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

Newsletter April 2013

The Leverhulme Trust

Blackfoot collections in UK museums

Making up history in the Kremlin

Moving beyond the monosyllable

Reinvestigating Shanidar Cave

'Off with my head!'

William Hesketh Lever, the Founder of the Trust that bears his name, was a man of firm views and decisive action. So, having commissioned the most famous portrait artist of the 20th century, Augustus John, to preserve his image on canvas, when the painting arrived and was thought by its subject to depict him in an unflattering light, the Viscount did not hesitate: he simply fetched a knife, cut the offending head out of the canvas, and locked it in his safe.

Lever later explained that he didn't want anyone to see the picture, and as it was too big to hide in his safe, he removed the head and locked it away from public view. (It doesn't seem to have occurred to the great man that each of his several houses might have had an attic.)

Despite the media storm that ensued, Lever was in fact a sensitive, knowledgeable, and enthusiastic supporter of the arts. He was particularly fond of Chinese porcelain, Roman sculpture and Greek vases, but his catholic tastes also led to his assembling world-famous collections of pre-Raphaelite paintings and Napoleonic memorabilia. During his lifetime, Lever gathered together more than 20,000 works of art, including not only paintings, sculptures, and ceramics, but also textiles, furniture and more than 1,000 ethnographic objects. The best of this collection is on display today in the Lady Lever Art Gallery, purpose-built by Lever, and named in commemoration of his wife Elizabeth.

The Leverhulme Trust celebrates this aspect of Lever's life in a long-standing commitment to support training in the fine and performing arts. The various schemes hitherto operated by the Trust were last year consolidated into a single competition for Arts Scholarships. The results are reported in full elsewhere in this edition of the Newsletter.

The main headline is that grants worth more than £9 million in total have been awarded to more than fifty organisations. Students across the whole range of the fine and performing arts – from music and drama to sculpture and fine art – will benefit from bursaries to allow them to develop their skills or from innovative teaching awards to help further their artistic talents. Organisations which bid successfully for scholarships include renowned institutions such as RADA, the Royal College of Music and Glasgow School of Art, through to less familiar providers of specialist arts training, including the Phoenix Dance Theatre in Leeds, the National Children's Orchestra of Great Britain, and Belfast Community Circus School.

At a time when the place of the arts and creativity in the curriculum in England is under threat, and funding for the arts is generally being reduced throughout the UK, the Board of the Trust is convinced that these scholarships will make a valuable contribution to the development of the next generation of creative talent. We believe the awards are a cause for celebration and we like to think that William Lever himself would have approved. Congratulations are extended to all who were successful in the competition.

Gordon Marshall

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Moving beyond the monosyllable

There is no question of the importance of literacy in modern living, yet unlike our inborn capacity for spoken language, the acquisition of literacy requires a painstaking process of dedicated instruction, supervision, and practice. Recent psychological research has been remarkably successful in beginning to uncover the mental processes through which skilled adult readers translate printed words into sounds and meanings. This research has in turn offered fresh insights into our understanding of typical and atypical reading development, the genetic and neural basis of reading, and reading education.

However, the most influential theories of reading have a very serious limitation, in that they only explain phenomena pertaining to words with a single syllable, like *cat* or *chair*. In fact, in contrast to the hundreds of studies that have examined how people read words with just a single syllable, only a handful have examined the processes through which people read words comprising more than one syllable. One reason for this gap is that words with more than one syllable present special additional challenges – for example, in understanding how people decide which syllable to stress, as in *camel* versus *canal*. The result is that our understanding of reading is effectively limited to single-syllable words, which constitute less than 10% of English words, and far fewer in many of the world's other languages.

This project brings together an international team of investigators who will exploit behavioural, neuropsychological, and computational modelling approaches to understanding how people read. We plan four converging approaches. Our first research stream will consist of a 'mega-study' that examines how adults pronounce a very large set of disyllabic nonwords such as *misfoob* or *dinven*. Our second research stream will consist of a series of tightly-controlled experiments designed to determine the nature of the cues that people use to assign stress in reading nonwords aloud. For example, why do people tend to read *zortle* with stress on the first syllable but *vibesse* with stress on the second syllable? These research streams will examine nonword reading because this provides a very clear picture of skilled readers' general knowledge about spelling-to-sound relationships, as opposed to memory for individual words. Our third research stream will then test whether the generalisations uncovered in the first two research streams predict how adults read aloud disyllabic words like *confide* or *conquer*. Finally, our fourth research stream tests these generalisations further by investigating how individuals with dyslexia acquired through brain damage read aloud these same disyllabic words. Our work at every stage of the project will be informed by the computational modelling of reading phenomena, and our findings will be used to test, develop, and refine the most influential theories presently available.

This work will make a critical theoretical contribution to our understanding of skilled adult reading, and we also expect significant applied implications in the clinical diagnosis of reading impairments, and in the development of evidence-based strategies for literacy education.

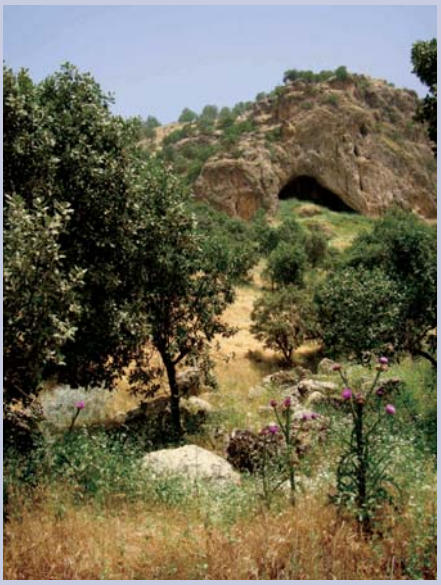
Professor Kathleen Rastle
Royal Holloway, University of London

How resilient were Neanderthals and modern humans in Southwest Asia to climate change?

One of the most intriguing questions about human evolution relates to why, after surviving for hundreds of thousands of years, Neanderthals died out around 40-30,000 years ago, a time when our own species, *Homo sapiens* ('modern humans'), was successfully colonising much of the globe. The reasons for the success of modern humans at the expense of Neanderthals are hotly debated, especially given the evidence that they sometimes co-existed and even interbred. The Near East has the longest record of such coexistence, going back perhaps 150,000 years, and Shanidar Cave in Iraqi Kurdistan is one of the very few sites in the world that has provided evidence that it was used by both Neanderthals and modern humans.

The cave has iconic status in archaeology as a result of major excavations conducted there in the 1950s by Ralph Solecki. His discoveries included several Neanderthal skeletons estimated to be about 35,000-45,000 years old and a cemetery of modern humans dating to about 10,000 years ago. Some of the Neanderthals probably died in rock falls, but others seem to have been buried with proper rites, including one that may have been covered in flowers and injured individuals who appear to have been cared for by the community before death – complex funerary and social behaviour normally regarded as belonging exclusively to our own species. The Shanidar finds are cited in virtually every scholarly discussion of the differences and similarities between Neanderthals and ourselves, and the possible reasons for their demise and the success of *Homo sapiens*.

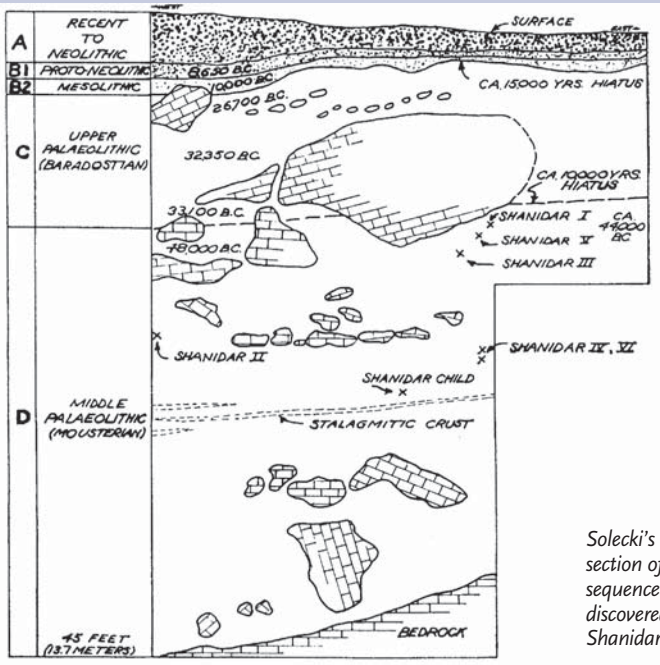
Looking across the backfill (in the foreground) of Solecki's main trench.



Looking up to Shanidar Cave.

Global climates were fluctuating profoundly through the period that Neanderthals and modern humans were in the Near East, from conditions like today to far colder climates (after about 80,000 years ago). Was the ability to adapt to abrupt climate change a critical factor in their different evolutionary histories? To investigate this question, we need to move beyond general global climatic models (established from temperature records in cores drilled through the Greenland and Antarctica ice caps, for example) to detailed reconstructions of the local environments and landscapes that were actually experienced by Neanderthals and modern humans, and of their daily and seasonal hunting and gathering activities, and their social lives in general.

The original excavations in Shanidar Cave were exemplary for their time, but scientific techniques of dating, climate reconstruction and cultural study have transformed since then. Leverhulme funding will enable a team of archaeologists and geographers from Cambridge University, Queen's University Belfast and Birkbeck, University of London, aided by international collaborators, to investigate the daily lives of the Neanderthals and modern humans who sheltered in Shanidar Cave, how they dealt with the changing worlds they inhabited, and what their story can tell us about how and why modern humans outcompeted Neanderthals. The project will involve staff and students from local universities, and will support the plans of the Kurdish Regional Government to make the cave the centrepiece of a world-class archaeological park.



Solecki's drawn section of the sequence he discovered in Shanidar Cave.

Professor Graeme Barker
University of Cambridge

Cover thumbnail: Looking out of the cave.

Integrating evolution into conservation

Dragon's Blood woodland (image credit: Andy Ensoll).

The Socotra Archipelago has been described as the Galapagos of the Indian Ocean, due to its diverse and unique extant biota. In contrast to well-studied oceanic islands such as the Galapagos, Hawai'i and Macronesia, Socotra is a continental fragment with high levels of endemism and is therefore of exceptional interest to evolutionary biologists.

Its charismatic flora sits at the crossroads of three biogeographical regions and includes such intriguing endemic life forms as the dragon's blood tree *Dracaena cinnabari*, cucumber tree *Dendrosycios socotranus*, and the desert rose *Adenium obesum*. The island is topographically, geologically and climatically diverse, with endemic taxa concentrated in high altitude 'wet refugia' which experience increased precipitation. Endemic taxa are also found on dry upland limestone plateaus and coastal plains.

Socotra harbours some 835 vascular plant species: 308 of these (37%) and 12 genera are found nowhere else. When ranked by number of endemic species per km^2 it is exceeded only by a single oceanic archipelago (Hawai'i) and isolated continental islands that are much larger (e.g. New Caledonia, Jamaica). This is complemented by high levels of animal endemism, resulting in its designation as a UNESCO World Heritage Site, UNESCO Man and Biosphere Reserve, WWF Global 200 Ecoregion and Plantlife International Centre of Plant Diversity.

Perhaps uniquely, human impact has been low and spatially restricted: in many places the vegetation is intact with no evidence of recent extinctions, and the few alien species present are not yet invasive. Evidence suggests that humans settled several millennia ago, whereas other islands have been colonised and suffered degradation more recently and rapidly. Increasing pressure from development, tourism and alien species has been well documented in some island groups: on Socotra, such pressures are imminent. Research to address fundamental questions about evolution and conservation on Socotra is urgently required.

This programme of study will address three fundamental questions about the flora of Socotra:

1. Are protected areas on Socotra best defined by patterns of plant evolutionary diversity?
2. What is the origin of the Socotran flora, and what processes have driven the evolution of its endemic species?
3. How can ongoing evolutionary processes integrate into practical conservation strategies?

In order to allow a detailed assessment of the drivers the richness of endemic species and evolutionary history on Socotra, data will be assembled on distribution, reproductive strategy, plant functional types, geology, topography and climate alongside protected area boundaries from Socotra. These data will be analysed alongside entire flora DNA sequence variation (to establish evolutionary history present in different areas), and used to inform fine-scale molecular studies of exemplar plant groups that show high numbers of endemic species across a range of environmental variables. We will explore how different diversity metrics can be incorporated into decision-making protocols for conservation management.

Mr Anthony Miller and **Dr Alan Forrest**
Royal Botanic Garden Edinburgh

Desert Rose (image credit: Tony Miller).

Tony Miller in the field on Socotra (image credit: Steve Scott).

Understanding Earth's middle ages

The 'middle ages' of our planet, from 2.3 billion to 800 million years ago, were so different from today that could we go back in a time machine it would seem like an alien world. The depths of the ocean were devoid of oxygen and the atmosphere had only 1-10% of the oxygen it has today. There was little or no life on land, and the only organisms in the ocean were microscopic and almost exclusively single-cellular. For 1.5 billion years of the Proterozoic Eon, the Earth remained in this low oxygen state, which held back the evolution of complex life. Our project aims to find out what kept the planet locked in this state.

We will start by trying to understand what the chemistry of the ocean was like in the deep past. Our only window into conditions on the ancient Earth is via the chemistry of fragments of preserved rocks from ancient seas. These represent just a few pieces of a jigsaw puzzle whose full picture we can't yet see. Currently there are at least three competing models. Controversy centres on why a special type of rock formation called 'Banded Iron Formations' ceased to form around 1.8 billion years ago. The 'traditional' model is that the deep ocean became ventilated with oxygen at the time, thus rusting out the iron it contained. An alternative model proposes that the deep ocean remained devoid of oxygen and instead became full of stinking hydrogen sulphide, which reacted with the iron and removed it in the form of fool's gold (pyrite, see image). Finally, in the last few years, new data has shown that the deep ocean may in fact have remained relatively rich in iron, in a ferruginous state. By using a three-dimensional model with all the relevant chemistry, we aim to reconstruct the chemical state of the ancient ocean and understand which, if any, of the current models explains the available data. We are especially interested in how the presence of sulphide-rich or iron-rich waters would have affected the availability of the key nutrients, nitrogen and phosphorus, and also the trace metals that are used by life in its biochemistry. We will also examine how the peculiar ecology of the ancient ocean affected its state. We know that complex (eukaryotic) cells had evolved but that they remained in the ecological background as simpler (prokaryotic) cells – bacteria – continued to dominate the world. These bacterial cells would have sunk very slowly, and as they were consumed by other bacteria this would have created the most suffocating and sulphidic waters at relatively shallow depths.

Finally, we will try to work out what regulated atmospheric oxygen at an intermediate level for 1.5 billion years. The ocean is crucial to this story in that the burial of dead organic matter in the ocean was the key source of oxygen, in turn determined by the availability of nutrients. Thus, the project will try to fill in a key missing link in the history of our planet.

Professor Tim Lenton
University of Exeter

Blackfoot collections in UK museums: reviving relationships through artefacts

This International Network brings together Blackfoot people in Canada and the United States with museum professionals and university colleagues in the UK to work together to revive, generate and exchange knowledge about Blackfoot artefacts now in British museums. Many museums nowadays actively involve indigenous people in collections care, but this work is especially challenging for those in Europe, given the distances involved, diversity of collections, lack of specialist curatorial knowledge and stretched finances. Limited financial resources have also prevented indigenous researchers from accessing historic and culturally significant collections. Although Blackfoot people have close relationships with a number of museums throughout North America, they have had fewer opportunities to extend these relationships overseas, despite there being sizeable collections of Blackfoot cultural material in European institutions.

This Network aims to address these challenges and will focus first on the Blackfoot collections of the Museum of Archaeology and Anthropology (MAA), University of Cambridge, and the Royal Albert Memorial Museum (RAMM), Exeter. These collections were accumulated during the 19th and early 20th centuries, at a time of tremendous change for Blackfoot people, and include early examples of clothing, as well as items connected with ceremony and other aspects of Blackfoot ways of life. They are integral to understanding the historic political relationship between the Blackfoot nations and Great Britain, formalised in 1877 by the signing of Treaty 7. Indeed, the RAMM collection includes items acquired from Blackfoot political leaders at the signing of this treaty, including a shirt that belonged to Chief Crowfoot. As few Blackfoot people have had the chance to engage with these items, knowledge of their meanings and significance has remained partial. In essence, the Network will address gaps that exist between museums and Blackfoot people which continue to limit the interpretation of collections in ways that support cross-cultural awareness, and have also limited the ability of Blackfoot people to contribute to their care.

The Network involves a series of reciprocal research visits involving curatorial staff at both museums and Network partners from the four Blackfoot Nations of Siksika, Piikani, Kainai and the Blackfeet. These meetings will first enable Blackfoot and museum colleagues to work together to properly identify the collections and to update existing records. Blackfoot colleagues will also provide guidance as to the care and interpretation of these materials. The Network will then shift the location of its meetings to Blackfoot territory, during which the Network partners will continue exploratory discussions with a wider range of community members with a view to developing future cultural and educational projects as appropriate. As this form of cross-cultural museum work is still in its infancy, the Network will take a key role in developing methodologies for working internationally with multiple indigenous groups. We envisage that the expertise gained during the project will benefit other European museums and the Blackfoot themselves, as they continue their efforts to locate heritage items and to initiate discussions about their care.

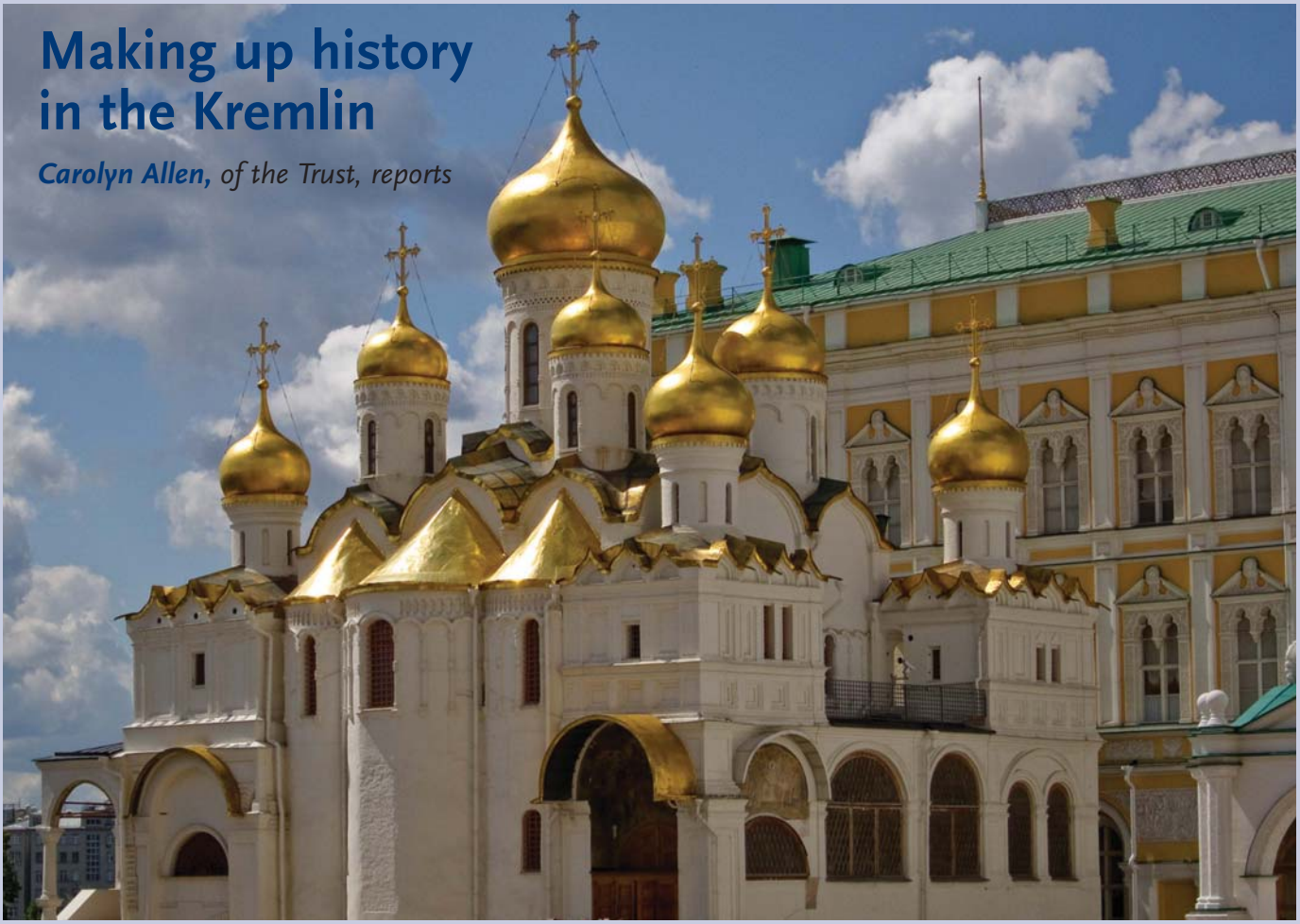
Chief Crowfoot (image courtesy of Royal Albert Memorial Museum and Exeter City Council).

Dr Alison Brown
University of Aberdeen

Cover: Chief Crowfoot's shirt (image courtesy of Royal Albert Memorial Museum and Exeter City Council).

Making up history in the Kremlin

***Carolyn Allen,** of the Trust, reports*



The Annunciation Cathedral, whose current incarnation was originally built by architects from Pskov in the 15th century, was the main religious building for the palace. It was lavishly restored in the last years of the 20th century (the gold leaf is all new).

At 11.55 on the morning of 7 May 2012, President-elect Vladimir Putin solemnly climbs the 58 steps of the ceremonial Red Staircase of the Grand Kremlin Palace towards the glittering Kremlin Hall. Full of pomp and circumstance, Putin's third inauguration resonates with age-old Russian traditions, some dating back to the earliest Tsars. Centre stage of those traditions: the Red Staircase. From Ivan the Terrible in 1547 to Nicholas II in 1896, each of the Tsars began the procession towards their lavish 'Byzantine' coronation ceremony on these steps.

But all is not quite as it seems. The Red Staircase featuring so prominently in the inauguration of Russian presidents is actually fewer than ten years old. The architect who built the Grand Kremlin Palace for Nicholas I (from 1837 to 1849), knocked down the original staircase to accommodate his opulent new building, only to rebuild it in an even grander style. And it was on this reconstructed Red Staircase, that the last of the Tsars, Nicholas II, had paused during his coronation.

In 1930, Stalin dismantled the 19th century staircase to make way for a canteen and lavatories. Then, in 1994, Yeltsin knocked down the lavatories and canteen, building a facsimile of the Red Staircase in their place.

The splendid 'Byzantine' Red Staircase, redolent with Russian history, is a facade: one of the many illusions created in the Kremlin to perpetuate the fairytale of the eternal Russian State.

Professor Catherine Merridale, a historian at Queen Mary, University of London, recently completed a three-year Leverhulme Trust Major Research Fellowship studying the history of the Kremlin from its foundation to the present day.

In her forthcoming book, *Red Fortress*, she highlights the way successive Russian leaders have used the Kremlin to emphasise the idea of continuity and reinforce stereotypical ideas about Russia's past and its likely future. Screened within the Kremlin walls, new generations have adapted the 'authentic' and 'historic' site to project new messages made to look old and unarguable; and to airbrush out old messages that do not fit the party line.

Shortly after her Leverhulme award was announced, Professor Merridale received an invitation to work in the Kremlin itself. She had been trying to secure this privilege for two years and is convinced that the support from the Leverhulme Trust gave her request greater authority, opening doors that had previously remained resolutely closed. On her first 'working' visit, Professor Merridale joined the curator of the Kremlin buildings for a tour of the Palace. But first, the curator picked up a set of long ancient looking keys. And a set of pliers. "It was so, so wonderful," Professor Merridale recalls "we just went from room to room taking the seals off one and then another."

The first of these sealed rooms reinforced Professor Merridale's view that the tourist's Kremlin – the glittering picture of perfection – is a thinly painted veneer: an exotic fantasy presented as truth. Unlocking a beautiful golden gate, then breaking the seal to the door beyond, the curator explained that this was the Chapel of Alexei Nikolaevich, containing icons by Simon Ushakov – the greatest icon painter of the 17th century. Inside it was smelly and damp and, turning on the single electric light bulb, Professor Merridale realised why this room had been kept in darkness: the gold had gone, ripped out by Lenin in 1921, officially to feed the starving, but actually because the government was going bankrupt. Opening this chapel to the tourists milling around just the other side of the gate, would raise all kinds of awkward questions about the revolution and art and authenticity. So, it is simply kept locked.

When Stalin removed uncomfortable truths from view, it was usually more permanent. Founded in the 14th century, the men's Chudov Monastery and the women's Voznesensky Monastery (also known as the Ascension Convent), each with their magnificent cathedral, churches and icons, were dismantled in their entirety, more or less overnight, in 1929. And, just as censored Soviet photographs make it appear that Trotsky was never even there, Professor Merridale found that Stalin's edit of the Kremlin presented a new history of Russia with much of its rich spiritual heritage removed.

"The really interesting thing is that people who were living in the Kremlin at the time, or who lived in it soon after, didn't believe me when I said there were monasteries there," said Professor Merridale. "With buildings, it's worse than photographs. Buildings address a much bigger audience. People see them everyday and they are adamant that what's there now is the only thing that's true."

Although she admits the conclusions in her book could seem depressing, they haven't dimmed the love affair Professor Merridale has had with Russia since her teens:

"For me, the book's real significance is that it leaves no reason to keep on thinking of Russian history as a continuum or that there is anything inevitable about it being an autocratic statist nation.

And there's nothing inevitable about Putin either.

As soon as you see that, it is really liberating. The scales fall from your eyes. Putin is making it up. And you can see him making it up in real time. The eternal Russian State has been constructed on the ruins of previous eternal Russian States, over and over again. Putin standing on that Red Staircase looking so traditional? It's just Disney."

Professor Merridale's book, *Red Fortress*, will be published by Penguin in Autumn 2013.

S.P. Bartenev's map of the Kremlin, 'The Moscow Kremlin in Old Times and Now', 2 vols, published St Petersburg 1912.

UK-Thai programme of observational and theoretical research into binary stars

A recently awarded International Network Grant will enable us to start a collaboration between the astronomy groups at Sheffield and Warwick Universities and the National Astronomy Research Institute of Thailand and Prince of Songkla University.

The Thais have recently opened a new 2.4m telescope at 2,500m in a national park to the west of Chaing Mai – an excellent site with clear, dark skies for most of the year (except the rainy season). To monitor an object in the sky continuously, there must be telescopes spread around the globe at various longitudes, and these are rare in Thailand.

The UK team is mounting a new instrument on the telescope, called ULTRASPEC. ULTRASPEC is able to rapidly image the sky, taking up to 100 images every second and this allows it to see rapid changes in objects. It can be used to study the flow of material close to the event horizon of black holes, and much closer to home, it can also examine transits and eclipses of planets around nearby stars.

Of particular interest to the Network are binary stars: most stars are not single like the Sun, but in pairs (or even triples). Using the Thai National Telescope, and ULTRASPEC in particular, we can monitor binary pairs, and sometimes directly weigh and find the size of the stars, we can look for planets, and see how binary stars interact with each other. We can also model the formation and early evolution of binaries.

Thai National Telescope (image courtesy of National Astronomy Research Institute of Thailand).

This grant will allow us access to a wonderful new facility in Thailand and foster long-term collaborations between the UK and Thailand.

Dr Simon Goodwin
University of Sheffield

The evolutionary biomechanics of sesamoid bones

Many vertebrates have evolved small extra bones in their limbs called sesamoids. Sesamoids tend to act as levers or pulleys for the limb tendons and ligaments. It has been lamented that sesamoids are often treated with disinterest and have been dismissed as unimportant by anatomists and evolutionary biologists, without due justification. This is despite widespread acknowledgement that they are superb examples of the interplay between genetic and mechanical factors, they display fascinating diversity and variability, and they seem to strongly relate to biomechanical loading and function. The common sesamoids, such as the patella (kneecap) in birds, lizards and mammals, seem to have evolved repeatedly in different groups, or have even sometimes been lost – why have they evolved, or what are the consequences of evolving a kneecap for knee function, for example? There are also very different sesamoid bones that we have discovered in the feet of elephants that act as extra false fingers: 'predigits'. Some other mammals such as moles and pandas have evolved such predigits too. Why did some land animals evolve these lever-like and finger-like sesamoids, and how do they develop, function and evolve?

I have assembled an ideal team to answer these questions from an integrative perspective, combining analyses including comparative anatomy, advanced histology and micro-imaging, phylogenetics, biomechanical experiments, computer models, and more. In this project, the team seeks to unify understanding of sesamoids by combining data on anatomy, ontogeny and locomotor function across evolution in terrestrial vertebrates with limbs (called tetrapods). First, we will measure how the predigits of elephants and other mammals grow and then trace the evolution of those giant sesamoids through mammalian phylogeny. This will illuminate how and perhaps why predigits evolved in so many groups. Second, we will investigate how the patella and similar sesamoid bones in the limbs develop, and again trace their evolutionary patterns. We will augment this analysis with functional tests of how the form and development of the patella relate to mechanical loading during locomotion in growing emus and lizards, combining 3D measurements of knee motion with sophisticated finite element models to estimate bone stresses and strains during ontogeny. This will help reveal how and why the patella seems to have evolved multiple times. Together, these analyses would form a novel 'sesamoid synthesis' that incorporates all available data not only on growth and form but also function, and across evolution.

The project thus aims to provide a new, comprehensive perspective on why sesamoid bones evolved in particular ways in particular lineages of animals, unifying the fields of evolution, development and biomechanics. This would begin to dispel the lingering mystery and neglect that obscures scientific understanding about sesamoid bones, which are an ideal subject for experts in the latter fields. This is a curiosity-driven synthesis of multiple fields to illuminate an uncharted area of evolutionary biomechanics. It is a project that is also ripe for dissemination to the general public via the team's enthusiastic public engagement activities, since it involves appealing aspects of anatomy, evolution, fossils, animal movement, computer modelling and imaging, and relatability – almost everyone can find their kneecap (patella) and ponder why it is there.

Professor John Hutchinson and **Professor Andrew Pitsillides**
Royal Veterinary College, University of London

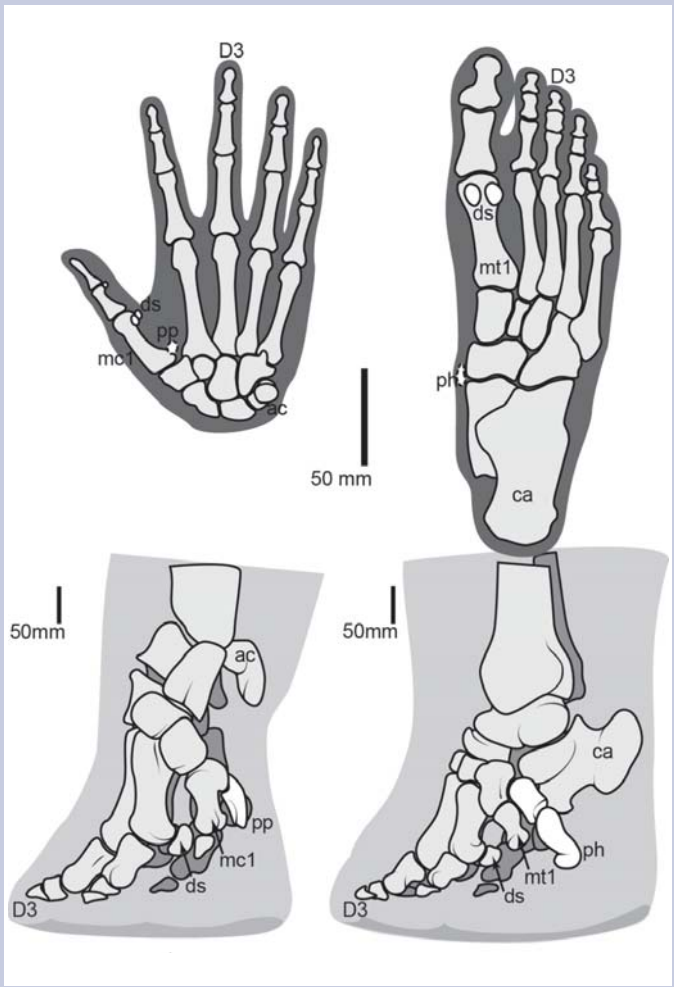
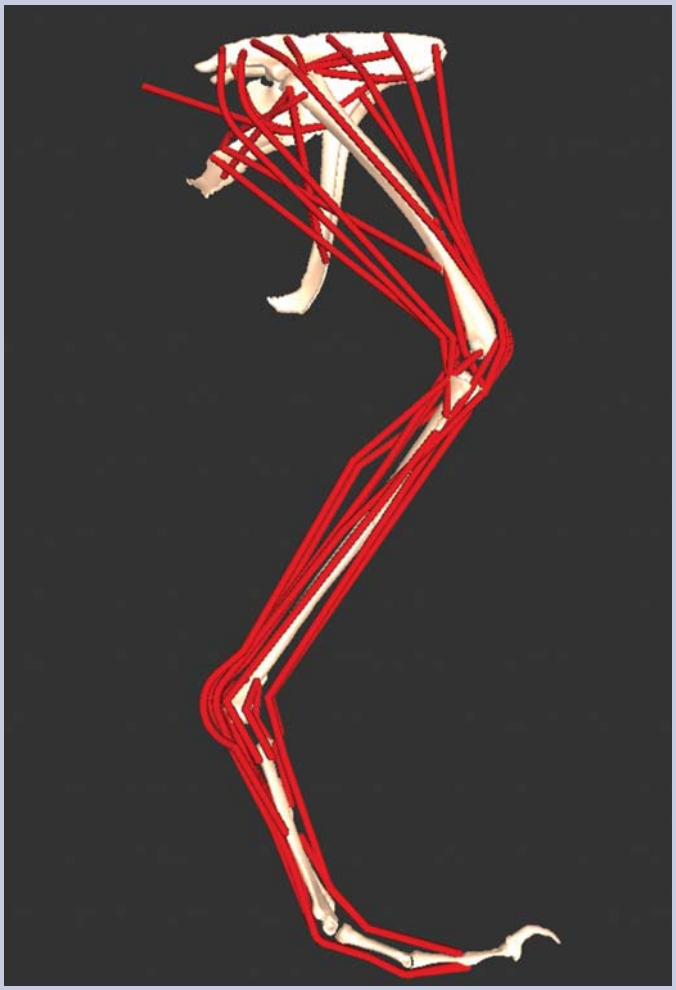


Illustration of human (above) and elephant (below) hands (on left) and feet (on right), showing the sesamoid bones in each. Labels: ac= accessorium (pisiform), ca= calcaneus, D3= third digit, ds= digital sesamoid(s), mc1= metacarpal I, mt1= metatarsal I, ph= prehallux, pp= prepollex.



Computer model of the right leg (side view) of the early extinct bird Archaeopteryx. *Red lines represent paths of major muscles. As the knee joint does not have a patella, the knee muscles run close to the joints and thus have less leverage than in living or later birds.*

Recently Awarded Grants

Research Project Grants

Sciences

Dr Jennifer Barclay *University of East Anglia*	Timing is everything: anticipating future eruptive activity on Ascension Island	£242,932
Professor Kai Bongs *University of Birmingham*	Understanding and exploiting quantum processes in nature	£249,910
Dr Martin Booth *University of Oxford*	Three-dimensional photonic engineering of diamond using adaptive optics	£237,648
Professor Stephen Busby *University of Birmingham*	New roles for old transcription factors	£124,368
Dr Donatella Cassettari *University of St Andrews*	Advanced atom traps for precise rotation sensing	£249,791
Dr David Cassidy *University College London*	Gravitational free fall experiments with positronium	£147,622
Dr Adrian Chaplin *University of Warwick*	Transition metal based [2]rotaxanes for the investigation of alkane activation	£160,874
Professor Deborah Charlesworth *University of Edinburgh*	Evolution of suppressed recombination between the X and Y chromosomes of a plant	£106,696
Dr Victor Chechik *University of York*	Chemistry at cold plasma – liquid interfaces	£153,237
Professor Hilary Downes *Birkbeck, University of London*	Forming the Earth and other rocky planets	£169,716
Professor John Gerard Doyle *Armagh Observatory*	The contribution of jets and sporadic events to the coronal heating puzzle	£249,678
Dr Ingrid Dreveny *University of Nottingham*	Molecular basis of ciliary trafficking: lessons from Bardet Biedl proteins	£150,721
Dr David Fermin *University of Bristol*	Novel dehydrogenase based architectures for electrocatalytic conversion of liquid fuels	£141,512
Dr Elizabeth Gibson *University of Nottingham*	Dye-sensitised NiO photocathodes for solar fuel generation	£95,779
Dr Richard Goodey *City University London*	Interaction between new and existing buried infrastructure	£155,950
Professor Elisabeth Hill *Goldsmiths, University of London*	The role of motor abilities in the development of typical and atypical social behaviour	£216,005
Professor John Hutchinson *Royal Veterinary College, University of London*	The evolutionary biomechanics of sesamoid bones in vertebrate limbs: a synthesis	£284,288
Dr Rufus Johnstone *University of Cambridge*	Adaptive modeling of human infant growth	£144,340
Professor Gareth Jones *University of Bristol*	Ecosystem services, bats and biodiversity – an evidence-based approach in Malawi	£201,136
Dr Yuri Kalnishkan *Royal Holloway, University of London*	On-line self-tuning learning algorithms for handling historical information	£133,964
Dr Vitaliy Khutoryanskiy *University of Reading*	Developing in vitro approaches for testing mucoadhesive drug delivery systems	£160,851
Dr Leonid Kulakov *Queen's University Belfast*	A phage metagenomics approach to forecast the evolution of microbial communities	£84,070
Professor Tim Lenton *University of Exeter*	Controls on ocean redox structure and atmospheric oxygen during the Proterozoic	£224,415
Dr Ilya Mandel *University of Birmingham*	Testing general relativity with ground-based gravitational-wave observations	£162,185
Dr Karen McComb *University of Sussex*	Emotional awareness as a basis for social success in a non-human: the domestic horse	£285,389

Professor Francis McGlone *Liverpool John Moores University*	Investigation of the role of 5-HT in psychological responses to affective touch	£235,639
Mr Anthony Miller *Royal Botanic Garden Edinburgh*	Conserving the flora of the Socotra Archipelago: integrating evolution into conservation	£237,426
Professor Philip Mountford *University of Oxford*	Synthesis and reactions of novel alkaline earth and rare earth metal-metal bonds	£179,354
Dr Karen Polizzi *Imperial College London*	How does yeast Golgi organisation contribute to protein glycosylation?	£108,160
Professor Robert Poole *University of Sheffield*	Carbon monoxide (CO) and CO-releasing molecules (CO-RMs) as adjuvants to antibiotics?	£224,515
Dr Emmanuel Pothos *City University London*	Quantum similarity: harnessing the flexibility of human similarity judgments.	£98,962
Professor David Procter *University of Manchester*	Asymmetric reductive desymmetrisation of feedstocks by electron transfer	£149,616
Professor Kathleen Rastle *Royal Holloway, University of London*	Moving beyond the monosyllable in models of skilled reading	£161,537
Professor Katharine Reid *University of Nottingham*	Time-resolved measurements in the molecular frame	£154,132
Professor David Saad *Aston University*	Islands of equilibrium in a non-equilibrium world	£155,624
Dr Marie Smith *Birkbeck, University of London*	Exploration of typical and atypical development of flexible face processing strategies	£112,203
Dr Abigail Tucker *King's College London*	Evolution of mammals: a comparative study of the developing middle ear	£197,593
Dr James Tucker *University of Birmingham*	Expanding the range and versatility of Ferrocene nucleic acids	£118,436
Dr Meesha Warmington *University of York*	Executive control, working memory and literacy skills in bilingual children	£217,890
Dr Chris Wendl *University College London*	Intersections in low-dimensional symplectic field theory	£151,035
Dr Andrew Wilson *University of Leeds*	Towards bionic proteins – tertiary structures from non-natural building blocks	£244,987

Humanities

Professor Graeme Barker *University of Cambridge*	How resilient were Neanderthals and modern humans in Southwest Asia to climate change? reinvestigating Shanidar Cave	£470,805
Professor Guy Cook *King's College London*	People, products, pests and pets: the discursive representation of animals	£249,951
Dr S William G Davies *University of Southampton*	Palaeolithic origins of ceramic technology: innovative and creative revolutions	£136,663
Professor Colin Haselgrove *University of Leicester*	(Re)dating Danebury hillfort and later prehistoric settlements in the environs: a Bayesian approach	£242,743
Professor Stephen Rippon *University of Exeter*	Planning in the Early Medieval landscape: technology, society and settlement	£98,381
Dr Leigh Shaw-Taylor *University of Cambridge*	Transport, urbanisation and economic development in England c.1670-1911	£278,418

Social Sciences

Dr Philip Boland *Queen's University Belfast*	From plantation to peace: Derry/Londonderry as the UK's first City of Culture	£197,819
Professor Rupert Brown *University of Sussex*	The indirect experience of hate crime: the victim group response	£247,602
Dr Theodoros Papaioannou *Open University*	Unpacking the role of industry associations in diffusion and governance of health innovations in developing countries	£142,196
Professor Chris Reed *University of Dundee*	DrEAMS: dialogue-based exploration of argument & mediation space	£188,834

International Networks

Sciences

Dr Simon Goodwin *University of Sheffield*	A UK-Thai programme of observational and theoretical research into binary stars	£64,500
Professor Pat Monaghan *University of Glasgow*	Interdisciplinary network on telomere biology	£98,000

Humanities

Professor Elleke Boehmer *University of Oxford*	Planned violence: post/colonial urban infrastructures and literature	£26,289
Dr Alison Brown *University of Aberdeen*	Blackfoot collections in UK museums: reviving relationships through artefacts	£50,731
Dr Daniel Grimley *University of Oxford*	Hearing landscape critically: music, place, and the spaces of sound	£118,154
Dr Alfred Hiatt *Queen Mary, University of London*	Cartography between Europe and the Islamic world, 1100-1600	£44,567
Professor David Moon *University of York*	Exploring Russia's environmental history and natural resources	£123,005
Professor Nicholas Thomas *University of Cambridge*	Multiple modernisms: 20th century artistic modernisms in global perspective	£120,143

Arts Scholarships

Access All Areas	£119,114
Aldeburgh Music	£360,000
Belfast Community Circus School	£68,750
Birmingham Conservatoire	£195,000
Birmingham Repertory Theatre	£136,950
British Youth Opera	£47,250
Central School of Ballet	£136,641
Central School of Speech and Drama	£120,900
Circus Space	£100,000
Drama Centre London	£102,000
Elmhurst School for Dance	£78,583
English National Ballet School	£60,000
European Union Youth Orchestra	£64,104
Ex Cathedra	£47,149
Glasgow School of Art	£207,780
Guildhall School of Music and Drama	£711,000
JMK Trust	£92,400
London Academy of Music and Dramatic Art	£102,756
London Contemporary Dance School	£418,325

London Film School	£148,753
London Sinfonietta	£145,147
London Studio Centre	£240,000
National Children's Orchestra of Great Britain	£165,000
National Film and Television School	£309,090
National Youth Choirs of Great Britain	£128,000
National Youth Choirs of Scotland	£100,530
National Youth Orchestra of Great Britain	£247,164
Northern School of Contemporary Dance	£219,555
Opera North	£67,500
Phoenix Dance Theatre	£18,000
Pro Corda Trust	£188,682
Purcell School	£105,000
Royal Academy of Arts	£189,000
Royal Academy of Dramatic Art	£195,000
Royal Academy of Music	£570,820
Royal Ballet School	£97,933
Royal College of Art	£110,000
Royal College of Music	£331,330
Royal Conservatoire of Scotland	£225,000
Royal National Theatre	£230,190
Royal Northern College of Music	£330,900
Royal Welsh College of Music and Drama	£270,000
Sadler's Wells	£117,284
Scottish Opera	£42,390
Scottish Youth Dance	£41,250
Siobhan Davies Dance	£42,725
South West Music School	£14,100
Southbank Sinfonia	£105,000
Theatre Royal Bath	£103,986
Town Hall and Symphony Hall	£55,092
Trinity Laban Conservatoire of Music and Dance	£517,636
Wigmore Hall	£60,225
Wysing Arts Centre	£42,000
Youth Music Theatre: UK	£65,400