide insights into the factors that have driven these diversity changes.

With so many species threatened by global change brought about by human activities, understanding the reasons for high biodiversity in the tropics is not a purely academic exercise. The study of fossil bryozoans from the ancient tropics will add new lines of evidence to this endeavour.

Dr Paul D Taylor
Natural History Museum, London
Research Project Grant

ABOVE Quarry in East Kalimantan, Borneo, exposing sedimentary rocks containing fossil bryozoans that inhabited a tropical environment during the Miocene Epoch.

LEFT Scanning electron micrograph showing colonies of two bryozoan species growing on the underside of a modern coral from tropical Puerto Rico.
You have been Director of the Leverhulme Trust for almost 4 years now. Are you enjoying the role?

I think I may have died and gone to research heaven. I seem to have fallen in with a Board of Trustees whose only interest is in advancing knowledge by funding as much high-quality scholarship as the endowment permits. That's something in the region of £80 million of grants each year, almost all distributed in response to the researcher's own vision of a worthwhile project, and awarded via competitive peer-review led by the academy itself. Who knew that a Board of leading business executives would take such a non-utilitarian and long-term approach to research?

Any other ‘likes’?

I like the fact that the Trust has only 14 employees – because that means we have no capacity for generating unnecessary administrative or reporting requirements. It's also a real treat that the office is in the City, surrounded by some great cafes and restaurants. I may have to buy shares in the Italian coffee shop along the street.

You were previously the Chief Executive of a Research Council. How do the roles compare?

Superficially, they might seem similar, but fundamentally they are very different – mainly because the Councils are spending public money. That means dealing with the Treasury, the Department of Education and the quasi-political business of preparing bids for the Spending Reviews. Leverhulme is a charitable trust that spends its own money. Amongst other things, this means that the Board can invest in somewhat higher-risk research proposals, so over the past eight decades the Trust has come to acquire a reputation as a supporter of basic (fundamental or ‘blue-skies’) research and of cross-disciplinary (or multidisciplinary) projects – since these tend to be perceived as riskier investments. I am a huge fan of the Research Councils, and I enjoyed my years at the ESRC enormously, but I don't miss the close engagement that was required with Whitehall and Westminster.

Do you think the research funding landscape has changed much since your time at ESRC?

That was fifteen years ago – but it is surprising how many of the same issues are still being discussed today. Consider research selectivity, for example. Then, as now, we worried about whether research concentration had become excessive, and about the costs and benefits of the RAE (latterly the REF). Funding for long-term infrastructure also seems to be a permanent and unresolved concern. We appear to be wedded to ‘hand-to-mouth’ in the UK – far more short-term in our approach to most aspects of research and education than are our global competitors and comparators. And the country still spends much less on research and development generally than it should.

Has the Trust got a specific place in this environment?

I think so, yes. We have ‘degrees of freedom’, if I can put it that way, which give the Trust great flexibility. Our smallest awards are in the region of £15,000. (Actually, half that much, if you include the British Academy Small Grants Scheme, to which we are a major contributor.) But we also make large awards of up to £5 million. We have a diverse portfolio of some 15 funding schemes, offering opportunities for fellowships, collaborations and project grants, and these attract in excess of 4,000 applications each year. I find it easy to become absorbed by the wonderful range of subjects and issues that are broached in the applications for funding that cross my desk. I was an active researcher myself for more than twenty years, and I have also been a Vice-Chancellor of a university with an impressive research base, so I know how important it is that somewhere in the funding eco-system there is an organisation which supports individual academics and research excellence wherever it is found, and at whatever scale is appropriate.

Since you became Director, there has nevertheless been some reshaping of the Trust's schemes, and some new initiatives.

True. The Board has made some changes to existing programmes, for example opening up the Philip Leverhulme Prizes to eighteen subject areas covering virtually the whole disciplinary landscape, and increasing the value of each Prize to £100,000. But we are also in the fortunate position of having sufficient funds to introduce additional ventures. Last year we launched an entirely new scheme of Leverhulme Doctoral Scholarships.

What was the thinking behind that?

The Trustees wanted to do something more to support aspiring researchers who might be struggling to launch research careers in today's tight funding circumstances. We have the popular Early Career Fellowship scheme, and it is possible for grant-holders to fund individual doctoral students on a project, but concerns have been expressed about the impact of the new undergraduate tuition fee arrangements for home and EU students on the supply of talented candidates being attracted into postgraduate studies. The UK Government has now recognised the need for a postgraduate loan scheme, but it's still a huge leap for many students to make a commitment to postgraduate studies, given what this means for them financially. The new Doctoral Scholarships Scheme is consistent with the Trust's desire to support talented individuals (in this case the next generation of doctoral students) wherever it finds them. I was delighted that, in the first round of these awards, the Trust was able to fund a total of 210 scholarships across 14 universities. Our £14 million was match-funded by some institutions, so the final number of scholarships will be in the region of 300, and since we are planning to run this scheme every three years the Board hopes that, over time, our contribution will make a real difference to the flow of fresh talent into the UK research base.

Is the Trust planning any other new initiatives?

Only our new competition for Leverhulme Research Centres. This is something I'm very excited about, as are our Trustees. Each centre will be funded for up to 10 years at a cost of up to £10 million, so it is a big investment in UK research. We're hoping to see some really bold and ambitious bids for innovative research that would be unlikely to be funded by another agency. This initiative will sit alongside our programme of holding one of three rotating £10 million competitions each year: Arts Scholarships this year, Research Leadership next year, and the Doctoral Scholarships again in 2017 – with the possibility of the Board funding further Research Centres in due course. But it is important to emphasise that the philosophy behind the Trust, and our mode of operation, remain unchanged. The Board tries to maintain the Trust in the spirit in which William Lever built up the company bearing his name. He put his effort into finding talented individuals, whom he then backed to get on with the job, and encouraged to use their own judgement. And that's an approach we will continue to foster.

Roll on the next four years!

On the eve of the General Election, we asked the Director for his view of the prospects for research in the UK, and of the Trust's place in the funding landscape.

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Roll on the next four years!
By studying supersymmetric particles generated by the Large Hadron Collider Davide Costanzo will try to solve some of the mysteries about the dark matter in our Universe

The Large Hadron Collider (LHC) is restarting its second round of operation with the aim to discover new elementary particles and shed light on some of the mysteries of our Universe. The LHC is the biggest particle smasher ever built. Very high-energy protons travel in opposite directions inside two 27 km rings at the CERN laboratory and are made to collide at certain points around the ring. Particle detectors reconstruct the debris from these collisions and work as the ultimate microscope studying the intimate composition of matter on scales never explored before.

The ATLAS detector is one such detector, with a collaboration of about 3000 scientists working on it. On the 4 July 2012 the ATLAS collaboration announced the discovery of the Higgs boson, marking a major advancement in particle physics, and explaining why particles have mass, thus allowing the Universe, as we know it, to exist.

However, there are still unanswered questions. Why is the mass scale of particles the one we observe? And why is the visible matter that makes up the Universe only one sixth of the total? In particular it is known that a large quantity of invisible dark matter exists in the Universe, this dark matter cannot be accounted for by any of the particles that have been experimentally observed.

One possible answer to these questions is given by supersymmetry, a theory postulated in the 70’s that associates to each known particle a heavier partner with similar properties. Such particles could be produced in the collisions at the Large Hadron Collider and detectors such as ATLAS would be able to detect them. Supersymmetric particles have so far managed to escape detection, which means that they may be too heavy to be produced at the Large Hadron Collider. The analysis of the data collected at the CERN particle collider in 2011 and 2012 shows that supersymmetric particles have to weigh at least as much as a 700 protons.

The Large Hadron Collider is restarting operation this spring, colliding protons at an even higher energy, thus opening new possibilities to discover particles that are heavier than 1000 protons. Some well-motivated incarnations of supersymmetry foresee that the partners of the top- and bottom-quark are expected to have a mass in this range. Furthermore these supersymmetric particles (or sparticles) are expected to decay into invisible massive particles, which are the dark matter particles the Universe is made of.

This search is starting now, and over the next two years we will have a unique opportunity to expand our knowledge of particle physics, and of the Universe.

Dr Davide Costanzo  
University of Sheffield  
Research Fellowship

ABOVE Supersymmetry simulated event, ATLAS Experiment © 2014 CERN.  
COVER ATLAS detector, ATLAS Experiment © 2014 CERN.
Learning to read in a digital society

Jenny Thomson, in collaboration with Clare Wood, is focusing on the need to update our understanding of reading development in the light of young children's increased exposure to digital texts on different sized devices.

Does learning to read text on a tablet involve different skills to learning to read from traditional print books? Certainly, as an adult, reading from digital devices can feel like a very different experience to our experience of reading from paper. There are common reports of feeling less immersed in the text, as well as uneasy relationships with the physical properties of the device compared to the feel and smell of a print book.

However, our experiences as individuals who first learned to read on paper will be quite different to children whose first exposure to print may be across books, tablets, computers and smartphones.

I came to this research area through work with Matt Schneps at Harvard University, looking at struggling readers. Intriguingly, we found that for some school children with dyslexia their reading skills for extended passages of text were stronger when reading from a smartphone, compared to paper, or even a tablet. This is the opposite result from what you might see with individuals who do not struggle with reading. It made it clear to us that depending on the skills you come to reading with, and the time at which you first learned, your experience across different text platforms could vary considerably.

These findings led to the current project that is looking at the reading preferences and characteristics of beginning readers of all ability levels. Research on teaching methods for early literacy is extensive, and there is consistent evidence for intensive, systematic phonics approaches, embedded within a language-rich classroom environment. While such evidence has impacted on early literacy tuition in the UK, discussion of teaching methods is only just beginning to grapple with the impact of text presentation on reading achievement – the modality – digital or paper, and the resulting size, spacing and line length of text.

The project will explore whether traditional notions of early predictors for reading success need updating in the digital era. We also are seeking to understand the impact that pre-school experience with digital texts may have on emergent literacy on school entry, with a view to helping parents and early years practitioners navigate these relationships.

Dr Jenny Thomson
University of Sheffield
Research Project Grant

A leading authority on the life and world of Kenelm Digby, Joseph Moshenska aims to produce the first edition of his correspondence and a narrative of his 1628 Mediterranean voyage, weaving together historical and literary interpretation.

My research concerns a philosopher, a literary critic, a book collector, an alchemist, a privateer who liberated slaves and fought a sea-battle, an experimental scientist, the son of an executed traitor, and an enthusiastic amateur cook. I am not investigating a motley gathering of individuals, however: these are the roles assumed at different points by a single person, the seventeenth century polymath Sir Kenelm Digby (1603–65).

Digby's interests and activities were remarkably wide-ranging, but this has led to him slipping through the cracks that divide academic disciplines, because he does not belong comfortably to any one of them. This means that a revaluation of Digby's life and work can be particularly consequential since he forged connections between seventeenth-century worlds that we still tend too strictly to separate. He was a courtly Catholic whose friends included the Puritan alchemist and governor of Connecticut, John Winthrop, Jr.; he endorsed the modern renovation of atomism and the insights of Descartes (whose work he introduced to Thomas Hobbes), but he sought to blend them idiosyncratically with the older wisdom of Aristotle; he petitioned the Pope and met Muslim women in Algiers, he procured Arabic manuscripts for Archbishop Laud and edited the work of his friend Ben Jonson, he stole statues from Greek islands and wrote the first paper to be officially sponsored for publication by the Royal Society. The award of a Research Fellowship will support two branches of my work on Digby. First, it will allow me to complete a book about the Mediterranean voyage that he undertook in 1628. Digby wrote literary criticism aboard his ship and an autobiographical romance on a Greek island, and continued to reflect on his experiences throughout his life: his major philosophical work contains reminiscences of the steam baths at Algiers, and the sheer power of his cannons, able to shatter pigeon eggs on the shore by their noise alone. In this book I aim not only to tell the story of Digby's voyage, but to reflect upon the role of literature in the telling – and the living – of a life.

Secondly, it will allow me to make significant progress on the editing of Digby's correspondence, which has never before been collected. The letters that he exchanged with both lesser known and major figures – Hobbes, John Selden, Pierre de Fermat, Marin Mersenne – not only give insight into the range of Digby's activities, but provide a new sense of the function of letters in seventeenth-century Europe. Philosophical and religious speculation will sit side by side in my edition with more personal missives – a newly discovered letter from Digby to his wife Venetia, sent from the Mediterranean, and the impassioned letters written after her sudden and suspicious death. Digby was a brilliant practitioner of the epistolary arts, finding in the letter a form as adaptable and protean as he himself aimed to be.

Dr Joseph Moshenska
University of Cambridge Research Fellowship
Exploring the role of lakes in past African climate shifts

Focussing on lakes and wetland climate, Joy Singarayer’s research project will develop a state-of-the-art Earth System Model to explore hydroclimate dynamics in the subtropics of Africa.

Future projections of changes in rainfall in semi-arid regions of northern and southern Africa are critical to the assessment of vulnerability to climate change. These areas have high variability in rainfall year-to-year and are particularly relevant to climate change given the high numbers of people employed in rain-fed agriculture. Projections for the next century using computer models suggest that North and East Africa will experience an increase in rainfall, while southern regions may become drier. The frequency of extreme events such as heavy rainfall occurrences or droughts is also expected to increase. However, uncertainty in these projections is very large and complicated by the importance of evaporation and soil moisture for predicting impacts on water availability.

We know that there have been times in prehistory when there were also very different rainfall regimes to today in tropical and sub-tropical Africa. One particularly well-documented event was the African Humid Period (roughly 14,000 to 6,000 years ago) when, due to enhanced monsoon rainfall, much of the Sahara was transformed into a region with extensive wetlands, savannas, and large lakes, occupied by people and a variety of iconic animals, including hippos and crocodiles. Similarly, in southern Africa, regions such as the Kalahari Desert have previously supported lakes and greener conditions than present.

Currently, no state-of-the-art computer model is able to simulate the extreme hydroclimate changes recorded in palaeoarchives, despite decades of advances. The inability of climate models to reproduce the magnitude of known, past changes poses serious questions about how robustly those same models can predict future hydroclimate change for Africa. One factor still missing from models is the capability to have varying surface water inundation (lakes/wetland) interacting with the climate system and vegetation. We want to test the idea that feedbacks between surface water bodies and climate were critically important in pushing the system between wet and dry climate regimes.

In this project we will develop the new UK Earth System Model, which will be used to simulate future climate changes, dynamically able to form lakes and wetlands over Africa, which interact with the wider modelled climate system. We will simulate crucial past time periods to examine the importance of African lake/wetland feedbacks for producing the verdant environments seen previously in currently arid regions. We will similarly explore the impacts on future African hydroclimate dynamics. Given that vulnerable African regions may in future experience increases in rainfall and/or rainfall variability, we predict that these feedbacks will be similarly important for the robust assessment of long-term potential hydroclimate change and to the vulnerability of regional populations to those changes. Our work will enable us to look directly at potential future changes for the likelihood of hazards such as flooding, as well as water availability for Africa. Our simulations of prehistoric time periods will provide maps of past water availability for humans and animals, which we hope will inform palaeontological and archaeological research on hypotheses for human dispersal, adaptation, and population dynamics within Africa.

Dr Joy Singarayer
University of Reading
Research Project Grant

ABOVE Stone tools on the surface of the Makgadikgadi salt pan, found during a lithic survey by co-investigator Sallie Burrough.

LEFT Evidence of ancient human occupation in the rock art at Tsodilo Hills, Botswana.
## RESEARCH PROJECT GRANTS

### Sciences

**Dr Simon Ameer-Beg**  
*King’s College London*  
Super-resolved functional mapping of protein-protein interactions  
£390,143

**Dr Edward Anderson**  
*University of Oxford*  
Sequence-based stereochemical prediction: a new tool for polyketide structure elucidation  
£161,082

**Professor Peter Andras**  
*University of Keele*  
Designing and validating novel voltage-sensitive dyes for neuroscience research  
£178,374

**Professor Paul Barlow**  
*University of Edinburgh*  
Probing regulation of the complement system by factor H on biomimetic surfaces  
£218,671

**Professor Michael Benton**  
*University of Bristol*  
The exceptional early Jurassic fossils of Strawberry Bank, Somerset  
£240,754

**Dr Silvana Cardoso**  
*University of Cambridge*  
Precipitation reactions in environmental plumes: implication for oceanic methane releases  
£204,433

**Professor Brian Charlesworth**  
*University of Edinburgh*  
Analysing genomewide patterns of DNA sequence variation and evolution in Drosophila  
£184,333

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*University of Sheffield*  
Individual energy budgets, life histories and population dynamics in the field  
£159,336

**Dr Ben Collen**  
*University College London*  
Predicting the dynamics of African ecosystems under multiple pressures  
£293,535

**Professor Ian Crawford**  
*Birkbeck, University of London*  
Assessing the potential of lunar geology as a window into galactic history  
£174,468

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The evolution of eye salience as a signal for communication  
£186,907

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*University of Aberdeen*  
Electroreduction of carbon dioxide in room temperature ionic liquids  
£138,278

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*University of Warwick*  
Structural basis of the CO2 sensitivity of Cx26 and role in human physiology  
£172,834

**Dr Silvia Dalla**  
*University of Central Lancashire*  
Predicting solar energetic particle radiation at Earth and Mars  
£159,542

**Professor Simone Di Giovanni**  
*Imperial College London*  
The novel role of reactive oxygen species in axonal growth and regeneration  
£280,030

**Dr Simon Doherty**  
*Newcastle University*  
Engineering high performance alkaline anion membranes for electrochemical applications  
£106,871

**Professor Andrew Dove**  
*University of Warwick*  
Alkene-containing polymers: novel synthetic elastomers inspired by nature  
£184,714

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*University of Cambridge*  
Next generation electronic devices using a new thin film  
£241,069

**Dr Bertram Dürring**  
*University of Sussex*  
Novel discretisations of higher-order nonlinear PDE  
£257,236

**Dr Roberto Filippi**  
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An investigation of the effects of multi-language acquisition across the lifespan  
£279,774

**Professor Malcolm Halcrow**  
*Leeds University*  
Exploiting a spin-crossover module in materials chemistry and nanoscience  
£177,228

**Professor Adam Hardy**  
*Cardiff University*  
The Nagara tradition of temple architecture: continuity, transformation, renewal  
£270,284

**Professor William Harwin**  
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3D learning in a rich cooperative haptic environment  
£253,141

**Dr Ross Hatton**  
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Engineering hybrid interface materials for thin film photovoltaics  
£166,140

**Dr Antonios Kanaras**  
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Nanoparticles with synergistic roles: sensing and drug delivery  
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**Dr Euan Kay**  
*University of St Andrews*  
Switching on colloidal catalysts with rotaxane nanoparticle monolayers  
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*University of Birmingham*  
Stimulating the destabilisation of fear and traumatic memories.  
£180,843

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*University of Exeter*  
Quantum drum  
£258,209

**Professor Frank Marken**  
*University of Bath*  
New materials for ionic diodes and ionic photodiodes  
£204,712

**Dr James McLaughlin**  
*Northumbria University*  
Revealing the fundamental nature of time-dependent, wave-generating reconnection  
£199,773

**Professor Simon McQueen-Mason**  
*University of York*  
Manitol metabolism in marine microalgae: physiology and applications  
£249,173

**Professor Kate Nation**  
*University of Oxford*  
The Oxford children’s corpus: lessons for learning to read  
£182,196
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<th>Research Fellowships</th>
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Dr David Greenhalgh  
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Mathematical modelling of vaccination against dengue  
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University of East Anglia
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Nottingham Trent University
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University of Nottingham
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