

2016

ANNUAL REVIEW

The Leverhulme Trust

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REVIEW

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CONTENTS

Page 04

Introduction

06	Chairman's foreword
08	History of the Leverhulme Trust
11	Funding the Trust offers
12	Director's report
13	Summarised financial information
14	2016 in numbers

Page 16

Awards in Focus

18	Shakespeare and human rights
20	British amateur topographic art and landscape in northwest Italy, 1835–1915
22	No ducking the issue: the representation of abstract relations during imprinting
24	Drawing together: the visual archive of expeditionary fieldwork
26	A new North? The making and re-making of a global Arctic
28	Wasps with a point of view?
29	In my time of dying: a history of death and the ends of life in Ghana
30	Bedrock river erosion in the temperate zone: a case study from New Zealand
32	Metropolitan science: places, objects and cultures of practice and knowledge in London, 1600–1800
34	Birth and philosophy
36	From tradition to contemporary: Sattriya music and dance in India and global contexts
38	Fathers and sons? Artistic generations in late imperial Russia, 1880–1923
40	The skullcracker suite: an interdisciplinary artistic research project
42	Breaking the rules – development and evolution of extreme asymmetry and evolutionary novelty
43	New searches for dark energy
44	Imagining India: Mughal art and the creation of modern British zoology
46	Urban energy landscapes and the global sustainability transition
48	Coevolution in a sickly-sweet brood parasite: the honeyguide
50	Women, apprenticeship and companies in seventeenth-century London
52	Speaking the unspeakable: major American writers and the writing of trauma

Page 54

Recent Research Highlights

56	Professor Daniel Robert
58	Professor Ingrid De Smet
60	Dr Liz Stephens
61	Professor Jonathan Erichsen
62	Professor Laura Robinson
64	Professor Steven Schwartz
66	Professor Kimberley Brownlee
67	Professor Kirstie Blair
69	Professor Edward Cowie
70	Dr Lee Broughton

Page 72

Awards Made

INTRODUCTION

The Leverhulme Trust was established by the Will of William Hesketh Lever, one of the great entrepreneurs and philanthropists of the Victorian age

Since 1925 we have provided grants and scholarships for research and education; today, we are one of the largest all-subject providers of research funding in the UK, distributing approximately £80 million a year

We award funding across academic disciplines, supporting talented individuals in the arts, humanities, sciences and social sciences to realise their personal vision in research and professional training. As well as substantial grants for research projects, we offer fellowships for researchers throughout their academic career, awards for international collaboration and travel, and support for the fine and performing arts.

Our approach to grant-making is distinctive. Our awards are made in the responsive mode, with the choice of topic and research design left with applicants. We look for work of outstanding merit, which is original, important and has significance beyond a single field. We particularly value research that crosses disciplinary boundaries or that is willing to take risks in its pursuit of new knowledge or understanding.

CHAIRMAN'S FOREWORD



I am delighted to report that the Trust is in good financial health. During 2016, we received more than 4,000 requests for funding, and awarded grants worth approximately £80 million. This year we also reached something of a landmark as the Leverhulme Trust has now distributed more than £1 billion in grants since its foundation in 1925.

Each year we run a £10 million competition for larger grants, and 2016 saw the third round of our Research Leadership Awards. We received an outstandingly strong group of applications from across the disciplinary array and agreed to fund 13 of these at a total cost of £12 million. We now look forward to seeing what this cohort of research leaders achieve as they forge new teams to help them launch their research initiatives.

At a time when the UK's place in Europe is under scrutiny, this year's Leverhulme Annual Lecture was particularly apposite, since the distinguished economist and Nobel Laureate Amartya Sen chose to speak on the subject of 'Who Exactly Are We?'. Professor Sen's enlightening talk provided a wonderful stimulus for a broad-ranging discussion about the possible implications of Brexit for scholarship in the UK.

The Trust itself continues to place importance on international collaborations, by assisting Study Abroad Students to expand their horizons through postgraduate study or research overseas, supporting academics to develop new collaborations and lines of research with colleagues around the world via our International Academic Fellowships, and enabling UK universities to host distinguished academic visitors from overseas through our Visiting Professorships. It is also noteworthy that so many of our other grant holders choose to spend at least part of their time working with colleagues in other countries and in ways that invariably prove to be immensely rewarding. The Trust Board is delighted to be able to help foster these

collaborative research relationships. British academic and cultural institutions are world leaders because of their ability to attract the finest talent from around the world; we should be robust in safeguarding this unique competitive advantage.

This year also saw the formal launch of our four new Leverhulme Research Centres based at the Universities of Cambridge, Dundee, Liverpool, and Sheffield, each receiving grants of £10 million over 10 years. These cover an exciting and diverse range of themes – Future of Intelligence, Forensic Science, Functional Materials and Climate Change Mitigation. Launch events included a talk by Professor Stephen Hawking, a high-profile conference at the Royal Society, and a formal opening by HM The Queen.

I was delighted to welcome two new Trustees to the Leverhulme family in 2016, and I hope that Amanda Sourry and Keith Gull will find the diversity of scholarship, the research ambition of our applicants, and the impressive outcomes of their efforts to be as fascinating as I do.

Looking ahead, 2017 promises to be another exciting year. With a commitment of £10 million, we will again be running our Doctoral Scholarships, offering at least 150 doctoral awards to help nurture the future generation of aspiring researchers. More generally, across all twelve of our schemes, I am confident that we will continue to attract the large numbers of high-quality bids to conduct original and exciting research that we have seen in recent years.

On behalf of the whole Board, I would like to thank the Trust staff and the many academic colleagues who make all of this possible, by generously offering their time and expertise to review the many bids we receive and so help us locate the very best that UK research has to offer.

Niall FitzGerald KBE DSA

Chairman of the Leverhulme Trust Board

British academic and cultural institutions are world leaders because of their ability to attract the finest talent from around the world; we should be robust in safeguarding this unique competitive advantage

HISTORY OF THE LEVERHULME TRUST



A committed philanthropist throughout his life, on his death in 1925 Lord Leverhulme left a proportion of his holdings in Lever Brothers for certain trades charities and to provide ‘scholarships for... research and education’. It was thus that the Leverhulme Trust came into being

Born in 1851, William Hesketh Lever made his fortune through the manufacture and marketing of soap and cleaning products. In the space of only a few years his company Lever Brothers grew to become a household name, and its products, which included Sunlight Soap and Lux, were sold around the world. The title ‘Lord Leverhulme’ was conferred upon Lever in 1922. A committed philanthropist from the beginning, when Lord Leverhulme died in 1925 he left a share of his holdings in his company to provide for specific trades charities, and to offer ‘scholarships for... research and education’. The Leverhulme Trust was established to carry forward these charitable aims. In 1930, Lever Brothers merged with Margarine Unie to form Unilever – one of the world’s major multinational companies – and the shares held by the Leverhulme Trust became shares in Unilever PLC.

The Trust Board

In making decisions about funding, the Trustees seek the advice of a range of peer reviewers and expert panels or committees who offer an assessment of the academic merit and significance of applications.

Trustees

Mr N W A FitzGerald KBE DSA
(Chairman)

Sir Iain Anderson CBE FRSE

Mr D Baillie

Mr A C Butler

Mr P J P Cescau

Professor K Gull CBE FRS (from
4 October 2016)

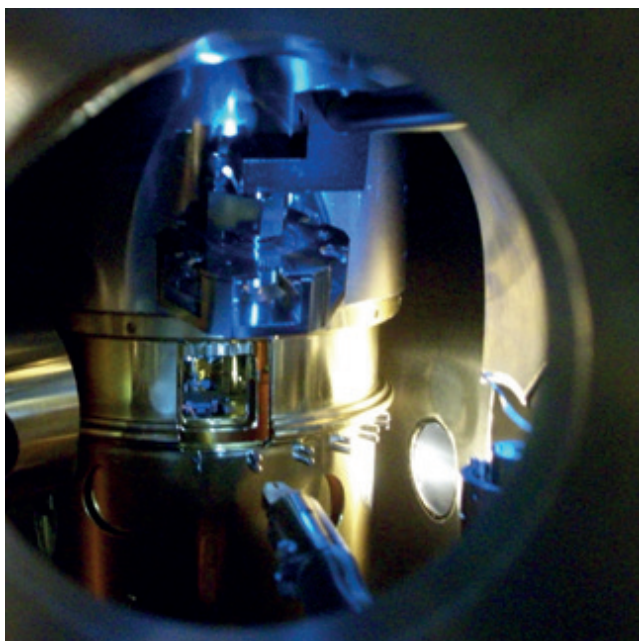
Mr R Markham CMG

Mr P Polman

Mr C Saul

Ms A Sourry (from 25 November 2016)

Mr S Williams



FUNDING THE TRUST OFFERS

Research Projects

Research Project Grants cover salaries for research staff engaged on a project and associated costs directly related to the proposed research. The choice of theme and research approach is left entirely to applicants. Up to £500,000 over five years is available.

Research Leadership Awards support researchers with an established university career who wish to build a research team to address a distinct research problem. Between £800,000 and £1 million over four to five years is available. The award covers salary costs for research assistants and research students working under the leadership of the award holder, and associated costs directly related to the proposed research. The Research Leadership Award scheme runs every three years.

Fellowships and Studentships

Early Career Fellowships provide a bridge into an academic career for researchers with a proven research record, but who have not yet held an established academic post. Fellows should expect to complete a single piece of original, publishable research during their tenure. The scheme provides fifty per cent (up to £24,000 a year) of the salary costs of a three-year academic appointment, with the host institution providing the remaining funds.

Research Fellowships of up to £50,000 over a period of three to twenty-four months are awarded to experienced researchers, particularly those whose day-to-day responsibilities have prevented them from completing a programme of research. Applications are welcomed from established independent scholars as well as those holding posts in higher education institutions.

Major Research Fellowships support well-established academics in the

humanities and social sciences to focus for two or three years on a specific piece of significant, original research. The scheme is particularly aimed at researchers whose day-to-day duties have prevented them from completing a programme of research.

Emeritus Fellowships provide funding over up to two years for senior researchers who have retired from an academic post to complete a research project, and prepare the results for publication. The awards offer research expenses of up to £22,000, but do not provide maintenance for the applicant.

Study Abroad Studentships support an extended period of advanced study or research at a centre of learning in any overseas country, with the exception of the USA. Applicants need to have been resident in the UK for at least five years, and should be either currently a student, or have been registered as a student in the last eight years. The scheme offers basic maintenance costs of £21,000 a year, travel costs and a contribution towards research expenses. Studentships are awarded for between twelve and twenty-four months.

International Academic Fellowships enable established researchers to visit overseas research centres, to develop new knowledge, skills and ideas. Up to £40,000 is available for a period of three to twelve months.

Visiting Professorships are awarded to UK institutions that wish to invite an eminent researcher from overseas to enhance the knowledge and skills of academic staff or the student body within the host institution. The scheme covers maintenance, travel expenses and research costs. Visiting Professorships last for between three and twelve months.

Leverhulme Doctoral Scholarships provide grants of £1.05 million to ten UK universities. Each award funds 15 doctoral students at that institution, with five scholarships to be offered in every year of the three-year grant. The awards are offered in a subject area that applicant universities have identified as a research priority. The scheme covers maintenance (at research council levels) and tuition fees, with any remaining funds to be used for the Leverhulme Scholar's research and training expenses. The Leverhulme Doctoral Scholarships scheme runs every three years.

Philip Leverhulme Prizes

Each year, the Trust awards thirty prizes to recognise researchers at an early stage of their career, whose work has already had a significant international impact, and whose future research career is exceptionally promising. Prize winners receive an award of £100,000 over two or three years, which may be used for any research purpose. To be eligible, nominees must hold an academic post in the UK, and must be within 10 years of the award of their doctorate on the closing date for nominations. Nominations are accepted for work across 18 broad disciplines, with prizes in six of these disciplines offered each year.

Arts Funding

Arts Scholarships are open to specialist arts training organisations to develop innovative teaching and to provide bursaries for individuals of exceptional talent to develop their skills in the fine and performing arts.

For further information about the funding schemes offered by the Leverhulme Trust, please visit www.leverhulme.ac.uk

DIRECTOR'S REPORT



2016 proved to be another year with some significant highlights for the Trust, some of which the Chairman has already reported on, but this year also saw the completion of the latest cycle of Philip Leverhulme Prizes, which are offered in 18 subject areas over a three-year period. This means that early-to-mid career researchers in virtually every discipline have the opportunity at some point to be nominated for an award. Each prize is worth £100,000, recognises an outstanding contribution to scholarship, and commemorates the contribution to the Trust made by the Third Viscount and grandson of the benefactor. This year our six Prize Panels dealt with almost 300 high-quality nominations across the fields of Archaeology, Chemistry, Economics, Engineering, Geography and Languages and Literatures, making the task of selecting just 30 winners a considerable challenge. I cannot think of any other organisation that awards £3 million of prize money every year to recognise excellent scholarship at this important career stage and to support the research these exceptional individuals are pursuing. Our thanks go out to the prize panels for their assistance and our congratulations to the prizewinners themselves.

To demonstrate the Trust's ongoing support for researchers who are commencing academic careers, a record 116 Early Career Fellowships were awarded in 2016, representing a total commitment of more than £10 million of Trust funds. This will attract a further investment of £8 million from host universities – a significant contribution by the sector for researchers at the beginning of their careers. The diverse range of projects that have been

funded include research on 'Nano-enabled water desalination', 'Shakespeare and human rights' and 'New muralism and the politics of erasure – a study of public culture in Peru'.

Research Project Grants are still a major strand of our work, in one sense the 'core business' of the Trust, and in 2016 represented some 46% of our total spend. More than 170 projects were supported, always team-based, sometimes in the form of a single doctoral student or research assistant led by principal investigator, or alternatively a larger group combining studentships, PDRAs, co-applicants and local researchers. Grants are available through this scheme for awards up to £500,000 over up to five years, to support research endeavours at different scales.

Leverhulme grants span the whole range of academic enquiry, but I continue to be impressed by the sheer diversity of the scholarship that we see. This view was echoed by the young work experience student who wrote about her time at the Trust last summer, "I am struck by the sheer range of scholarship and enquiry that is encouraged and supported... and all of this flows from the vision of one man who, in a final act of kindness, facilitates continuing progress in science, social science, the arts and humanities, nearly 100 years after his death." Among the intriguing bids that the Trust funded in 2016 one can find projects on 'Information technology's dark side: how does it reduce employee well-being?', 'Taking utilitarianism seriously', 'Mapping migration in Roman Iberia', 'New searches for dark energy', 'The lost

meteorites of Antarctica' and 'Mermaids of the British Isles'. Leverhulme must surely have one of the widest subject horizons in the research landscape, as is illustrated by the projects in our Awards in Focus section.

During 2016, the sector focussed a good deal of attention on the difficulties of supporting interdisciplinary research, so it was reassuring to note that the Trust emerged as a funder considered to be particularly supportive of such work. This was a pleasing validation of the Trust Board's philosophy and its aspiration to encourage research that transcends traditional disciplinary boundaries.

As well as applying this philosophy to our own grant schemes, the Trust has invited the three National Academies to develop a new joint-programme of support for interdisciplinary and curiosity-driven research, to embrace the sciences, engineering, the social sciences and humanities. We look forward to seeing the first awards made under the new APEX (Academies Partnership in Supporting Excellence in Cross-disciplinary Research) scheme in 2017.

Finally, and to echo the closing sentiment expressed by the Chairman, I would like to say a huge 'thank you' to all our peer reviewers, assessors and panel members, without whom the Trust simply could not do its work. As ever, not forgetting the 'Famous Fourteen' (as they are apparently known in one prominent university that I visited during the year): the Trust staff here in the office at Pemberton Row.

Professor Gordon Marshall CBE FBA

SUMMARISED FINANCIAL INFORMATION

For the year ending 31 December 2016

		2016	2015
		£000	£000
Income from:	Investment income	86,707	74,131
Expenditure on:	Investment management costs	1,944	1,806
	Charitable activities	78,616	109,032
Net income/(expenditure) before net gains on investments		6,147	(36,707)
	Net gains on investments	318,353	207,428
Net income and net movement in funds		324,500	170,721
Statement of funds	Total funds brought forward	2,314,476	2,143,755
	Total funds carried forward	2,638,976	2,314,476

This information is taken from the Leverhulme Trust Annual Report and Financial Statements 2016, which are available to download from the Charity Commission website or on request from the Trust.

2016 IN NUMBERS

Gender split

KEY
■ Male ■ Female

Major Research Fellowships

63% 37%

Research Fellowships

59% 41%

Applications

52% 48%

Early Career Fellowships

74% 26%

Research Project Grants

Major Research Fellowships

58% 42%

Research Fellowships

56% 44%

Awards

46% 54%

Early Career Fellowships

80% 20%

Research Project Grants



14
Staff



122
Institutions funded



611
Grants awarded

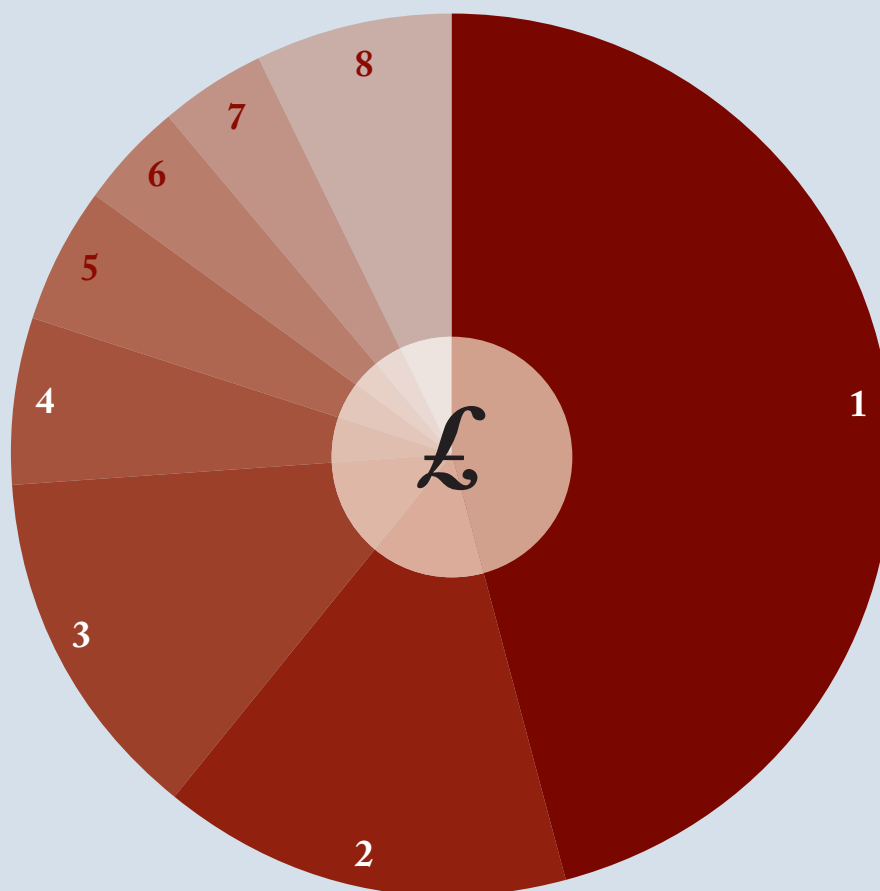


4,186
Applications received



13,451
Peer reviews received

Distribution of funds in 2016



- 1 Research Project Grants – £37,094,000 **46%**
- 2 Research Leadership Awards – £12,399,000 **15%**
- 3 Early Career Fellowships – £10,440,000 **13%**
- 4 Major Research Fellowships – £4,593,000 **6%**
- 5 Research Fellowships – £4,291,000 **5%**

- 6 Academy Fellowships/Scholarships – £3,140,000 **4%**
- 7 Philip Leverhulme Prizes – £3,000,000 **4%**
- 8 Other* – £5,167,000 **7%**

* including International Networks, Visiting Professorships, Study Abroad Studentships, Emeritus Fellowships, Artists in Residence Grants, International Academic Fellowships, Study Abroad Studentships

Application success rates

	2016	
	Applications received	Success rate %
Research Project Grants	1056	17
Early Career Fellowships	847	14
Research Fellowships	739	15
Philip Leverhulme Prizes	290	10
Major Research Fellowships	194	17
Visiting Professorships	128	23
Study Abroad Studentships	114	23
Emeritus Fellowships	68	52
International Academic Fellowships	52	24

AWARDS IN FOCUS

Written by current award holders, and spanning a range of funding schemes and academic disciplines, our awards in focus highlight the breadth and significance of research funded by the Trust in 2016

SHAKESPEARE AND HUMAN RIGHTS

Drawing on six case studies of Shakespeare translated and appropriated by people negotiating contemporary conflict and post-conflict situations, Preti Taneja's interdisciplinary research project interrogates the role of Shakespeare in conflicts, human rights law, humanitarian practice and peace-building today

Dr Preti Taneja

University of Warwick
Early Career Fellowship

What happens when Shakespeare's plays are performed at the margins of societies, by and for people disenfranchised and unhomed by conflict? Why do they choose Shakespeare and how do they translate, adapt and appropriate him? What real-world histories and current conditions shape their work? And what do bodies performing across ethnic, religious and linguistic boundaries, in liminal spaces such as refugee camps and divided cities, really achieve, affect and represent? These were just a few of the questions I had in mind when, in 2014, I began to investigate how Shakespeare's plays are interpreted by people negotiating contemporary conflict and post-conflict situations across the world today. Working in the Department of Global Shakespeare at Queen Mary, University of London, and the University of Warwick allowed me the interdisciplinary scope to travel and observe practitioners as they developed their ideas right through to collecting critical reactions to their finished pieces. Very quickly, I became aware that the process of my travel, of gathering research and of speaking to actors and directors about their work and reporting on it in the media and to colleagues, was changing the course of their projects and mine. Mapping these changes is becoming a key element in my understanding of how Shakespeare as a cultural icon can 'speak' to aberrations of human rights and across linguistic, geographic borders in humanitarian emergencies. I have also become fascinated by the questions of who hears this 'speech', how and why.

I began to think about the wider role Shakespeare's writing plays in conflicts, human rights law, humanitarian practice,

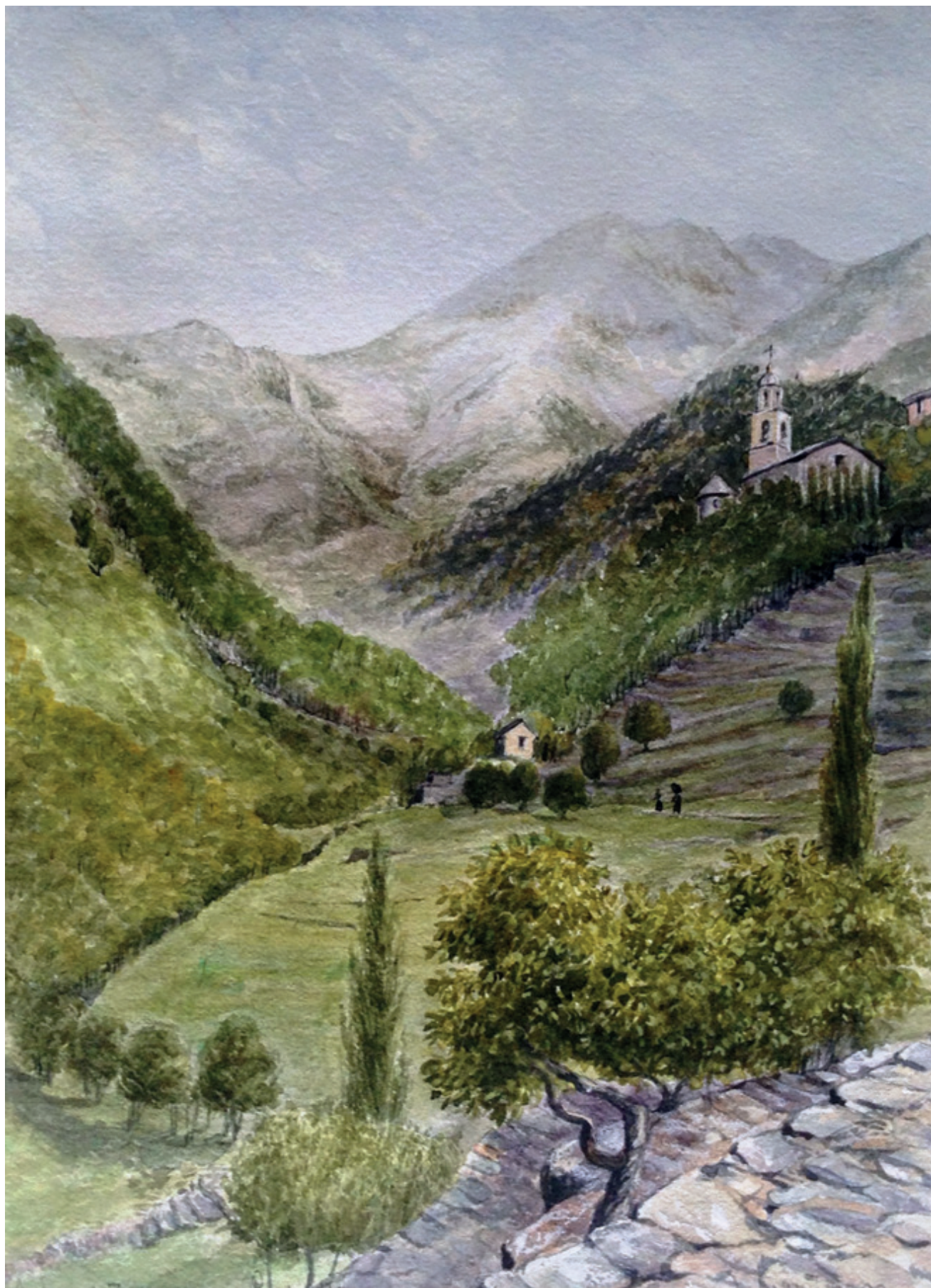
peace-building and in the global media's reporting of these. Having gathered extensive documentary and multimedia evidence from work produced in the Middle East, the Balkans, India and Europe, I want to now translate my evidence and place my findings in their literary and historical landscape and in relation to national and international legal frameworks. This will mean going into the archives of the Shakespeare Birthplace Trust in Stratford-upon-Avon and the Folger Shakespeare Library in Washington, but also to UNARMS, the United Nations Archives and Records Management Section, to look at the implementation of protections on cultural and linguistic rights in the places where I have gathered my evidence.

The Fellowship will allow me to work with international Shakespeare scholars and also with the University of Warwick, leading writers and translators, rights advocates and in the Centre for Human Rights in Practice, where I will consider different approaches to writing within and about the human rights framework. Building on my experience of filmmaking undertaken while researching and reporting on lives affected by conflict for NGOs with the collective ERA Films, I will also be able to present my research process and evidence as an interactive multimedia documentary. This will enable anyone to experience almost for themselves the constraints of making artistic work in difficult geopolitical circumstances, and of reporting on it. Eventually my project aims to formulate a way of thinking about the cultural life of human rights and add to debates about their universality, through the lens of Shakespeare, one of the world's most universally recognised cultural icons.

Preti Taneja's debut novel *We That Are Young* will be published by Galley Beggar Press in July 2017.

Right. 'Romeo and Juliet', produced by Qendra Multimedia (Prishtina) and Radionica Integracija (Belgrade). Image credit: Maja Medić.





BRITISH AMATEUR TOPOGRAPHIC ART AND LANDSCAPE IN NORTHWEST ITALY, 1835–1915

Using the rich archive of British amateur landscape art for northwest Italy, Charles Watkins will contextualise amateur works through an evaluation of the artists' intellectual and cultural influences, a source hitherto largely ignored by geographers, historians and art historians

Professor Charles Watkins

University of Nottingham
Research Project Grant

Many British tourists visited the coast and mountainous interior of northwest Italy in the nineteenth century. The number of visitors rapidly increased after the defeat of Napoleon in 1815, and from 1835 onwards more and more of these visitors settled along the coast in search of health and warmth. Several English-speaking colonies of resident retired clerics, colonial officials, aristocrats and industrialists were established, and by 1900 there were large residential communities at places such as Alassio, Bordighera and San Remo. Many visitors and residents were keen amateur artists, and in this project we will identify and analyse drawings, paintings and photographs by British visitors and residents in northwest Italy (Western Liguria, Piedmont and Valle d'Aosta) between 1835 and 1915.

The originality of this project lies in bringing together approaches from the disciplines of geography and history to re-evaluate the importance of amateur topographical art which until recently has been largely ignored by academics and dismissed as mundane or hackneyed. I am working on the project with Dr Ross Balzaretti and Dr Pietro Piana. We will contextualise these amateur works by evaluating the artists' intellectual and cultural influences. We are creating a database of amateur art which survives in public and private archives and will analyse the art to provide insights into the way landscapes were appreciated and understood in the past by visitors, tourists and residents. We will examine how their

ways of seeing influenced and interacted with the landscapes they chose to depict and use the images, in conjunction with maps, archives and fieldwork, to deepen knowledge of past land management history and traditions.

The landscapes of northwest Italy have changed dramatically over the last hundred years. The coastal areas are now characterised by dense development of hotels, houses and industry linked by many new roads and motorways. The inland areas in contrast have suffered from intense rural depopulation and land abandonment. This means that many former pastures and cultivated terraces are now covered with naturally regenerated woodland, and traditional forms of agriculture and woodland management have disappeared. We will examine the extent to which amateur topographical art is a way of rediscovering former cultural landscapes obscured by such recent 're-wilding'.

The analysis of the images and comparison with present-day landscapes and intervening historical maps will be used to demonstrate the extent and rapidity of change, provide insights into forgotten and hidden geographies and help to generate ideas about how lost landscapes might be recreated. The detailed analysis will make use of a geographic information system and draw on the database of art and the systematic analysis of similar views by different artists to interpret environmental change. The project seeks to establish amateur art as a novel archive which can be interpreted to help solve current environmental issues brought about by both rural land abandonment and extensive coastal development.

Left. The Rev Alfred Sells (1822–1908), a retired Anglican minister, made several topographical views of Liguria at the turn of the nineteenth century. He focussed on rural subjects depicting with great detail trees and agricultural terraces. This view of S. Andrea di Foggia, just inland of Rapallo, painted in 1900, shows the area before the abandonment of grazing of the hills, and before housing development.

NO DUCKING THE ISSUE: THE REPRESENTATION OF ABSTRACT RELATIONS DURING IMPRINTING

Alex Kacelnik's recent discovery that duck hatchlings rapidly and without reinforcement imprint on the relational concepts of 'same' and 'different,' opens promising questions regarding concept learning, memory representations and imprinting

Professor Alex Kacelnik

University of Oxford
Research Project Grant

Animals gather, store, retrieve, and use information to make decisions, and during these steps the information is 'represented' in the animal's brain.

An example of this is visual identification. Whether an animal needs to identify specific members of its species, the general appearance of potential predators, or the category of items which constitute its diet, it has to compare its visual input against representations in its brain which are the result of genetically encoded information or of the content of earlier perceptual experience. Progressing in understanding the nature of these, often called 'mental' representations, is the goal of the present project. We study aspects of such representations using newborn ducklings as subjects.

It is crucial to the survival of newborn ducklings that they identify their mother and stay near her. They learn to follow their mother the day they hatch, and can identify her in just a few minutes. This form of learning, called 'imprinting', has been extensively studied and forms some of the foundational work on ethology and neuroethology by Konrad Lorenz, Patrick Bateson, Gabriel Horn and others.

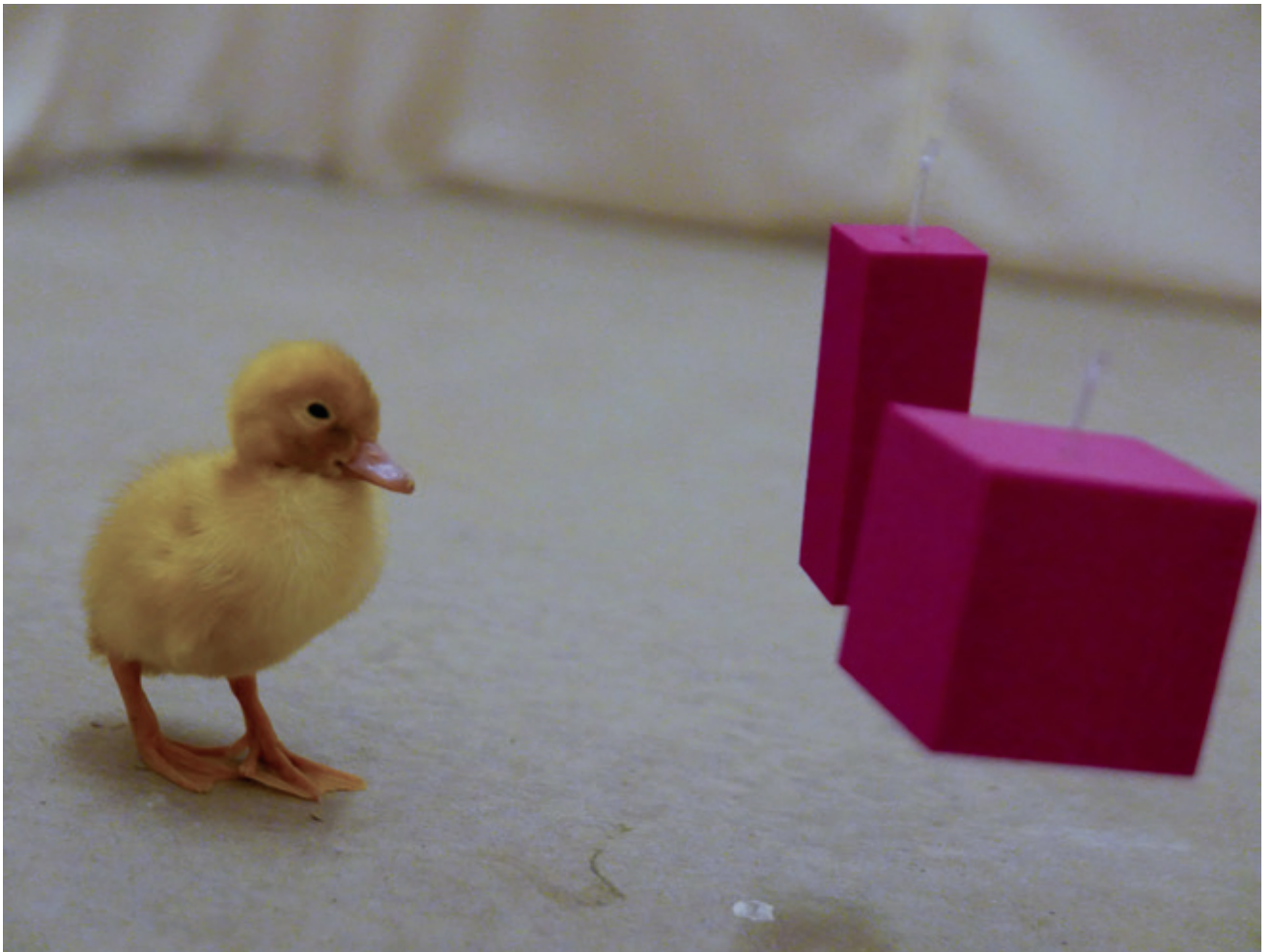
In the work that inspired this project, my then-student Antone Martinho, who will be working on this project as well, and I investigated whether the representation formed during imprinting is solely visual or includes abstract properties of the objects seen by the duckling in its earliest experiences. We tested this by exposing newborn ducklings to pairs of objects that were either the 'same' or 'different' in shape or colour, and testing their following preferences between two novel pairs composed of new objects, one of which held the same, and the other the opposite relation to each other. The ducklings reliably made this distinction, suggesting that the representation of their visual experience includes logical relations. This makes biological sense, because a mother duck does not always appear the same to a duckling looking at her: she can be partially obstructed by a tree, or floating partially immersed in water, or have her wings extended and so take on a different profile. The ducklings need to be able to recognise these highly variable visual stimuli as indicative of their mother, and so need to form a sort of internal library that defines her, rather than just one or even a number of camera-like visual 'snapshots'.

What is surprising, though, is that these hours-old ducklings, in successfully parsing our same/different problem without any special reinforcement, have

demonstrated an ability previously only seen in adult primates and very intelligent bird groups like adult crows and parrots, and in all these cases after considerable training. As a consequence of our findings, Antone and I hypothesised that abstract concept formation, which has been considered a rare and difficult ability, is probably actually much more common than previously thought, as most animals that use vision to represent specific objects or classes of objects will have problems similar to those of ducklings identifying their mother: representations need to be rich enough to work on ever-changing visual input.

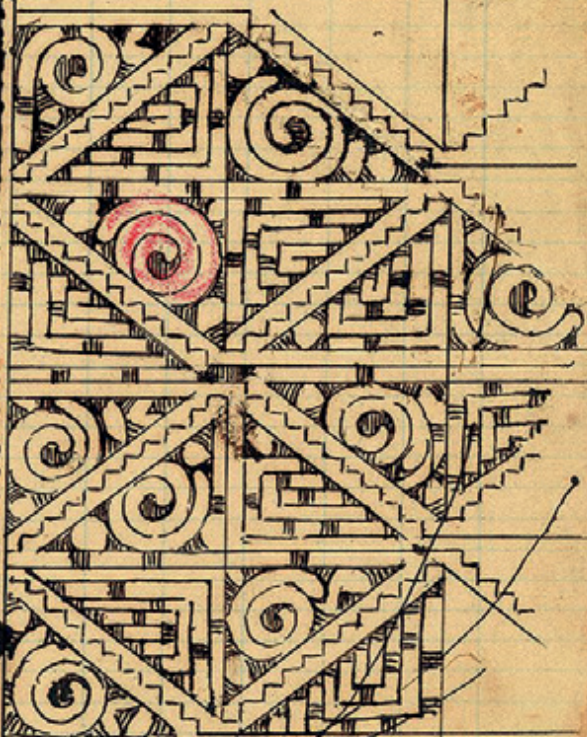
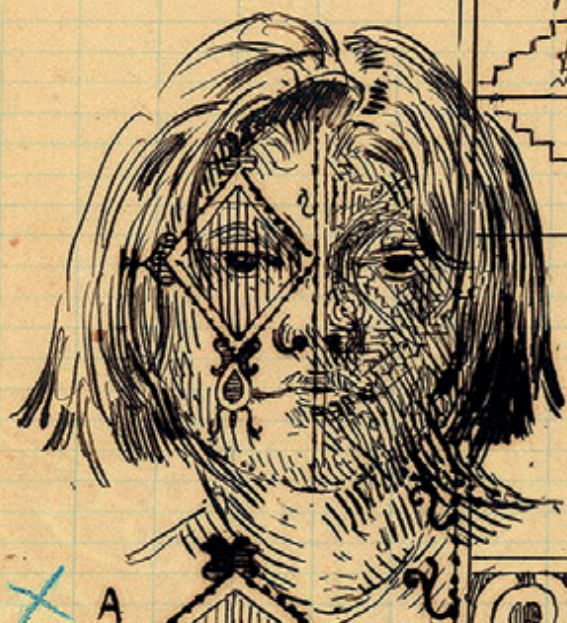
The core of the present project is to identify kinds of abstract concepts that ducklings can form and deploy during imprinting. So, for example, we know that they can identify same and different, but do they show similar prowess in distinguishing between symmetrical and asymmetrical groups, or between different numbers? How do they define 'sameness' when faced with arrays of multiple objects instead of just pairs: so, for example, once they have been trained to prefer 'same' or 'different' with, say a brief exposure to nine identical or nine different shapes, what will they think of eight spheres and a cube? What about seven and two? Where do they draw the line between same-ish and different-ish? Data from baboons suggests that Shannon entropy (a measure of the amount of information contained in a percept) may be a good predictor of how animals make this distinction, so that the transition between judging a stimulus as 'same' or 'different' is gradual and predictable. We aim at testing such ideas with newborn ducklings, using their readiness to imprint in the absence of prolonged rewarded training.

Hopefully, Antone and I will be able to tell you more about this very soon.



VII

I quadri sono più perfetti - Quello
A più somigliante a quello di sopra
e nella figura, e le linee di profilo
più meno fatte. Qui i quadrati
sono riciccati allungati per difetto
della quadratura della carta. da
per l'immagine conosciuta ho ripro-
dotto; I disegni di triangoli del
fondo sono alternativamente dispo-
sti (in origine) come nella fig. B.



32

dalla fascia di mia ... moglie - Marzo 6/92

DRAWING TOGETHER: THE VISUAL ARCHIVE OF EXPEDITIONARY FIELDWORK

Inspired by recent approaches to the study of visual technologies in anthropological fieldwork, Luciana Martins explores the practice and experience of image-making as deployed on European expeditions to South America from the 1850s to the 1950s

Dr Luciana Martins

Birkbeck, University of London
Research Fellowship

What do the British botanist Richard Spruce (1817–1893), the Italian artist Guido Boggiani (1861–c.1902), and the French anthropologist Claude Lévi-Strauss (1908–2009) and his wife Dina Dreyfus (1911–1999) have in common? All undertook sustained fieldwork in tropical Latin America, part of the wider history of expeditionary travel. The focus of my Research Fellowship is to investigate their visual archives, now scattered across libraries and private collections in London, Paris, Prague, São Paulo, Rio de Janeiro and New Haven.

This project explores various forms of visual engagement in the field, examining in particular the relationship between drawing, photography and film-making as embodied practices of *in situ* observation. Conventional histories of field observation are based on assumptions about the increasing accuracy of visual evidence. In recent work, by anthropologists and historians of science especially, more contextual approaches to the performance of visual documentation are emphasised. In this project, I am particularly interested in what Chris Ballard calls the ‘dialogic practice’ of visual representation and its affective investments.

My first case study focusses on the sketches of Richard Spruce, who spent 15 years (1849–1864) collecting herbarium specimens and ethnobotanical artefacts in the Amazon and the Andes, many now

held at the Royal Botanic Gardens, Kew. It also encompasses a notable collection of drawings by Spruce at the Royal Society, as a way of considering the epistemology and practice of field sketching in natural history in the era of early photography.

The second case study considers the visual archives of Guido Boggiani, who travelled in Paraguay documenting the landscapes and indigenous peoples of the Gran Chaco (1892–1902). Of specific interest are his pioneering records of Kadiwéu facial and body painting. Boggiani’s work is relevant to my project for two reasons: its combination of both highly accomplished drawing with the skilled use of photography; and its subsequent role in more recent discussions of Kadiwéu cultural identity and cultural property.

My third case study examines the uses of pencil and camera by Claude Lévi-Strauss and his first wife Dina in the course of expeditions to Mato Grosso (1935–1936 and 1938). In this context, the Fonds Lévi-Strauss, held at the Bibliothèque nationale de France, contains a remarkable visual archive, which provides a means of exploring the couple’s experience of fieldwork in Brazil and, in particular, Dina’s contribution, which has yet to be fully considered.

This research will provide new insights into the uses of visual technologies in the field, including their role in cross-cultural exchanges and encounters. I hope the research will also contribute to our understanding of the place of Latin America in the broader European geographical imagination of the period.

Left. Guido Boggiani’s sketchbook of his first expedition to Kadiwéu territory, 1892, reproduced courtesy of Pavel Frič / Yvonna Fričová (Prague).

A NEW NORTH? THE MAKING AND RE-MAKING OF A GLOBAL ARCTIC

What future awaits the Arctic this century and beyond? Klaus Dodds explores this question by considering how the region has been progressively 'globalised' and as such attracts ever greater demands to be doing things – to exploit, to protect, to legislate, to cooperate and to facilitate

Professor Klaus Dodds

Royal Holloway, University of London
Major Research Fellowship

Approximately ten years ago, global media headlines were filled with stories that there was a 'new scramble for the Arctic'. A Russian flag had been gently deposited on the bottom of the central Arctic Ocean, and some commentators were warning that this was a 'sign' that Russia might be preparing to lay claim to a vast area of the seabed. Canadian observers seemed to have been caught unawares by the incident, and the then Harper government worked hard to reassure its citizens that Canada was confident of its sovereignty in the North.

Framing the flag-planting incident as emblematic of a 'scramble' clearly raises historic parallels with past scrambles such as nineteenth-century Africa and colonial empires competing for territory, resources and control of peoples. The twenty-first-century Arctic is a vastly different place, but any talk of 'scrambles' raises troubling questions about the land and resource rights of indigenous and northern communities who have been frequently marginalised by Arctic states and 'southern' companies and stakeholders. Taking the longer view, it is not difficult to piece together a story of the Arctic, which is one punctuated by a series of resource scrambles led by imperial powers and commercial actors such as the Hudson's Bay Company.

But there is another way to think about 'scramble' and that might focus on how our imaginative geographies and lived experiences of places get 'scrambled'. What happens to the Arctic when its geophysical and environmental characteristics alter because of global warming and climatic shift? With declining sea ice thickness and distribution comes new visions of an Arctic increasingly interconnected to global flows of traffic and trade.

For millennia, indigenous peoples developed traditional knowledge of the Arctic based on a sophisticated understanding of polar seasonality, sea ice distribution, the migratory routes of animals, the limits of tundra and availability of food stores and shelter. A warming Arctic is 'scrambling' traditional indigenous knowledge, and sea ice melting and thinning is transforming human – animal relations including subsistence hunting and fishing.

The Arctic is also being 'scrambled' as it becomes an object of global interest and investment. In the last ten years, China, South Korea, India, Singapore and Japan have invested ever more in Arctic science and developed new relationships with the so-called eight Arctic states, including Norway, Iceland and Finland. They join a phalanx of other countries and organisations which work with the Arctic states through forums such as the Arctic Council. The UK is an active polar partner, and British agencies such as the NERC Arctic Office are working to leverage commercial and scientific advantage in the Arctic region.

Recently, commentators have spoken of a 'global Arctic' rather than a 'circumpolar Arctic'. What is at stake when we shift our meta-geography? What does it mean to juxtapose the 'global' and the 'Arctic' together? As a geographer, I am going to investigate how the Arctic is being re-imagined as a global region and what the material consequences at stake are, ranging from China describing itself as a 'near Arctic state' to the long-standing struggles of indigenous peoples to secure land rights and social justice.

Right. Will Greenland's resources help to encourage further a 'global Arctic'?



WASPS WITH A POINT OF VIEW?

The learning behaviour of digger-wasps that sometimes fly with light prey or drag heavy prey along the ground raises interesting questions: do these digger-wasps have mechanisms of generalisation allowing views learnt in the air to guide return journeys on the ground? Or is digger-wasp behaviour adapted to provide similar views when learning the nest location and when returning to it? Thomas Collett intends to find out

Professor Thomas Collett

University of Sussex
Emeritus Fellowship

A major reason for studying insect behaviour is to understand how insects manage to accomplish seemingly complex things and what limits there are to a species' flexibility. It is well established that insects can learn. Honeybees, for instance, remember the colours of rewarding flowers and learn how best to extract nectar or pollen from them, but it is unclear in what ways a bee can generalise from its individual experiences. A common approach to answering such questions has been to train bees that some sensory stimulus leads to a food reward and then to test their ability to obtain food in situations that differ from the one in which they were trained. Another approach is through close analysis of an insect's normal behaviour.

Solitary wasps often dig nests in which their young develop and then return with prey to provision the nests. To bring prey safely home, they learn how to locate their nest during complex learning or survey flights that they perform when they first leave the nest. I will study the digger wasp, *Ammophila*, to examine how it copes with an intriguing problem. *Ammophila* hunts for caterpillars that it either drags home when large and heavy or can bring home on the wing when small and light. Many hymenopterans (ants, bees and wasps) tend to follow visually-guided routes home by adjusting their path so that the view that they see matches a previous view acquired while learning the route. Views while walking on the ground can differ substantially from views seen from the air in flight. How do *Ammophila* deal with this problem? One solution is for a particular individual to select always small or always large caterpillars and tailor what it learns to the transport of prey of a fixed size.

Alternatively, since all wasps probably fly while approaching prey, they may all learn during the same type of learning flight and have the capacity to generalise between views recorded in the air and on the ground. That solution would raise many questions for future work. But it is perhaps more likely that wasps, when dragging prey, briefly abandon the caterpillar and fly up or climb vegetation to obtain a view corresponding to what they had seen during learning. After this re-orientation, they would then return to the caterpillar and drag it in the correct direction. And it is always possible that they behave in quite unexpected ways.

Conveniently, each *Ammophila* makes several provisioning trips to several nests making it possible to test an individual's mode of locomotion. A first step in this direction will be to try and persuade wasps to visit a feeding station ten or so metres from their nest at which caterpillars of a variety of sizes can be presented.



IN MY TIME OF DYING: A HISTORY OF DEATH AND THE ENDS OF LIFE IN GHANA

Gathering together extensive documentary sources, John Parker seeks to reconstruct the changing ways that African societies and individuals perceived, experienced and reflected upon death and dying; he will explore the history of Ghana's vibrant funerary cultures from the era of the Atlantic slave trade to the end of the era of British colonial rule in the 1950s

Dr John Parker

SOAS, University of London
Research Fellowship

This project examines the history of death and the ends of life in that part of West Africa encompassed by the present-day nation of Ghana between the seventeenth and the mid-twentieth centuries. I have been inspired not only by previous work on aspects of Ghana's past, but by a rich and growing body of historical scholarship on death, burial and mortal remains in cultures around the world – from twentieth-century Russia and late imperial China to the world of early Islam, to Mexico and to modern France and England. In Africa, too, death is emerging as a topic of great interest, influenced in part by the existential threat of the HIV/AIDS pandemic and by shifting world views associated with the spread of new forms of Christianity. Much of this work charting the 'deathscapes' of the contemporary continent is anthropological, whereas my project seeks to reconstruct, over an extended time period, the changing ways that African societies and individuals have perceived, experienced and reflected upon death and dying.

Ghana may be one of the few regions of the continent where reconstructing an intimate social history of death is possible. European mariners first encountered the region they dubbed the Gold Coast in the late-fifteenth century, and although subsequent written records in the precolonial era remain rare and tend to be mediated by European interlocutors, they are extensive enough to tease out at least some of the ways that perceptions of death, of dying and of what made life a good thing – or a bad thing – changed over time.

The title of the planned book, *In My Time of Dying*, is taken from an old blues refrain, sung not in Africa, but in a variety of forms by African Americans in the southern United States. That, and scores of other such early recordings, triggered my curiosity about the interesting ways in which ordinary folk over time and across cultures have struggled – and often as not, failed – to make sense of their own and other's mortality. For many Ghanaians, the funeral has historically been *the* most important rite of passage, serving to cement the ongoing relationship between the living and the dead seen as so crucial to community wellbeing. Other themes I am interested in exploring include the increasingly bureaucratised management of African death by the

colonial state, as British officials from the 1850s mounted an assault on forms of death and aspects of mortuary practice deemed unacceptable: human sacrifice, capital punishment, the potentially deadly threat of putting people 'in fetich' by the uttering of ritual oaths, house burial, and the rough disposal or physical abuse of the corpses of supposed witches, slaves and those, such as women who died in childbirth, deemed by custom to have died a 'bad death'. Intersecting with these processes were shifting perceptions of the afterlife associated with the coming of Christianity: for many Ghanaians, by the twentieth century it was Jesus who would make up their dying beds.

Below. A funeral on the Gold Coast, from Pieter de Marees, *Beschryvinge ende historische verhael, vant Gout Koninckrijk van Gunea* [Description and Historical Account of the Gold Kingdom of Guinea] (Amsterdam, 1602).



BEDROCK RIVER EROSION IN THE TEMPERATE ZONE: A CASE STUDY FROM NEW ZEALAND



Although the tectonic impact on landscape evolution is now fairly well understood, the climatic effect on mountain building is still hotly debated, especially true in temperate and tropical regions. Sarah Boulton will address this outstanding challenge in the dynamic landscapes of New Zealand, investigating rates of erosion, river incision and landscape change

Dr Sarah Boulton

University of Plymouth
International Academic Fellowship

The landscape is intrinsically linked to many of the grand challenges facing our society, such as climate change, food security and energy. Therefore, understanding the relationship between climate and landscape response to changes in erosional base-level is fundamental if we are to understand how changing climates will affect the Earth's surface. Yet, much remains unknown about how climate (and climate change) influences landform development, weathering and erosion.

The widely held assumption is that erosion rate will increase with precipitation (or run-off), and this assumption is often used in landscape evolution models that try to link climate, tectonics and erosion. However, this critical relationship is not supported by field data or theoretical studies. Furthermore, active faulting complicates matters by increasing erosion rates due to uplift of the land and subsequent river incision, also increasing the likelihood of landslides and flooding. The majority of previous research that has investigated these interactions has been based in regions of (semi) arid or Mediterranean climate, such as Southern California. As a result, there is little information on the landscape response to external changes in the temperate and tropical regions, where there are many

vulnerable populations and landscapes. These communities are also often located in areas of high seismic activity and are disproportionately affected by strong earthquakes.

During my Fellowship I will investigate the style and rates of river response to active faulting in New Zealand. I will be using digital elevation models (DEMs) and field surveying to investigate the geomorphology of active faults and associated river systems in the north island of New Zealand. I will also learn how to derive and measure cosmogenic nuclide concentrations from samples of sediment bedload from rivers that traverse these active faults, allowing catchment average rates of erosion to be quantified upstream and downstream of the fault-driven incision. Cosmogenic nuclide analysis is a technique that studies nuclides of certain elements (i.e., ^{10}Be , ^{36}Al) that are formed in the Earth's surface materials as a result of interactions with high-energy cosmic particles. Therefore, the longer the material is exposed to this radiation the more nuclides are produced, allowing erosion rates and surface ages to be determined. Integrating these different datasets will allow me to investigate the relationship between tectonics and erosion in the temperate climate of New Zealand, and with comparisons to more arid environments so develop a better understanding of the impact of climate and faulting on erosion and landscape change.

METROPOLITAN SCIENCE: PLACES, OBJECTS AND CULTURES OF PRACTICE AND KNOWLEDGE IN LONDON, 1600–1800

Rebekah Higgitt aims to produce a new narrative of the development of a scientific culture within early modern London, as revealed through the city's geographies of knowledge and material culture; exploring the role of technical and scientific artefacts and understanding the institutional spaces in which they were made, used, traded and displayed

Dr Rebekah Higgitt

University of Kent

Research Project Grant

When Thomas Sprat wrote his defence of and manifesto for the recently founded Royal Society in 1667, he wrote of its location as the most advantageous possible for an institution such as theirs:

“London alone ... is the head of a mighty Empire, the greatest that ever commanded the Ocean: It is compos'd of Gentlemen, as well as Traders: It has a large intercourse with all the Earth: It is ... a City, where all the Noises and Business in the World do meet...”

He and others called the Society a Corporation or Company, and it is notable that it developed within a commercial city that lacked a university around which a scientific culture might otherwise have developed. My aim in this project is to take a long view of the ways in which relevant cultures and identities – formed around common interests, skills and tasks – developed in London before and alongside the well-studied Royal Society. In particular, we will work from surviving object collections to consider the growth of London's scientific instrument trade as something co-created by those who made instruments and those who used them.

The project's Co-Applicant, Alison Boyle, is Keeper of Science Collections at the Science Museum, and the research is timed to link into the development of a new gallery, *London: Science City*, opening in 2019. This will showcase the Museum's collections of seventeenth- and eighteenth-century instruments and place them in a historical, geographical and institutional context. As a former curator, I am well aware of the sometimes different but always complementary skills of academics and curators, and aim to bring these together to the

mutual benefit of project and gallery. To situate the instruments, and explore the construction of the trade and associated identities, we will look particularly at London's Livery Companies and Trading Companies. These were places within which skilled makers and users of instruments and natural knowledge were represented, disciplined, held office and found support. We will look for visual and material clues associated with these locations, as well as using the archives to explore individual experiences and institutional attitudes.

The project's ambitious aims are to develop a new kind of narrative of the development of a scientific culture in early modern London, and to be a testing ground for ideas about the use of material culture as a source for the academic history of science. The focussed research on Livery and Trading Companies will be put in the context of studies of other London institutions, from the government-funded Royal Observatory in Greenwich and Board of Longitude (subjects of my earlier research) to the Royal Court as a patron and customer. Through such sites and objects, we will build a picture of how technical and natural knowledge developed and was perceived within the city's practical and commercial settings.

Right. “Accurately made according to the Best & latest Improvements”: eighteenth-century trade card for Benjamin Cole, mathematical instrument maker and freeman of the Merchant Taylor's Company (Science Museum: 1934-122.10). © The Board of Trustees of the Science Museum.



Mathematical,
AND
Optical Instruments of all Sorts,
Are accurately made according to the Best & latest Improvements;
By Benjamin Cole;
At the Orrery next the Globe Tavern in Fleet street
LONDON.

BIRTH AND PHILOSOPHY



The first systematic philosophical account of birth and natality, Alison Stone's research will make a highly original contribution to a discussion that has until now focussed on death and mortality

Professor Alison Stone

Lancaster University
Major Research Fellowship

All human beings begin life by being born, and all human beings die. In these two ways we are finite: our lives are not endless but have beginnings and endings. However, historically, philosophers have concentrated their attention almost entirely on only one of these two poles of our finitude: our mortality. Philosophers have asked whether death is a bad thing, how one might die well, and how our awareness that we will die, even when it is implicit, shapes the whole range of ways in which we exist over time. In contrast, philosophers have said next to nothing about being born and how *that* shapes our existence. The exception to this neglect of birth is some contemporary work in feminist philosophy, but even here attention to being born tends to be overshadowed by a focus on the experiences and politics of giving birth.

The aim of this project is to contribute to overcoming philosophy's neglect of being born. As well as drawing on feminist philosophy, I will take up the existentialist project of inquiring into the structure of meaningful human existence, but unlike other existentialists I explore *natality*, i.e. human existence as it is shaped by our being born. Taking natality into account highlights the following features of human existence.

We begin life profoundly helpless and acutely dependent on the care of others, often our biological mothers and families. Although most of us become more independent over time, dependency on others persists across all human lives to varying degrees. Moreover,

our early dependency means that our first relationships with our care-givers matter immensely to us and have great formative impact in constituting our basic personality structures, emotional dispositions and character traits, even shaping the ways that we are open to new relationships in the future. The self, then, is thoroughly relational; and our dependency and relationality derive from our natality.

Further, we are always born into specific situations: interpersonal, cultural, social, political. However much autonomy we may exercise in reshaping our lives, the weight of situation remains, and it descends from our birth. Being born also shapes the temporality of lived human experience, as it stretches between the two poles of birth and death and the corresponding two orientations of anticipating and remembering.

Taking natality into account transforms our view of mortality as well. Here I oppose the individualistic view that my own death and the deaths of others are radically distinct, as the end of my entire world *versus* mere events in my world. Instead I suggest that because the self is relational, each individual's death is intimately bound up with the deaths of the others with whom that individual has maintained significant relationships. When I die, parts of these others die too, and when they die, part of me dies; death is always shared.

These are some of the main aspects of natality that I intend to explore during this Fellowship. The key outcome will be a major monograph, which will provide the first systematic philosophical account of how the fact of our being born shapes human existence over the whole course of life.

FROM TRADITION TO CONTEMPORARY: SATTRIYA MUSIC AND DANCE IN INDIA AND GLOBAL CONTEXTS

Menaka PP Bora's research will examine how Indian Sattriya dance and music has developed from traditional to contemporary performance, documenting and analysing how practice has travelled and translated globally and its potential as curatorial practice in the contemporary arts world

Dr Menaka PP Bora

Royal Holloway, University of London
Early Career Fellowship

My project is the first multidisciplinary study of Sattriya, a rare sixteenth-century performance tradition in Hindu monasteries of Assam in northeast India, with a particular focus on the choreographic and musical elements of dance, deploying the theoretical paradigms of ethnomusicology, cultural studies, history and dance studies. I will take a practitioner-based approach to research the development of the Indian classical form from the monastic tradition to contemporary practice in performances in the UK and internationally and will produce digital audiovisual materials.

Originally practised as a sacred performance exclusively by male monks, Sattriya is now developing into a contemporary classical form through a process of professionalisation and institutionalisation. My research will be situated in relation to questions of tradition, modernity and globalisation and how these are shaping contemporary cultural forms in practice. With a background as an award-winning and critically acclaimed Indian classical soloist, ethnomusicologist and choreographer, my research to date has focussed on studying interrelationships between traditional and classical Indian musical forms and contemporary musical practice. In parallel to the twentieth-century historical development of better-known Indian classical forms such as Bharata Natyam, Odissi and Kathak, and the current context of cultural globalisation as experienced in India from the 1990s onwards, Sattriya culture has embraced four layers of transition: from a religious ritualistic art form to that of a concert art form; from a male-oriented performance form to that of a female-oriented performance form; from an oral tradition-based knowledge to that of a textual and ethnographical knowledge; and from a remote community-based form to that of a national and global representational form of Assam.

One of the first female practitioners who brought Sattriya to national and international recognition was my mother, Indira PP Bora, who in turn has passed this tradition to me. Lines of mother-daughter transmission in Indian dance have recently become the subject of considerable scholarly and popular interest, and I propose to examine reflexively my own performance genealogy to understand critically this mode of acculturation. By introducing Sattriya culture as a rarely studied South Asian classical tradition in the UK, I have already built strong working relationships with dance and music departments at the University of Oxford, Goldsmiths, Kingston University, University of Roehampton, Asian Music Circuit, Nehru Centre, British Museum, Horniman Museum, Asia House in London, World Museum in Liverpool and Pitt Rivers Museum in Oxford, among others. I wish to build on these networks to critically interrogate Sattriya's siting and reception.

My research objective is to examine the historical and cultural transformation of Sattriya performance in the context of questions of 'tradition' and 'modernity'. I will research the rare instruments and repertoires of Sattriya dance and record their oral traditions in order to integrate them into a contemporary classical version of 'Sattriya performance art' in practice, evaluating the knowledge transfer of Sattriya research in the cultural sector. I will consult understudied Assam-based collections at key national museums (British Museum and V&A), libraries (The Bodleian Libraries, British Library), galleries (Asia House), dance venues (South Bank Centre and Sadler's Wells), festivals (Edinburgh and Glastonbury) and community centres in the UK, and investigate the ethics of their transfer and transmission.

Right. Menaka performing classical Sattriya dance at Te Papa National Museum, Wellington, New Zealand. Image courtesy of artist.



FATHERS AND SONS? ARTISTIC GENERATIONS IN LATE IMPERIAL RUSSIA, 1880–1923



Isabel Stokholm's study will reconsider the idea of generational rupture amongst the Russian realists known as the Peredvizhniki, highlighting instead the direct and positive influence they had on the young within the vibrant world of intermingling artistic pluralism that characterised the late Imperial era

Left. Ilya Repin, *Unexpected Return*, 1884–88. Oil on canvas, 160.5 × 167.5 cm, State Tretyakov Gallery, Moscow.

Miss Isabel Stokholm

Study Abroad Studentship

On 16 January 1913, Moscow's Tretyakov Gallery witnessed a startling act of vandalism. Shortly after opening time, a young man was found plunging a knife into a painting and screaming 'Enough blood!' His target was Ilya Repin's *Ivan the Terrible and His Son* (1885), a treasured work by Russia's foremost living painter and figurehead of a group of realist artists known as the Peredvizhniki, or Wanderers.

The gallery soon identified the vandal as a disturbed icon painter, but instead of treating this as a freak incident, many viewed the assault as a symptom of sickness in Russian art – that of 'decadence' and the insolence of its adherents towards tradition. In the wake of the event, the Tretyakov's chairman immediately resigned and the curator committed suicide. Vicious discussions engulfed Moscow's cultural sphere, culminating in an organised debate during which radical young talents condemned the art of their predecessors, while the 68-year-old Repin sat among the audience. That the painting in question depicts an act of betrayal between a father and son is a great historical irony.

This was the most notorious event in an uneasy state of affairs that has come to characterise our view of generational relations between Russian artists from the late 1880s to the 1920s. Long before a knife was smuggled into the Tretyakov, it is thought that the art world had witnessed a polarisation between young experimentalists and older, established artists. Art-world dynamics were, however, much more complicated.

My doctoral research reconsiders the nature of these relationships, questioning how intergenerational bonds influenced the development of Russian art. Reading the letters, diaries and memoirs of artists both young and old reveals frequent and warm intermingling. Senior Peredvizhniki not only trained and mentored young artists, but also socialised with them at salons, drawing sessions and exhibitions. They travelled together, visited one another's homes and studios, lived in the same neighbourhoods and married into each other's families. That these ties remain concealed owes much to the direct intervention of Stalin, who in 1932 initiated a Peredvizhnik cult for propaganda purposes, leaving no room for any acknowledgement of association between the Peredvizhniki and young 'dangerous' proponents of modernism.

Based at Moscow State University for a year, I will conduct archival research in Moscow and St Petersburg, taking trips to collections as far afield as eastern Siberia. My focus is on personal documents and unexhibited works of art, as outbursts such as the 1913 debate – and other public behaviours and statements – often conceal the reality of artists' everyday interactions. Steering away from an assumption of generational rupture offers a fresh, de-Sovietised reading of one of Russia's most important art groups, and their impact on artists to whom they are rarely linked. By better understanding the nature of intergenerational tensions and commonalities, we can place the artist's experience within wider debates in Russia, where a deeply patriarchal society headed by an autocratic 'father' in the form of the tsar, or *batiushka* ('little father'), was asking searching questions about the role of father figures.

THE SKULLCRACKER SUITE: AN INTERDISCIPLINARY ARTISTIC RESEARCH PROJECT

Drawing on contemporary anthropological theory, and working in seminars and workshops with art students and faculty at Emily Carr University of Art and Design (Vancouver) and the Ruskin School of Art (Oxford), John Cussans will examine, challenge and re-think historical myths about cannibalism, sorcery and human–animal metamorphosis amongst indigenous and colonised peoples

Dr John Cussans
University of Oxford
Research Fellowship

“Anthropology is ready to assume its new mission of being the theory/practice of the permanent decolonisation of thought.”
Eduardo Viveiros de Castro
Cannibal Metaphysics

In the summer of 2015 I visited the artist Steve Calvert in Powell River, a paper-mill town at the top of the Sunshine Coast in British Columbia. For the last few years Steve had been living alongside the Namgis people of Alert Bay, a small fishing village on Cormorant Island in Queen Charlotte Strait. There, at the invitation of the celebrated First Nations artist, Beau Dick, he had attended and documented several potlatches, the ritual gift-giving and title-bestowing feasts of the indigenous peoples of the region. Aware that I had recently written a book about stereotypical representations of Haitian Vodou in twentieth-century popular culture, Steve handed me the book that would be the inspiration for the skullcracker project: *Hamatsa: The Enigma of Cannibalism on the Pacific North West Coast* by Jim McDowell.

The Hamatsa are a secret society of the regional Kwakwaka'wakw people, made famous in anthropological circles by Franz Boas in the late-nineteenth century, whose annual winter dances re-enact, in a dramatic theatre of traditional costumes, masks, music, dance and sophisticated stagecraft, the initiate's transition from man-eating savage to tamed human. The central mythological beings of the Hamatsa legend are a terrible man-eating giant called Baxbaxwalanuksiwe and his giant 'cannibal' bird consorts: Gwaxwgwakwalanuksiwe, the raven; Galuxwadzuwus, the Crooked-Beak of Heaven; and Huxhukw, the supernatural crane who cracks the skulls of men to eat their brains.

Interpreted as an actual cannibal rite by most colonial observers at the time, the Hamatsa ceremony was banned by the Canadian authorities, along with the potlatch, in 1885. But rather than dying out, Hamatsa society was to acquire an uncanny second-life, becoming an illustrious example of the 'vanishing culture' of Pacific Coast Indians after the ceremony was re-staged by Boas, his colleague George Hunt and a troupe of Hamatsa dancers from Vancouver Island, at the Chicago World's Fair of 1893, and then by Edward S. Curtis in his 1914 film *In the Land of the Headhunters*. Since 1951, when the potlatch ban was lifted, some of the aboriginal artists who had worked with Boas and Curtis, and helped recreate authentic Indian artefacts for museums around the world, would be instrumental in reviving Hamatsa traditions amongst their native communities, often referring to the meticulous records that the ethnographers had left to posterity.

Taking the example of the Hamatsa's prohibition, appropriation and revival as an example of the complex interdependence of colonial and counter-colonial politics in the region, and re-situating the story within the art scene of British Columbia since the 1960s, I will investigate how contemporary art in the region, created by both settler and aboriginal artists, has advanced the project of a 'permanent decolonisation of thought', and how it might continue to do so in the future.

Top right. 'Masked dancers – Qagyuhl' by Edward S. Curtis (1914). During the winter ceremony, Kwakiutl dancers wearing masks and costumes, crouch in the foreground with others behind them. The chief on the far left holds a speaker's staff. Three totem poles in background. (Smithsonian Institution Libraries).

Below right. Raven dances at Chief Alan Hunt's potlatch, guided by Beau Dick (Courtesy Stephanie Moran).



BREAKING THE RULES – DEVELOPMENT AND EVOLUTION OF EXTREME ASYMMETRY AND EVOLUTIONARY NOVELTY

How does body symmetry turn into asymmetry? And how does morphological novelty arise? Ralf Britz has teamed up with Gareth Fraser and Ariane Standing to investigate these two fundamental biological questions from a developmental and evolutionary perspective, focussing on a group of tiny fish with astonishing characteristics

Dr Ralf Britz

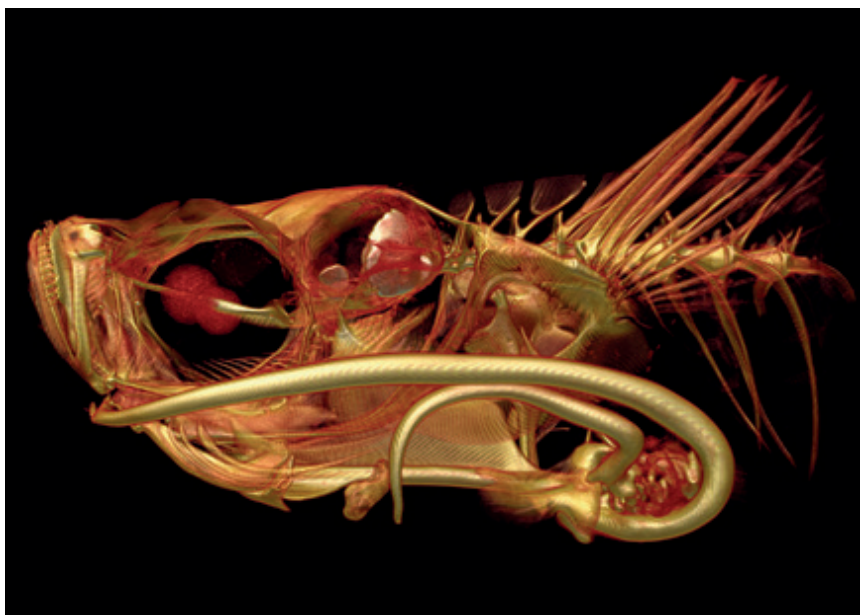
Natural History Museum
Research Project Grant

Left-right or bilateral symmetry of the body is the defining character of more than 1.5 million species, the majority of the multicellular animals, the *Bilateria*, and it evolved more than half a billion years ago. Nonetheless, breaking this symmetrical body plan has repeatedly been a solution to many evolutionary challenges. Well-known examples include the asymmetric position of the heart and liver in humans and other vertebrates, the asymmetric shells of molluscs, or the claws of fiddler crabs.

However, these examples are nothing compared to the radical asymmetry encountered in the priapium fish of the family *Phallostethidae*. I have been fascinated by these miniature and transparent fish since I first looked at their bizarre anatomy, especially their copulatory organ, termed the priapium. It consists of up to a dozen skeletal elements of unclear homology associated with a highly modified musculature, single rather than paired gonads, and a highly unusual path of the intestinal and urogenital systems, so that the anus

and genital opening, usually located half way down the body in other species, are shifted to the *priapium* under the throat. These complex modifications in several organ systems make the priapium one of the most remarkable morphological novelties among vertebrates. Even more surprisingly, the organ shows extreme asymmetry with most species having some males with left- and others with right-sided priapia. This combination of radical asymmetry and astonishing morphological novelty appeared to be a remarkable exception to the universal '*natura non facit saltum*' or the axiom that evolutionary change of characters is gradual.

Furthermore, when the priapium begins to form I found that it initially develops from paired symmetrical rudiments in larval stages of these fishes. One side then regresses as the other continues to grow. I want to know how asymmetry of this initially symmetric trait is established in development, how a normal pelvic fin turns into a dramatically different and highly complex copulatory organ, and whether there is a link between asymmetry and novelty. I want to address these developmental and evolutionary issues from a morphological and genetic point of view. Ariane Standing, with a medical research background, was keen to join me, and we approached vertebrate evolutionary biologist, Gareth Fraser, to help us with the developmental genetic side of the project. We will be using traditional and cutting-edge morphological methods to document the anatomical changes during priapium formation combined with the latest genetic techniques to understand their developmental genetic basis.



Left. Nano CT-scanning image of the head and priapium of a male *Neostethus bicornis*, illustrating the large double priapial hook in this species.

NEW SEARCHES FOR DARK ENERGY

The expansion of our Universe is accelerating, but we cannot explain how this happens. Clare Burrage proposes three new methods to detect or constrain dark energy with particle colliders, experiments with cold atoms and cosmological observables, focussing on interactions between dark energy and matter

Dr Clare Burrage

University of Nottingham
Research Leadership Award

We do not understand the Universe we live in; when we observe the stars and galaxies that surround us, we find that we cannot explain their motion with the forces and types of particle that we have detected here on Earth. We can infer that our Universe began with a big bang explosion which sent everything flying in different directions, but then, if our current understanding were correct, the energy from this explosion would dissipate and the pull of gravity would cause galaxies to start to fall back towards each other. However this is not what we see in the sky; not only are galaxies not all falling towards each other, they are

flying apart at an accelerating rate. No one understands how this can be happening, but we give the mysterious substance driving the acceleration the name 'dark energy'.

We do not yet have a good theory that could explain the effects of dark energy, but an almost inevitable consequence seems to be the existence of dark energy particles that transmit a new force. To explain why such a force has not yet been detected directly we believe that it changes its behaviour depending on the environment, just like a chameleon changes its colour for camouflage. In previous experiments, dark energy has avoided detection through this camouflage, but a carefully tailored experiment could reveal its existence. I plan to develop these new search strategies, supported by the Leverhulme Trust.

As the effects of dark energy have so far only been detected on the largest distance scales in the Universe, some of these searches will look at how the dark energy force modifies how galaxies cluster together, and whether the propagation of light is affected in the vicinity of these galaxies. However, the misfortune of astronomy is that

you are always a passive observer. You cannot go out and poke a galaxy and see what happens, and you cannot reboot the Universe to see if it will evolve in the same way a second time. This makes it difficult to come to a definitive conclusion about the nature of dark energy using only astronomical observations. Luckily, dark energy is present everywhere in the Universe, including our laboratories. This means that in a carefully designed experiment its effects could be seen. I will develop these searches, focussing in particular on high-precision measurements looking for new forces, and searches for the existence of new particles and forces at particle colliders such as the Large Hadron Collider.

This is an exciting time for dark energy. The satellites and telescopes that are now beginning to study the effects of dark energy on cosmological scales are an important front in the battle against our ignorance. But we cannot just wait for dark energy to come to us, we need to go out and search for it in the laboratory, because only then will we be able to fully understand the biggest mystery in our Universe.



IMAGINING INDIA: MUGHAL ART AND THE CREATION OF MODERN BRITISH ZOOLOGY

The development of modern British zoology has customarily been depicted as profoundly Eurocentric; David Lowther intends to challenge this dominant interpretation by uncovering the powerful influence of colonial naturalists in the scientific discourse which shaped this period

Dr David Lowther
Durham University
Early Career Fellowship

The division between the arts and sciences is now so deeply entrenched that it is easy to forget that it is a relatively recent phenomenon. Yet the biological sciences, particularly botany and zoology, are intensely visual disciplines, and have been so right from their beginnings. This was no more marked than in the early nineteenth century, crucial transitional decades, when imagery played a vital role in helping Europeans to understand a natural world of ever-increasing and dizzying variety.

This was also a time of expanding imperial ambitions. Colonial officials working across the British Empire often spent their leisure time dabbling in natural history – collecting birds and mammals, both alive and dead, and illustrations. My project will focus on a few of the most remarkable of these individuals, employees of the English East India Company and now almost all relegated to the footnotes of the history of science. No great artists themselves, men such as Richard Wellesley (1760–1842), governor-general of Bengal, and Brian Hodgson (1801–1894), the British Resident in Nepal, commissioned their natural history images from Indian and Nepalese artists trained in the conventions of European scientific illustration. These images, made to accompany journal articles, illustrate learned zoological works, or serve as proxies for specimen collections, eventually numbered in the tens of thousands, and the artists did their

work well. Even today, collections such as Hodgson's at the Zoological Society of London offer the most comprehensive information on species that are now in steep decline.

Despite being now largely forgotten, superseded by the great transformation of science in the late-nineteenth century, the paintings are hugely significant. In this project, and the exhibition and monograph that will result, I will explore how the illustrations highlight a feature of nineteenth-century science which has been almost completely overlooked. Though serving as repositories of the rare and the ephemeral, the images had an instructional purpose. As working documents, they shaped interpretations of the species they depicted, and trained naturalists in 'correct' ways of seeing. Here, I think, lies their importance, for at a time when British and European naturalists were beginning to see the natural world and humanity's relation to it in revolutionary new ways, it was at least partly through the prism of Asian cultures. Recent work on scientific imagery, itself a developing field, understands scientific image-making as the product of a one-way traffic of knowledge from Europe to the rest of the world. The existence of the Hodgson, Wellesley and other Anglo-Indian collections demonstrates that the picture is considerably more complicated. Hybrids of Asian and European aesthetic traditions, they demonstrate that the creation of scientific knowledge in the decades before Darwin was a reciprocal process – between artist and scientist, and between West and East.



Top. Raj Man Singh, 'Scaly Thrush', graphite and watercolour on paper, painted for and annotated by Brian Houghton Hodgson, c.1835. B. H. Hodgson, *Birds of India*, Volume 3, sheet 146. James Godwin, Zoological Society of London.



Right. Raj Man Singh, 'Eurasian Eagle Owl', graphite and watercolour on paper, painted for and annotated by Brian Houghton Hodgson, c.1830. B. H. Hodgson, *Birds of India*, Volume 1, sheet 168. James Godwin, Zoological Society of London.

URBAN ENERGY LANDSCAPES AND THE GLOBAL SUSTAINABILITY TRANSITION



Vanesa Castán Broto has established herself as one of the leading thinkers on the transition to more sustainable and socially-just forms of urban development. By coining the term 'urban energy landscapes' she has opened up fresh opportunities for much greater geographical research on these hugely important topics

Dr Vanesa Castán Broto
University College London
Philip Leverhulme Prize

The role of urban areas in addressing climate change is undeniable. Cities and regions can reduce carbon emissions in the provision of urban services and implement climate change adaptation plans. Moreover, they support communities and businesses to deliver environmental innovation and sustainability actions. Such a role is recognised in international development policy, for example the 2015 Paris Agreement for Climate Action and the New Urban Agenda, adopted at the UN Conference on Human Settlements in Quito, Ecuador. The challenge now lies in moving away from specific actions for climate change in urban areas towards a radical transformation of social and economic systems of organisation; that is, an urban sustainability transition.

The last two decades of environmental governance research demonstrate that diversity and heterogeneity characterise urban sustainability transitions in cities and regions. In each urban setting, transitions to sustainability depend on context-specific drivers of innovation and conditions of implementation. Ready-made recipes for urban sustainability or best practice examples uncritically transposed from one context to another are obstacles for such transitions.

My research focusses on the representation of heterogeneous urban energy systems to understand the conditions for transitions in different settings. Urban energy landscapes represent spatial arrangements of socio-technical artefacts that enable the provision and use of energy in urban areas. Such spatial arrangements are visible in the built environment. Case studies show that urban energy landscapes

are contingent, heterogeneous and diverse. They challenge imaginations of a homogeneous electric city and point towards a mosaic of energy-use patterns that change across cities and across time periods.

I have analysed these landscapes through a comparative urbanism approach in four case studies (Maputo, Mozambique; Hong Kong, China; Bangalore, India; and Concepcion, Chile). The cases represent a variety of patterns (uniform, fragmented, scattered) in terms of how different fuels and electricity are provided and who has access to them. The spatial constitution of energy landscapes can be matched to how urban trajectories towards sustainability unfold in each city. This analysis suggests that urban energy landscapes condition the potential for sustainability innovations in any given city. This calls for forms of spatial planning that promote flexibility as a means to foster sustainability innovations.

The study of urban energy landscapes challenges current thought on urban planning and energy policy. In specific settings, changes affect the lives of urban dwellers. Such changes explain the production of energy vulnerabilities and raise questions about energy sovereignty and technology control. Comparative analysis of urban energy landscapes also reveals contradictions between the aspirations to deliver simultaneously universal energy access and low carbon development. Mapping the variability of energy landscapes in cities can deliver further insights to understand urban energy transitions at a global level. At the moment, I am developing methodologies to understand how these landscapes shape the global sustainability transition. Such methods include a comparative assessment of a larger number of urban areas alongside empirical evidence of urban transformations in different world regions.

Left. Gas provision systems in Bengaluru; food stall with live cooking in the street in Mong Kok, Hong Kong; shops in Maputo's neighbourhoods sell pre-paid credit to access electricity.

COEVOLUTION IN A SICKLY-SWEET BROOD PARASITE: THE HONEYGUIDE

The interactions between brood parasites and their 'hosts' have stimulated the curiosity of naturalists for centuries and are shaped by the process of coevolution; using self-built videographic equipment, Luke McClean will investigate how honeyguide chicks are able to exploit their barbet foster parents to receive adequate food to survive

Mr Luke McClean

Study Abroad Studentship

'It lays its eggs in the nest of smaller birds after devouring these birds' eggs ... they do not sit, nor hatch, nor bring up their young, but when the young bird is born it casts out of the nest those with whom it has so far lived'

Aristotle wrote this description of the behaviour of a cuckoo 2,300 years ago. Ever since then, naturalists have been working to decipher the puzzling behaviour of cuckoos and other brood parasitic birds, and to understand how they manage to trick other 'host' species into raising their young.

The marvellous interactions between species in nature, from the selfish exploitation of hosts by parasites, to the mutualistic partnership of our gut and its bacteria, are the products of coevolution, in which two or more species reciprocally influence one another's evolution. Coevolution is a powerful selective force that has helped shape the diversity of behaviours and forms displayed throughout the natural world.

What Aristotle may not have realised is that host parents are not entirely helpless against brood parasites, and that a coevolutionary 'arms race' is occurring, with hosts establishing defences against parasitism, forcing the parasites into countering these defences through development of more elaborate and complex trickery. With beautiful examples of brood parasites laying eggs that visually mimic host eggs to dissuade hosts from detecting and rejecting them, to hosts recognising foreign chicks and throwing them out of the nest to their death, it is easily apparent that brood parasitism is an excellent system for studying coevolution.

I will be studying a fascinating but little-studied avian brood parasite found in Africa, the lesser honeyguide. Honeyguides are most famous for guiding humans to bees' nests, but this sweet behaviour is shadowed by their more odious method of reproduction. Honeyguide chicks are a violently virulent form of brood parasite, as when they hatch, they possess a bill hook which they use aggressively to attack their foster siblings, killing them all and thus monopolising all of the parental care from their unknowing host.

Obviously it is detrimental for a host to have a honeyguide chick in the nest. How does the host defend itself against this intruder? How does the parasite acquire enough food from its foster parents? These are the sorts of questions that intrigue me, and my field site in Southern Zambia is poised to answer them. With a combination of purpose-built nest cameras and experimental manipulation of nests, my research aims to define behavioural and physiological adaptations that have arisen at the chick stage of this brood parasite system.

Evolutionary studies in the tropics have the potential to be exceptionally revealing, as interactions between species are ancient. The result of my research will increase our knowledge of coevolution in brood parasites once it reaches the chick stage.

Right. At 23 days old, this honeyguide chick shows no signs of its bill hooks which it used to monopolise the host nest.



WOMEN, APPRENTICESHIP AND COMPANIES IN SEVENTEENTH-CENTURY LONDON



Laura Gowing's project will recover a lost dimension of women's lives in early modern London: their work as apprentices, mistresses, and independent traders in the City; examining a complex dynamic of inclusion and exclusion in the companies, it bears on the whole nature of gender difference at a time of economic change and political redefinition

Professor Laura Gowing

King's College London
Research Fellowship

This project has its genesis in a fairly ordinary document: the apprenticeship indenture. Trying to trace a handful of women who were apprenticed to London companies (or guilds) in the late seventeenth century, I found that some companies were printing forms of indenture specifically designed for girls. Indentures were hugely symbolic documents to seventeenth-century guilds, and filling in forms was just starting to be part of civic life. To have a form tailored for a woman seemed surprisingly inclusive in an era when only one or two per cent of apprentices were female.

Often, the freedom of the City is assumed to be a male institution, but London's livery companies did take girls as apprentices, and women also took the freedom to enable them to trade independently in the City. After the civil wars of the 1640s, and still more so after the Great Fire, women found new roles in London's markets. Seamstresses produced and sold new fashions like the mantua; female servants arrived in huge numbers from the provinces; spinsters and widows invested. In late seventeenth-century London, women came to outnumber men by 3:2, and half the small shops in the shopping galleries at the Royal Exchange were tenanted by women. At the same time, women's role

in the public sphere and as citizens was increasingly formally restricted, making this moment a particularly important one in the development of the modern city.

Using a combination of parish, company and city records, I am going to reconstruct the lives, families and connections of the women involved with London's companies in this period of change. Most went into the needle trades, aiming to run milliners' shops, but we also see pastry cooks, button makers, stocking frame operators, painter-stainers and a scrivener. Some women petitioned the Aldermen for the freedom, citing their years of industrious labour and their hope to maintain their families in hard times with 'a little shop'. Others ended up in court when their apprenticeship contracts broke down, leaving fascinating accounts of conflicts over clothes, bad manners, tantrums in the shop and, worst of all, having to hold the baby or scour the pans instead of learning how to do fine sewing. Some mistresses trained several girls, who went on to take their own apprentices; skills, contacts and patterns must have passed between women. But women's access to freedom remained severely restricted by law and custom, and tracing those customs through indirect references is a key part of the project. Examining the balance between opportunities and constraints will, I hope, help us better understand both women's economic roles, and the meanings they had for contemporaries in a transforming metropolis.

SPEAKING THE UNSPEAKABLE: MAJOR AMERICAN WRITERS AND THE WRITING OF TRAUMA

Richard Gray's study aims to show exactly how generations of American writers, confronted with traumatic experiences that range from the personal through the regional and national to the transnational, have attempted to speak the unspeakable

Professor Richard Gray

University of Essex
Emeritus Fellowship

It has often been said that the determining feature of trauma is that it is, as one authority on the subject has put it, 'an affront to understanding'. For the writer, in particular, there is a twin imperative at work here, caught as she or he is between what one commentator on trauma has called 'the senselessness of the initial traumatic encounter and the sense-making apparatus of... narrative'. The writer has to achieve some kind of resolution, however fragile or fleeting, between the imperative of silence (since trauma is that for which there is no language) and the imperative of speech (since trauma is that which demands language as an alternative to emotional paralysis). The writer cannot write but must; words are no good, but they are all she or he has; even in denying or dismissing the tools of the trade, she or he is using them. This, the speaking of silence, is a paradox or problem that, in literary terms, lies at the heart of Romanticism and its aftermath as well as, in experiential terms, at the heart of trauma. The solution is either to surrender – which is not really a viable option, practically or emotionally – or to go on writing, continue trying to find some way of saying the unsayable. The victim of trauma may find it next to impossible to get beyond stuttering denial, under the impact of shock – a potentially endless repetition and confession of impossible memories and impotence. But getting beyond this is what the writer needs to do: if only because, as a recent American author, Lynne Schwartz has put it, there is always the simple imperative to go on writing. "We will do what is needed," Schwartz ends a short story written just after the trauma of 9/11. "We will write the next sentence."

Writing the next sentence, I hope to show, is something to which a series of American writers have committed themselves, when faced with traumas that are a complex web of the personal and the historical: traumas that are inextricably interwoven with such crucial issues and moments as slavery and civil rights, the civil conflict and 9/11 – and everything that was suggested by one writer, Barry Hannah, when he declared of himself and his fellow Americans, "It is terribly, excruciatingly hard to be at peace when all our history is war." This – doing what is needed, speaking the unspeakable – is a habit, a compulsion common to writers as otherwise different as Edgar Allan Poe and Emily Dickinson, Nathaniel Hawthorne and Herman Melville, Frederick Douglass and Frances Harper, Ernest Hemingway and William Faulkner, Richard Wright and Toni Morrison, Cormac McCarthy and Sylvia Plath. To that extent, their work has explored the possibility opened up by the poet Paul Celan, when he observed, with reference to his own response to writing after and about the horrors of the mid-twentieth century: "Only one thing remained reachable, close and secure amid all the losses: language ... But it had to go through its own lack of answers, through terrifying silence, through the thousand darkneses of murderous speech. It went through ... Went through and could resurface, 'enriched' by it all."

Right. Dust swirls around south Manhattan moments after a tower of the World Trade Center collapsed 11 September 2001. (Photo by Spencer Platt/Getty Images).



RECENT RESEARCH HIGHLIGHTS

In this series of interviews, we showcase the outcomes of a range of award holders as they report on their recently completed grants

PROFESSOR DANIEL ROBERT



“At the time, it was an idea unlikely to find support from other, more risk-averse funders”

With an initial objective to investigate the detection and use of weak electrostatic fields by bees, and their ecological function during interactions between plants and their pollinators, Daniel Robert and his team discovered that bumblebees could not only sense these fields, but also remember them

In 2013, the media was buzzing with the news that bumblebees can sense flowers' electric fields. Along with other floral cues such as colour and scent, these fields help bees to recognise their favourite species of flower, improving their foraging efficiency. Before this discovery, electrosensory perception was thought to be restricted to aquatic and amphibious animals, such as sharks and platypus. Textbooks confidently stated that land animals had no use for electroreception because electricity is not conducted through air. However, the idea that electric forces enhance the interaction between bees and flowers, was not entirely new. Stripped of electrons by friction, bees accumulate a tiny positive charge on their surface during flight; flowers on the other hand, tend to have a negative charge. The charge difference generates a force strong enough to cause pollen to 'jump' from flower to bee. How flowers exploit this natural phenomenon has interested plant biologists for decades; but no-one had thought to study the interaction from the bees' perspective.

For Professor Daniel Robert – a sensory biologist – it seemed an obvious question: “Does the bee know anything about this process?” That intellectual leap soon snowballed into a research project, funded in 2011 by the Leverhulme Trust. “At the time, it was an idea unlikely to find support from other, more risk-averse funders” Daniel says: “No-one had described this sensitivity in air. So, at that stage we could only say ‘We don't know... but here is how we could test it.’” He worked with a small interdisciplinary team, their expertise ranging from plant biology to sensory biology to physics. For the key experiment, they designed artificial flowers, each identical in size,

shape, colour and smell. To half the flowers they added a small static electric field, and a sugary treat. Flowers without an electric field offered bitter quinine instead. When bumblebees first foraged among these ‘flowers’, they were just as likely to visit a bitter one as a sweet one; but within 50 flights, they were four times more likely to choose a sweet flower. Then the researchers switched off the static electric fields. The trained bees returned to foraging at random. “That was what really made us jump up and down,” Daniel explains. “It showed that bees can sense these tiny electrical fields **and** remember them. We were really surprised how well they could learn!”

The project's findings were published in *Science* in 2013, and the University of Bristol – where the research was carried out – registered a record number of hits to its press release on the bee story. The team found themselves in high demand, with requests for talks and demonstrations from a wide variety of audiences. Even the bumblebees rose to the challenge, successfully demonstrating their skills on television, both with David Attenborough in his *Natural Curiosities* series and with Daniel as he explained the findings to presenter George McGavin on the BBC's *The One Show*.

So, how do bumblebees sense the electric fields? The Leverhulme-funded work suggested that they use the fine hairs on their bodies, something the team was able to confirm in a follow-on project supported with a large BBSRC grant, awarded to Daniel in 2015. The electric field – like static electricity from a balloon – causes the bee's hair to bend; this activates neurons at the base of the hair sockets, which allows the insects to ‘sense’ the field.



PROFESSOR INGRID DE SMET



“The Fellowship was a tremendous opportunity to consolidate and to stake out new areas of research, sometimes in unpredicted ways”

With a monograph in mind, Ingrid De Smet embarked on a major new investigation into early modern notions of secrecy and semi-secrecy vs. public knowledge in late Renaissance France; building her international profile and reputation along the way

In 2016, Apple refused the FBI's demand for a 'backdoor' to a terrorist's locked iPhone. The tech giant argued that the 'key' to an encrypted system is only as secure as the protections around it; building a backdoor would undermine those protections, compromising the safety and security of every iPhone lock. While the government insisted that its use would be limited to this case, Apple pointed out that there was no way to guarantee such control. On the face of it, this dilemma could not have been more twenty-first century but, as Professor Ingrid De Smet's research shows, there were striking parallels in Renaissance France.

Ingrid was gathering material for her 2011 Major Research Fellowship project on the changing ideas about secrecy, fuelled by the turbulent years of the French Wars of Religion. Then, as today, the need for covert operations and intelligence gathering jostled uncomfortably with ideas about the morality of secrets and their keepers. Consulting sixteenth- and seventeenth-century documents in research libraries and archives in the UK, Europe and the US, Ingrid investigated the intelligence networks in late Renaissance France: exploring the roles of the usual suspects – the secretaries, ambassadors, couriers and spies – and others such as physicians, whose travels provided plausible cover for subterfuge. As she delved into the physical ways secrets were kept, Ingrid redirected her focus towards the origins of locks and keys as metaphors of secrecy. It proved to be a fascinating detour through museum catalogues, photographs, art historical studies and documents of the locksmith trade. “The secrecy surrounding the trade and the way ideas about secrets and security went hand in hand, was a

revelation,” Ingrid says. The ordinances of various locksmiths' guilds prescribed, for example, the circumstances under which one should repair a lock that had been brought to the shop, or insist it was repaired *in situ*; and that a locksmith should only fabricate a key if he had the lock in front of him. One particularly exciting find was a seventeenth-century locksmiths' manual – possibly the first such document. In it, author Mathurin Jousse refers to the fabrication of so-called ‘serrures à secrets’, locks or keys with special characteristics known solely to the owner. Whilst he describes many other locks and keys in minute detail, on these he is less effusive, merely hinting at various methods which he “cannot reveal ... since knowledge of them is detrimental both to the public and the private individual and may give cause to ill use”. For the seventeenth-century locksmith, there was no question of breaking the trust bestowed by virtue of his craft.

Over the three years of her Fellowship, Ingrid laid the groundwork for a monograph on *Secrets and their Keepers in late Renaissance France*, which will be published by Droz (Geneva). In addition, by freeing up the time to complete ongoing projects – and to follow emerging lines of investigation on themes other than secrets – the award supported a range of other publications, including a major book on the history of falconry. “The Fellowship was a tremendous opportunity to consolidate and to stake out new areas of research, sometimes in unpredicted ways,” Ingrid says. This “precious period of research and career development” culminated in her promotion to Professor at Warwick University and her election to the British Academy in 2014.

Below. Strongbox in the Bibliothèque municipale de Besançon © Marie-Claire Waille. It has an intricate locking mechanism, including a concealed key hole and a lockable 'secret' compartment on the inside.



DR LIZ STEPHENS



“The flexibility of the Leverhulme Fellowship allowed me to get involved in the heart of this new initiative”

Liz Stephens’ Early Career Fellowship enabled her to develop novel statistical techniques to determine local-scale performance of flood forecasts and apply them at the spatial and temporal scales required for more effective decision-making

In Britain, nothing can be certain except death, taxes... and a chance of rain. And yet, when online weather reports detailing the probabilities of this precipitation were introduced in 2012, many doubted the idea would catch on. The *Daily Mail* even forecasted an ‘80% chance of confusion’, apparently unaware of the Met Office study suggesting quite the reverse: using an online weather game researchers showed that rainfall probabilities – in cold hard numbers – help people make the best of the weather, come rain or shine. Systems capable of forecasting the probability of floods are a relatively recent innovation but promise an enormous jump in our ability to prepare for major disasters. Since July 2011, The Global Flood Awareness System (GloFAS) has provided early indications of possible flood events up to thirty days ahead, information previously unavailable on a global scale. One objective of GloFAS is to support an effective humanitarian response but after two years of operation, Dr Liz Stephens suspected that the information it provided was not fit for this purpose. “The flood forecasts weren’t routinely being used by humanitarian organisations... which is a pretty strong hint,” she says. This despite the fact that lives could be saved – and money better spent – if flood probabilities could be linked to appropriate early humanitarian action.

Liz’s research background spans the interface between the scientific and decision-making challenges of flood risk. Her PhD project focussed on developing statistical methods to evaluate and calibrate flood models, but the online weather game was also her brainchild. The plan for her 2013 Early Career Fellowship was to work closely with humanitarian organisations to understand the decision-making issues that they face; and to use their requirements to guide the future

development of the GloFAS system. The Fellowship was held at the University of Reading, taking advantage of its proximity to the operational base for GloFAS; and the close links already established between researchers at the two establishments.

Early meetings with forecast-users at the World Food Programme (WFP) revealed that while GloFAS was providing early warning systems at the local scale and up to two weeks ahead of time, humanitarian decisions were being made on regional scales and months or seasons ahead. More worryingly, Liz says, because GloFAS was not designed to give that information, seasonal forecasts of total rainfall were being used instead. After developing a way to measure regional flood hazard or ‘floodiness’, Liz demonstrated that this was not directly linked with seasonal rainfall totals. She fed this information back to the WFP and other forecast users and plans are currently underway to include operational forecasting of floodiness as part of the GloFAS service. Liz also worked alongside scientists at the Red Cross Red Crescent Climate Centre, who were leading the implementation of Forecast-Based Financing: an innovative mechanism to release donor funds for preparedness in advance of a potential disaster. “The flexibility of the Leverhulme fellowship allowed me to get involved in the heart of this new initiative,” Liz explains, “repurposing travel funds towards international meetings, workshops and pilot studies.” This collaborative research led to Liz’s successful application to lead a multidisciplinary international project supporting Forecast-Based Action, funded under the RCUK Science for Humanitarian Emergencies and Resilience programme. Liz has also accepted the offer of a Lectureship at the University of Reading.

PROFESSOR JONATHAN ERICHSEN



“The emphasis on a truly interdisciplinary approach highlighted interesting clashes of academic cultures ... but I think that was part of the fun of it for everyone”

Precisely how is it that migrating birds can find their way back to exact geographical locations over the distances associated with migration? Jonathan Erichsen’s research project focussed on the magnetic compass sense in the homing pigeon to find out

How animals navigate using Earth’s magnetic field is both intriguing and humbling... particularly for those of us with little or no sense of direction. Professor Jonathan Erichsen, a behavioural biologist at the University of Cardiff, is amongst the most directionally challenged: “I have enough trouble even with a map,” he says “and yet some of my peers just seem to know which way to go. I’ve often harboured the suspicion that they are on to something. Maybe this ability could be trained?” Perhaps not surprisingly, the first definitive evidence for a magnetic sense came from studies of migrating birds – an internal compass is clearly an advantage when it comes to flying the often vast distances to sunnier climes. Nevertheless, when a report demonstrating this ‘new’ sense was published in 1966, it was greeted with a scepticism bordering on ridicule. Over the years, the critics have been silenced; we now know that a wide array of animals including birds, insects and even some mammals have an inbuilt sensitivity to Earth’s magnetic field, giving them an acute sense of direction.

However, there is still little consensus on how magnetoreception works. Progress has been slow, not least because many findings have proved difficult to replicate. A key problem, identified by leaders in the field, is that the magnetic fields produced for behavioural experiments are often not adequately controlled and measured. But another reason for the irreproducibility plaguing magnetosensory research is that individual animals are just that: individual. And unreliable. If a bird doesn’t respond to a weak magnetic stimulus, for example, that may be because it can’t detect it. Or because it’s bored, nervous, or perhaps distracted

by a myriad of more pressing bird thoughts. Jonathan’s ingenious idea was for an assay to measure an animal’s magnetosensory ability based on its ‘startle’ response – a reflex behaviour that occurs no matter what the creature’s state-of-mind. He chose homing pigeons to test the concept because they are known to navigate using magnetic fields, and do so regardless of the season, but in theory it will work with any vertebrate.

With funding for a three-year research project, awarded in 2011, Jonathan was able to create the first team in the UK dedicated to studying magnetoreception. And probably the only team of its kind in the world to have electrical magnetic engineers and behavioural biologists working towards a common goal. “The emphasis on a truly interdisciplinary approach highlighted interesting clashes of academic cultures,” Jonathan says, “but I think that was part of the fun of it for everyone.” Despite some significant set-backs, the team succeeded in developing arguably the best and most carefully validated experimental apparatus for producing and manipulating magnetic fields for testing in animals. “There were challenges – things we couldn’t have known about – but that’s to be expected. One of the great things about this sort of study is that it’s kind of the Wild West. It’s the frontier in that there’s still so much that needs to be determined definitively and carefully,” he says. The team has also commissioned and validated the instruments necessary to perform ‘startle’ experiments opening up this novel approach for measuring magnetosensory ability in pigeons and many other animals... including humans. “That’s certainly something we’d like to explore. Is it something we can sense but we’re just not paying attention?”

PROFESSOR LAURA ROBINSON



“Priorities change during the long lead-time for deep-sea research and the great thing about the Prize is that it’s really flexible, allowing you to be nimble and adjust as you go along”

Laura Robinson has made leading contributions using a variety of techniques to enable reconstruction of past climate changes over recent glaciations; having led a major research cruise across the Atlantic Ocean collecting seawater, deep water corals and sediment samples, she has highlighted a new method for establishing the age of fossil samples

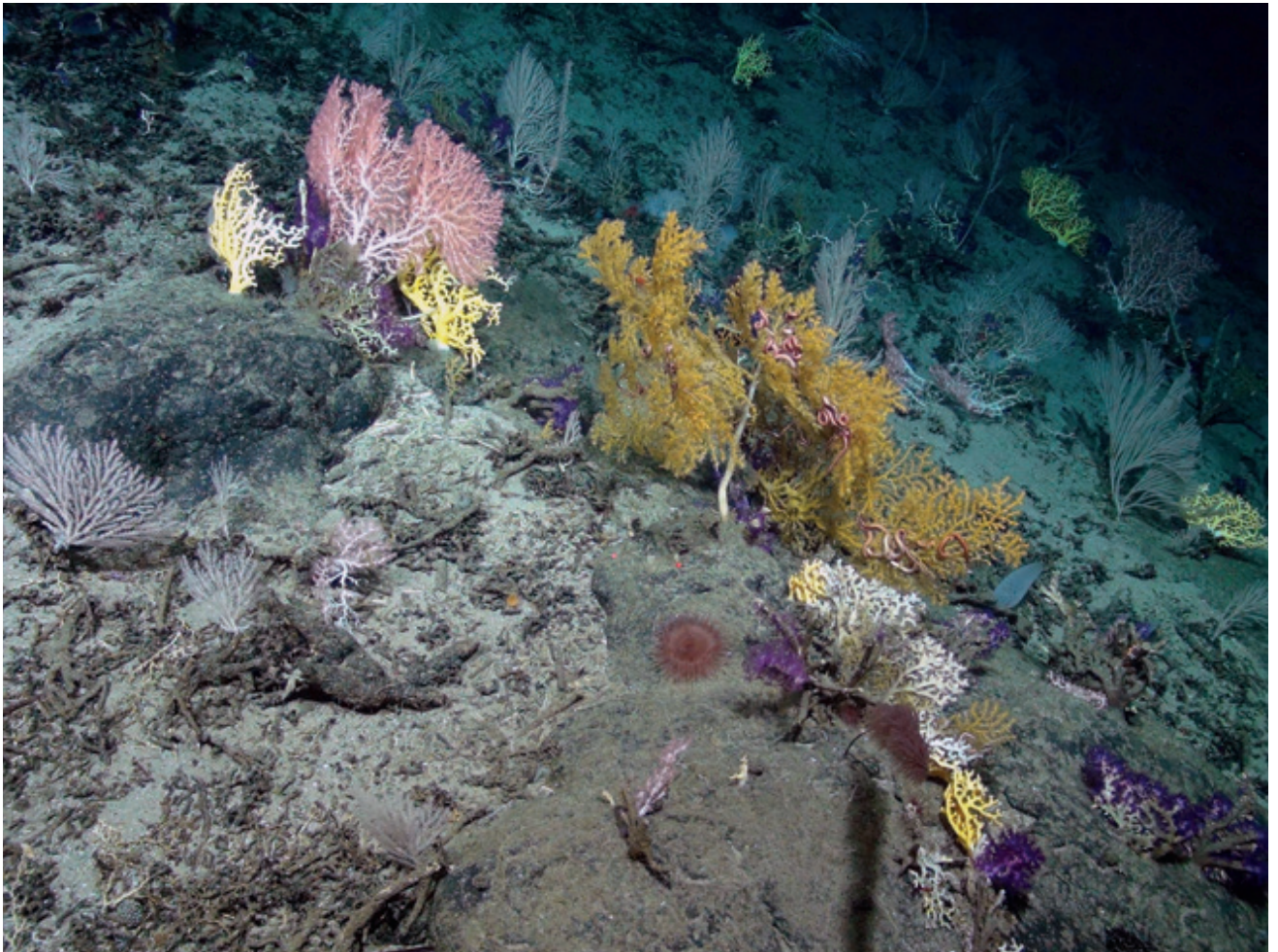
Beneath the surface of Earth’s deep oceans lies a vast, unexplored and often mountainous world. On the slopes of seamounts, some higher than Everest, lush coral gardens teem with a myriad of other strange and beautiful creatures. Cold-water corals can be found living in the depths of every ocean, their prevalence and biodiversity making them one of the most important marine ecosystems. These corals – and their fossils – are also a valuable natural archive of past deep-sea climates, because their skeletons lock in the chemistry of the ocean environment in which they grow. Professor Laura Robinson, a geochemist at the University of Bristol, is pioneering the development of techniques needed to analyse this archive, and to use it to reconstruct ocean climates over timescales of decades to hundreds of thousands of years.

In 2013, Laura led the TROPICS cruise – a two-month ERC-funded expedition on the RRS *James Cook* – collecting samples of deep-sea corals, seawater and marine sediments from the depths of the Equatorial Atlantic. The cruise took several years to plan, during which time Laura gathered a multinational team of oceanographers, marine biologists and Earth scientists: some students, some more seasoned explorers. Awarded a Philip Leverhulme Prize in 2012, Laura used some of the funds to bring additional experts aboard, making the most of the rare opportunity to study these remote habitats. Amongst these was Lucy Woodall, a biologist who joined the team to lead a project to assess the amount of litter, particularly plastics, polluting deep-sea environments. Lucy set up a plastic-free laboratory on board, ensuring that deep-sea samples were not contaminated by microplastic in the ship’s environment. She also developed new methods to analyse

plastic microfibrils based on procedures used in forensic laboratories. The cruise took the TROPICS team from Tenerife to Trinidad, exploring new terrain and collecting a wealth of samples. Back on dry land, Laura’s Leverhulme funds supported the archiving of fossil corals, ongoing research on cruise samples and data, and additional fieldwork opportunities for her research group. Lucy’s analyses showed that plastics, in the form of 2–3mm long fibres, were prevalent in all of the sediment cores analysed, suggesting that this contaminant is ubiquitous in the deep sea. The plastics project also provided the first evidence that deep-ocean creatures ingest this waste, with microfibrils found inside hermit crabs, squat lobsters and sea cucumbers that were collected from depths of between 300 and 1,800 metres. “This was an astonishing result and is a real reminder that plastic pollution has truly reached the furthest ends of the Earth,” Laura says.

Reflecting on her achievements during the two years of the Prize, Laura says that the Leverhulme support proved extraordinarily beneficial: not least because it helped her to establish her research group in the UK, by giving her and her students the opportunity to present their results at international conferences. The support also allowed her to develop new collaborations and scientific ideas, and had a particularly outstanding impact on the research outcomes of the TROPICS cruise: “Priorities change during the long lead-time for deep-sea research and the great thing about the Prize is that it’s really flexible, allowing you to be nimble and adjust as you go along. Being able to invite different types of expert meant that I could get more out of the fieldwork than I originally proposed.”

Below. A spectacular deep-sea coral garden on Carter seamount, around 1000 metres below the surface of the Atlantic Ocean and over 500 kilometres from the nearest land. The photo was taken by *ISIS*, a Remotely Operated Vehicle (ROV) used to survey and sample the deep-sea environment.



PROFESSOR STEVEN SCHWARTZ



“Having the Fellowship meant I was there at the start, talking directly to the instrument teams, I got the inside details: how the instruments work; how to dig out the real science nuggets”

Exploiting data from NASA’s Magnetospheric Multiscale Mission and using ground-breaking equipment, Steven Schwartz aimed to answer some fundamental questions about shock waves in astrophysics; namely how many particles are accelerated and to what energies

Steven Schwartz is Professor of Space Physics at Imperial College London; but his laboratory is literally out of this world. He studies collisionless shock waves in space plasma, a source of ultra-high energy cosmic rays with energies millions of times greater than any particles produced by terrestrial accelerators. How shock waves accelerate some particles to such enormous energies has perplexed scientists for decades, not least because the physics of space plasma – plasma so dilute that its constituent particles rarely collide – is impossible to recreate on Earth.

Much of our understanding of shock physics has come from measurements taken by spacecraft traversing Earth’s bow shock: the boundary created as the solar wind hits Earth’s geomagnetic field. This is the only place where we can study shock waves *in situ* and Steven’s Research Fellowship was timed to exploit a substantial upgrade in this unique laboratory, with the commissioning of NASA’s Magnetospheric Multiscale Mission (MMS) in September 2015.

The Fellowship supported Steven’s one-year sabbatical at the Laboratory for Atmospheric and Space Physics in Boulder, Colorado: the data nerve centre for MMS and the primary point of contact for scientists participating in the mission. Arriving in August, Steven was swept up in the buzz of final preparations, sharing his expertise while gaining invaluable knowledge on the instruments’ design, operations and limitations. “This was a brand new shiny mission with capabilities a hundred times anything before it,” Steven enthuses. “Having the Fellowship meant I was there at the start, talking directly to the instrument teams, I got the inside details: how the instruments work; how to dig out the real science nuggets.”

Costing over a billion dollars, MMS was designed to study the processes

driving magnetic reconnection – another space plasma phenomenon – and a ‘cast of hundreds’ of researchers had assembled to chase this one holy grail. Steven surreptitiously corralled a small group of researchers interested in using MMS to study shock physics instead. He knew that the capabilities devised to study magnetic reconnection could also be very illuminating for the shock problem... and was soon proved right. Looking at data collected on 7 October 2015, the first time MMS crossed the bow shock, the group made a surprising discovery. “The ion velocities and fields at the shock front seemed to be all over the place,” Steven remembers “but when I looked at the data again, plotting it differently, it instantly jumped out that these were ripples. Ripples moving so fast we wouldn’t have detected them without the capabilities of MMS.” Published in the prestigious journal, *Physical Review Letters* in 2016, the finding also caused ripples in the astrophysics community. Theorists had long predicted such structures as a mechanism for shaking things up, giving particles more energy, but the shock wave boundary hid these from previous instruments.

Back at Imperial, Steven continues to collaborate with the international ‘splinter group’, looking for other potential particle accelerators, particularly at the electron scale. Recently, they discovered electric field spikes within the shock structure, taller and faster than previously envisaged: some of the biggest electric fields anyone has ever seen in space. Steven’s Fellowship promises to continue to pay dividends for fundamental shock physics research. He is currently leading the team’s submission to NASA’s Senior Review, making the case for ongoing support for MMS with funding redirected towards the most productive projects... including those in the bow shock laboratory.



PROFESSOR KIMBERLEY BROWNLEE



“The Leverhulme Prize doesn’t commit you to a set of outputs or research agenda ... it’s an expression of trust in the researcher that the funds will be used well, which was very liberating”

Kimberley Brownlee has recently developed an interesting and novel idea that there is a human right against severe social deprivation, which will have significant implications for the use of quarantine and solitary confinement

‘People who need people are the luckiest,’ so the Streisand song goes. But a growing body of evidence suggests that we all need social connections in order to survive, let alone thrive. The pain of loneliness triggers the same ‘fight or flight’ response as physical pain, and chronically lonely people are less likely to live a long and healthy life. Those who have experienced the extreme social deprivation of long-term solitary confinement report feeling depressed, lethargic and forgetful; often it is only a matter of days before the mind starts to unravel with hallucinations and panic attacks. Yet, despite their importance for our mental and physical health, social needs for direct human contact have received little theoretical attention; nor are they explicitly protected in international human rights treaties. Kimberley Brownlee, a Professor of Philosophy at the University of Warwick, believes that this oversight allows gross injustices to go unchallenged. The main aim of Kimberley’s 2012 Philip Leverhulme Prize project was to write *Social Rights* – a monograph defending her claim that severe social deprivation is sufficiently detrimental that we have a right to be protected against it. Indeed, this human right is more fundamental than many other rights that we currently recognise.

Kimberley used her Prize to fund two years of research leave from her duties at Warwick – then as Associate Professor – giving time to develop her arguments and to present them to over sixty different academic audiences for feedback along the way. “I argue that there are three cases of social deprivation that we have a right to be protected against,” she says. “The paradigm case – which most people nod their heads about – is solitary confinement. But the

next two... that’s where fewer people nod.” These more controversial cases are where the only available social contact is brutal, as is often true in our prison system. And where the needs of someone unable to access social contact without help are neglected; a problem faced by increasing numbers of elderly people in our individualistic Western society. Despite uncomfortable implications, Kimberley also argues that our need for decent social connections is so fundamental that our right to them trumps another right we hold dear: the freedom to associate, when and with whom we please. This means, for example, that if an elderly parent depends uniquely on you for their social needs, then not spending quality – and quantity – time with them would not only be neglectful, but immoral.

Free from specific expectations from the Leverhulme Trust, Kimberley says she expanded her research agenda beyond the bare minimum social interaction necessary for survival, to the rich, interpersonal conditions necessary for us to flourish; she will present this work in a companion monograph titled *Social Goods*. “The Leverhulme Prize doesn’t commit you to a set of outputs or research agenda,” Kimberley explains “it’s an expression of trust in the researcher that the funds will be used well, which was very liberating and turned this into a two-book project.” Both books are under contract with Oxford University Press, and the second will be completed as part of a three-year Leverhulme Trust Research Project funded in 2017. Through this, Kimberley aims to firmly establish the study of the ethics of sociability, helping to bring social rights to the forefront of future academic and public debates.

PROFESSOR KIRSTIE BLAIR



“Leverhulme is one of the few funders that will just give you time... time to be in the archives, scrolling through endless microfilm reels of local newspapers, reading every week’s poetry column and the editorials that accompanied them”

By examining Victorian Scottish poetry from below – the everyday culture of local verse supported and fostered by working-class authors, readers and patrons – Kirstie Blair’s research has provided a revisionist history of the literary nineteenth century for both Scottish studies and Victorian studies

Boring, derivative and notable only for its complete lack of merit: the working-class verse of Victorian Scotland was the ‘nadir of Scottish poetry’. So why did so many working-class men and women devote their rare leisure time to these poems and songs, and particularly to the verses published every week in newspaper poetry columns? When she applied for her 2015 Leverhulme Trust Research Fellowship, Professor Kirstie Blair argued that the importance of working-class verse could only be understood by studying the poetry in its original context. “This is something nobody had previously had the time, energy or will to do,” she says, “and Leverhulme is one of the few funders that will just give you time... time to be in the archives, scrolling through endless microfilm reels of local newspapers reading every week’s poetry column and the editorials that accompanied them.”

It was only while working in the regional archives across Scotland that Kirstie realised quite how enormous this verse culture was. A vast amount of material, particularly in the little local libraries, had been unknown to scholarship since the nineteenth century. She also began to see why the poems mattered so much to their readers; and why so many men and women went home to write poems at the end of a long working day. The everyday culture of local verse was deeply politically engaged, its subjects ranging from the local to national and international affairs. The poetry was often highly sophisticated, its authors consciously using and subverting traditional styles to reinforce their case. Most surprising, she says, was the discovery that apparently innocent pastoral poems often served as calls to action in an ongoing,

bitter dispute over access and rights of way. The words of one such poem, Alexander Rodger’s ‘Come to the Banks of Clyde’, look fairly standard and uninteresting in their republication in *Whistle-Binkie*, a famous anthology of family-friendly verse. But the stated tune for this verse, ‘March to the battle field’, signals its original context. Glasgow readers in 1839 knew that Rodger’s song was composed about the Harvie’s Dyke case, in which a wealthy brewer tried to wall off the banks of Clyde. Rodger was the radical ‘poet laureate’ of the opposition to Thomas Harvie, and this was political protest verse.

Kirstie’s project has highlighted exciting and previously entirely overlooked links between Scottish Studies and Victorian Studies. And its impact on these two substantial academic fields promises to be a lasting one. Kirstie was recruited by the University of Strathclyde in 2016, and provided with start-up funding for a Scottish Centre for Victorian and Neo-Victorian Studies, which she will co-direct. During her Fellowship, she wrote a substantial part of a monograph (for publication in 2018), *Working Verse in Victorian Scotland*, discussing over fifty named poets, never previously studied, as well as numerous anonymous or pseudonymous writers. She also completed a general anthology of Victorian newspaper verse, *The Poets of the People’s Journal: Newspaper Poetry in Victorian Scotland*, which was published by the Association for Scottish Literary Studies in November 2016. With poems selected to appeal to a popular as well as an academic audience, she hopes this anthology will show how the concerns and interests of these ‘forgotten’ poets remain surprisingly relevant in the modern day.



Chobe Canticles.

4th. Study.

20.01.2015.

Edward Cowie.

PROFESSOR EDWARD COWIE



“The Leverhulme Fellowship was a tremendous boon ... It allowed me to go to places I could never have experienced otherwise”

Inspired by the sounds and sights of nature, drawing and painting forms a fundamental and complementary part of Edward Cowie’s compositional process, fusing sound with vision in the pursuit of new forms of self expression

With his unique blend of sound, sight and science, Professor Edward Cowie conserves some of the world’s most endangered habitats in music. Inspired by nature’s ever-changing shapes, rhythms and colours, his compositions evoke both what he hears and what he sees in these fragile environments. They serve as both record and warning. In 2012, he embarked on *Earth Music*, a series of short works for large symphony orchestra, featuring habitats particularly threatened by climate change. *Earth Music 1*, a response to the Great Barrier Reef, was commissioned by the BBC in celebration of Edward’s seventieth birthday and premiered at the BBC Prom in 2013. In 2014, he was awarded a two-year Leverhulme Trust Emeritus Fellowship to support the field trips needed to research the next two in the series.

Edward’s field trips are only part of his research process. First, he familiarises himself with what is known about his chosen habitat, reading scientific papers on its environment, flora and fauna. This understanding then underpins his fieldwork, allowing him to observe his surroundings with an informed eye... and ear. As nature’s compositions unfold, he takes meticulous records in three notebooks: one for drawings; one for musical notations; and one for words or mimetic prompts linking the other two. Back in the studio, he gathers his ideas by “drawing towards the music”, using visual art to harness sound, sight, understanding and memory, before finally putting notes to paper. Many of his drawings are exhibited or published separately to his music; and they are often back projected during performances, heightening the multisensual impact.

Botswana’s Okavango Delta was Edward’s ‘absolute first choice’ for *Earth Music 2*, not least because wetlands have suffered the most dramatic losses of

any threatened habitat. One of nature’s masterpieces, Okavango is a vast oasis in an otherwise dry environment: Africa’s last Eden. This was Edward’s first experience of tropical Africa and, travelling far from any beaten track, he found wilderness of exceptional potency. “Until you see such incredible sights, experience the amazing colour changes, sunrises and sunsets, the richness of birdsong, you can’t begin to imagine just how strange and inspiring it’s going to be,” he says. His experience in Chobe, north of Okavango, where he was privileged to witness a traditional Botswanian ceremony, imparted an unexpectedly spiritual air to the second in his *Earth Music* series. Written for double choir and two percussion, *Earth Music 2: Okavango Dawn and Chobe Canticle*, will be premiered by The BBC Singers in September 2017 and broadcast on BBC Radio 3. Edward also wrote *Okavango Nocturne for Large Orchestra* (published in 2015 by United Music Publishers London).

After the watery environments of the Great Barrier Reef and Okavango, Edward chose the driest possible place for *Earth Music 3: Death Valley, California*. During this field trip, he also studied the environments in three other Californian National Parks: Joshua Tree, Yosemite and the Californian Marine Coastline. Again, the fieldwork led to an unexpected wealth of creative outputs including *California Sweets*, four quintets for solo guitar and string quartet which will premier in autumn 2017, and ongoing work on an orchestral piece for *Earth Music 3*. “The Leverhulme Fellowship was a tremendous boon,” he says. “It allowed me to go to places I could never have experienced otherwise. Habitats so significant, they continue to inspire some of my very best creative work.”

DR LEE BROUGHTON



“A particular asset of the Leverhulme Fellowship was that it allowed me to get out and engage with the public”

Italian filmmakers seemingly used the US Civil War to comment allegorically on Italy's own historical traumas; Lee Broughton's project sought to formulate new interpretive models to allow us to fully understand Italian Westerns and the public memories of national trauma they evoke

In a plot twist worthy of its place in cinema history, Sergio Leone's *The Good, the Bad and the Ugly* (1966) is recognised as one of the greatest movies of all time. On its release few could have predicted how inspirational this – and other Spaghetti Westerns – would prove. Most American film critics dismissed them as excessively blood-soaked, morally confused, and historically inauthentic. In a time-worn Hollywood tradition, Spaghetti Westerns were often set against a backdrop of the US Civil War, but Italians seemed to use the North (Unionist) versus South (Confederate) symbolism haphazardly, without consideration for its historical or narrational effect. Researching the evolution of Western movies for his postgraduate degree, Lee Broughton wondered whether the North–South symbolism found in Spaghetti Westerns had in fact been carefully selected, but primarily with its original Southern Italian audience in mind. “I was aware that Italy had been, almost since its birth, a divided nation on a North–South basis,” Lee explains. “It had its own civil war around the same time as the American Civil War. And was again divided during World War II, with Nazi-sponsored fascists in the North and the Allies and the new Italian state occupying the South.” Were Spaghetti Westerns employing discernable patterns in the representations of North and South that resonated with Italy's traumatic past?

This question was at the core of Lee's 2013 Leverhulme Trust Early Career Fellowship project at the Centre for World Cinemas, University of Leeds. His findings contradict critics' assertions that Italian film makers selected northern and southern symbols at random, instead revealing consistent themes: southern Confederates are often coded as ‘good’ and honourable victims, while northern

Unionists are merciless fascist invaders; and while past conflict often leads to peaceful reunification in the Wild West of Hollywood, Spaghetti Westerns evoke no such happy ending. Lee argues that acknowledging the distinctive way American Civil War symbolism was appropriated in Spaghetti Westerns allows us to ‘read’ the films afresh. For a Southern Italian audience, these representations appear to illuminate and explore public memories of the aggression and brutality tied both to the history of northern invaders in 1861, and to the atrocities associated with the Nazi-sponsored fascists. Spaghetti Westerns that featured Civil War stories also captured the zeitgeist of 1960s and 1970s Italy, where the ongoing North–South divide became economic in nature and partisan political terrorism provoked further societal divisions.

Alongside his research activities, Lee organised and introduced public film screenings of Westerns, with support from the Leverhulme Trust. “A particular asset of the Leverhulme Fellowship was that it allowed me to get out and engage with the public,” he says. “People were often really enthusiastic and the question and answer sessions generated interesting and lively dialogue.” A highlight was the screening of *The Good, the Bad and the Ugly* at the National Media Museum in Bradford in 2016: the UK's premier celebration of this iconic film's 50th anniversary. This was part of an international conference, the last in a series of academic events convened by Lee, which provided much of the source material for his edited volume, *Critical Perspectives on the Western: From A Fistful of Dollars to Django Unchained* (2016). Published by Rowman and Littlefield, this wide-ranging collection celebrates the Western genre in all of its multifarious forms and the fruitful avenues of academic research it continues to inspire.

Below. Scene from *A Fistful Of Dollars* (1964). Image credit: Jolly/Constantin/Ocean/REX/Shutterstock.



AWARDS MADE

Find listings for all awards made by the Trust in 2016. Details are given for each of the funding schemes across the Sciences, Humanities and Social Sciences

AWARDS MADE IN 2016

Research Leadership Awards

Sciences

Dr Andrew Biggin

University of Liverpool

Shaping Earth: defining planetary evolution using palaeomagnetism
£999,592

Dr Clare Burrage

University of Nottingham

New searches for dark energy
£802,923

Dr Sergi Garcia-Manyes

King's College London

Mechanochemical biology: a force to be reckoned with
£942,614

Dr Philip King

University of St Andrews

Engineered quantum states via atomic-scale assembly of artificial 2D heterostructures
£999,629

Dr Nathan Lepora

University of Bristol

A biomimetic forebrain for robot touch
£998,928

Dr Nicholas Longrich

University of Bath

The Cretaceous-Paleogene mass extinction – severity, recovery and biogeography
£998,185

Dr Carolyn McGettigan

Royal Holloway, University of London

SONOVOX: the social neuroscience of voices
£961,815

Dr Kou Murayama

University of Reading

An integrative theory of interest: how can we motivate ourselves without extrinsic incentives?
£999,272

Dr Julia Steinberger

University of Leeds

Living well within limits (LiLi)
£964,872

Humanities

Dr Dagmar Divjak

University of Sheffield

Out of our minds: optimising language learning with discriminative algorithms
£935,900

Dr Gordon Noble

University of Aberdeen

Comparative kingship: the early medieval kingdoms of Northern Britain and Ireland
£971,149

Dr Timothy Stanton

University of York

Rethinking civil society: history, theory, critique
£828,772

Social Sciences

Dr Emily Keightley

Loughborough University

Migrant memory and the post-colonial imagination (MMPI): British Asian memory, identity and community after partition
£994,904

Research Project Grants

Sciences

Professor Steve Armes

University of Sheffield

In situ SAXS studies of micellar nucleation during block copolymer syntheses
£161,051

Dr George Bassel

University of Birmingham

Evolution of cellular patterning in plants
£150,461

Dr Andrew Bayliss

University of East Anglia

Examining the mechanisms underpinning shared attention
£270,862

Dr Magnus Bebbington

Heriot-Watt University

From hydroamination to dipolar cycloaddition through dual-mode catalysis
£110,467

Dr David Belin

University of Cambridge

Mapping the neural circuit subserving interoceptive control over behaviour
£325,585

Dr Yoselin Benitez-Alfonso

University of Leeds

Unlocking plant intercellular channels: lessons from cell wall molecular biophysics
£353,301

Professor Malcolm Bennett

University of Nottingham

Watching plants drink: imaging where, when and how roots take up water
£283,147

Dr Roger Benson

University of Oxford

Timing the origin of genome doubling in fossil teleosts
£248,425

Dr Zara Bergstrom

University of Kent

Neurocognitive mechanisms underlying retrieval-induced updating of face memories
£191,067

Dr Jacopo Bertolotti

University of Exeter

Prime factorisation using light
£118,672

Professor Peter Beton

University of Nottingham

Flexibility and curvature in two-dimensional supramolecular arrays
£289,358

Professor Jeffrey Bowers

University of Bristol

When and why do neural networks learn selective codes?
£252,194

Professor Steven Bramwell*University College London*

Spin ice spintronics: surface and thin film probes of emergent electromagnetism

£482,452

Dr Caroline Brennan*Queen Mary, University of London*

The genetics of numeracy and the evolutionary basis of number; can fish count?

£291,247

Professor Fernando Bresme*Imperial College London*

Electrotunable nanoscale friction: from full stall to superlubricity

£237,563

Dr Amanda Bretman*University of Leeds*

How are flexible behavioural responses to rapidly changing environments coordinated at the genomic level?

£245,369

Dr Ralf Britz*Natural History Museum*

Breaking the rules – development and evolution of extreme asymmetry and morphological novelty

£270,782

Dr Mark Burnley*University of Kent*

Emergent properties of the fatiguing neuromuscular system

£160,189

Professor Michael Carpenter*University of Cambridge*

Magnetoelastic coupling behaviour and multiferroicity of magnetic iron oxide and sulphide minerals

£219,851

Dr Yin Chen*University of Warwick*

Biochemical and structural characterisation of a unique Rieske oxygenase CntA

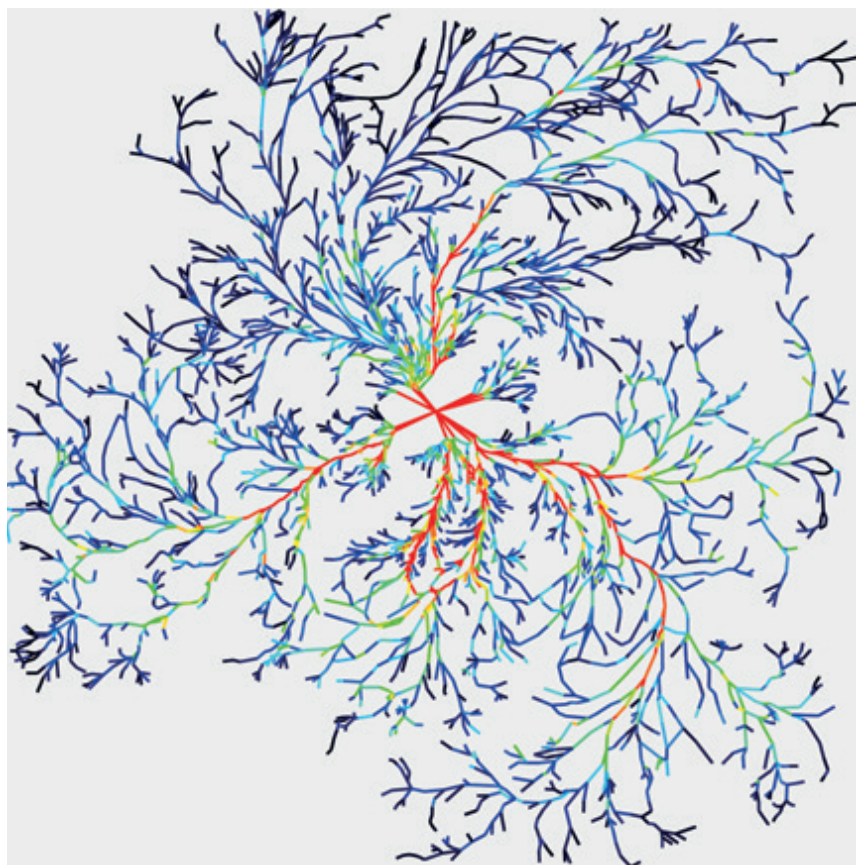
£181,768

Dr David Chesmore*University of York*

Automatic acoustic observatories: non-invasive long-term monitoring of acoustic species

£310,933



Dr Andy Chow*University College London*Agent-based modelling and optimisation of transport network resilience
£72,865**Professor Lesley Cohen***Imperial College London*Microwave-induced Andreev bound states
£216,563**Dr Georgina Cosma***Nottingham Trent University*Novel approaches for constructing optimised multimodal data spaces
£115,355**Dr Claire Cousins***University of St Andrews*Frozen but not forgotten: microbial habitability and preservation in planetary fluids
£165,903**Dr William Curran***Queen's University Belfast*The importance of social context in interpreting and generating laughter
£123,378**Professor Brendan Davies***University of Leeds*A new dimension for plants
£247,555**Dr Ian Davies***Liverpool John Moores University*New frontiers in lipoprotein analysis: small molecules, big questions?
£127,026**Dr João Pedro de Magalhães***University of Liverpool*Data-driven discovery of correlations between genes and ageing-related changes
£304,873**Professor Andrew Ellis***University of Leicester*The building blocks of gas hydrates
£126,560**Professor Maurice Elphick***Queen Mary, University of London*From starfish to sex: the origins of kisspeptin signalling
£113,015**Dr Geoffrey Evatt***University of Manchester*The lost meteorites of Antarctica
£258,599**Professor Norman Fenton***Queen Mary, University of London*Improved understanding of causal models in dynamic decision-making
£383,510**Dr David Ferrier***University of St Andrews*Determining major general regulatory mechanisms in the ParaHox gene cluster
£167,184**Professor Gavin Foster***University of Southampton*The nature and consequences of historic and future ocean acidification; insights from boron isotopes in corals
£262,470**Professor Mark Fricker***University of Oxford*The third mode of life
£240,471**Professor Lorenzo Frigerio***University of Warwick*The cell biology of rubber biosynthesis – the endoplasmic reticulum connection
£178,467**Dr Kumiko Fukumura***University of Strathclyde*The mechanisms of choosing pronouns: a cross-linguistic study
£156,799**Professor Matthew Gaunt***University of Cambridge*New concepts for activity-based protein profiling (ABPP)
£119,318**Dr Elena Gheorghiu***University of Stirling*Elucidating the role of colour in shape processing in human vision
£130,595**Dr Nikitas Gidopoulos***Durham University*Progress in Kohn Sham electronic structure theory from a wave function approach
£184,351**Dr Andrew Gillis***University of Cambridge*Development of gill arch appendages: insights into the origin of paired fins
£170,844

Dr Diego Gómez-Nicola*University of Southampton*

Understanding the dynamics and diversity of microglia in the healthy and ageing brain

£236,866

Professor Julie Gray*University of Sheffield*

How do plants restrict stomatal entry routes following pathogen attack?

£82,693

Professor Ruth Gregory*Durham University*

Challenging the standard model with black holes

£192,413

Dr Matthew Grubb*King's College London*

Linking functional and epigenetic plasticity at the single-neuron level

£212,234

Dr Scott Habershon*University of Warwick*

Network organisation in biological photosynthesis

£104,642

Professor Patrick Haggard*University College London*

Processes and precursors of volition: comparing endogenous and exogenous action decisions in the human brain

£220,328

Dr Antonia Hamilton*University College London*

Understanding and generating real-time face-to-face social interactions

£314,885

Dr D Flemming Hansen*University College London*

Exploring the conformational sampling and motions of side chains in proteins

£198,009

Dr Simon Harvey*Canterbury Christ Church University*

Nematode genetic variation and protein misfolding disease

£88,288

Dr Helmut Hauser*University of Bristol*

Computing with spiders' webs – an inspiration for new sensors and robots

£264,745

Professor Paul Hibbard*University of Essex*

Depth-cue combination in complex natural scenes

£71,714

Dr Neal Hinvest*University of Bath*

Elucidating the 'shared brain'

£127,111

Dr James Hodge*University of Bristol*

Optogenetic imaging and remote control of the fly electrical clock

£210,844

Professor Felix Hofmann*University of Oxford*

Probing the invisible: characterising atomic-scale point defects with X-rays

£254,220

Dr Sarah Horswell*University of Birmingham*

Advanced bioelectrochemical measurements on unsupported membranes

£245,580

Dr Andrew Hudson*University of Leicester*

Development of a sensor to quantify cellular concentrations of heme

£201,752

Dr Robert Hughes*Royal Holloway, University of London*

Memory and language: a perceptual-motor approach to verbal sequence learning

£149,397

Dr Wassim Jabi*Cardiff University*

Enhancing the representation of architectural space in 3D modelling environments

£300,485

Dr Mateja Jamnik*University of Cambridge*

ARD: accessible reasoning with diagrams

£383,728

Dr Francis Jiggins*University of Cambridge*

The evolution and origins of arthropod RNAi

£153,665

Dr Matthew Johnson*University of Sheffield*

Organisation of photosystem I and ATP synthase in plant photosynthetic membranes

£178,389

Professor Alex Kacelnik*University of Oxford*

Relational concept imprinting in ducklings

£171,635

Professor Anthony Kenyon*University College London*

Understanding and controlling dynamic functional oxides

£331,470

Dr James Kilner*University College London*

The role of emotion in believable acting

£149,231

Professor Hon Wai Lam*University of Nottingham*

Remote functionalisation by the chain walking of allylmetal species

£180,351

Dr Ellouise Leadbeater*Royal Holloway, University of London*

The evolution of cognition: 'intelligence' in the wild

£249,516

Dr Tung Chun Lee*University College London*

Mechanism of catalysis inside nanoreactors

£225,179

Dr Daniele Leonori*University of Manchester*

Visible-light mediated synthesis of nitrogen-centred radicals

£105,569

Dr Paul Long*King's College London*

Are endoparasitic cnidarians venomous animals? A pioneering study into an ancient lineage

£384,673

Professor Stefan Maier*Imperial College London*

Topologically protected flexural waves in thin elastic plates

£270,855

Dr Svetlana Makovets*University of Edinburgh*

Proteolysis-dependent regulation of telomerase catalytic subunit

£174,381

Dr Stephen Mansell*Heriot-Watt University*Enabling N₂ and hydrocarbon activation using first row transition metals

£106,406

Dr Jason McEwen*University College London*

Illuminating the dark Universe with novel 3D spherical informatics methods

£323,389

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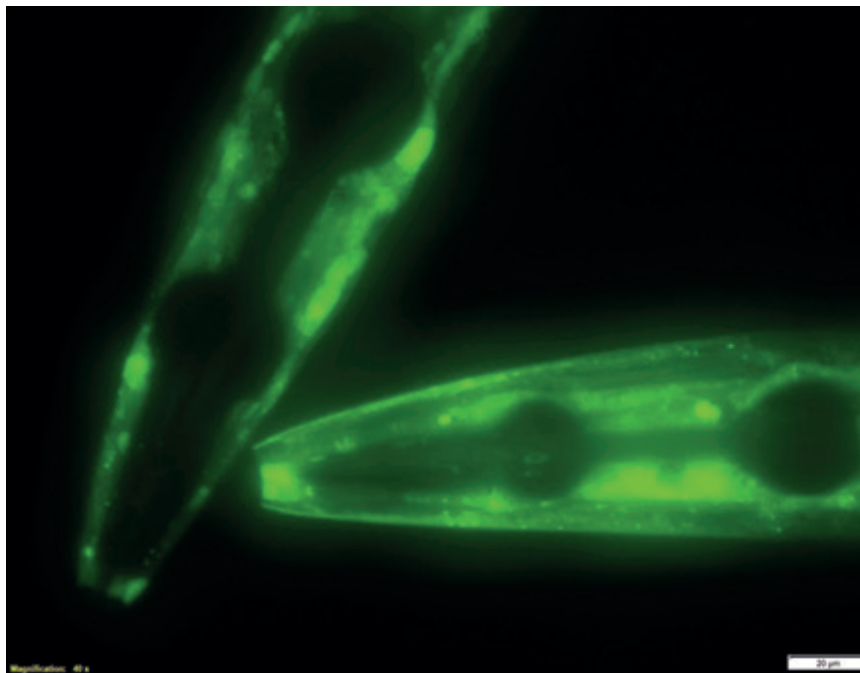
Visualising repressor-activator competition as a mechanism of Ikaros-mediated gene regulation

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Room temperature quantum electronics

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Professor Manuel Fernandez-Gotz

University of Edinburgh
Identity and power: northeast Gaul from the early Iron Age until Romanisation, 600 BCE–70 CE

Dr Oliver Harris

University of Leicester
Archaeological theory and Neolithic Britain

Dr Camilla Speller

University of York
Human–environmental interactions, past health and disease

Dr Fraser Sturt

University of Southampton
Maritime prehistory and geoarchaeology

Chemistry**Dr John Bower**

University of Bristol
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Professor Scott Cockcroft

University of Edinburgh
Supramolecular and physical organic chemistry

Dr David Glowacki

University of Bristol
Molecular dynamics, biochemistry, environmental chemistry and computer science

Dr Susan Perkin

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Physical chemistry of liquids and the measurement of forces in soft condensed matter

Professor Aron Walsh

Imperial College London
Computational materials chemistry

Economics**Dr Vasco Carvalho**

University of Cambridge
Macroeconomics with emphasis on business cycle fluctuations

Dr Camille Landais

London School of Economics and Political Science
Public finance and labour economics

Professor Kalina Manova

University of Oxford
International trade and investment

Professor Uta Schönberg

University College London
Labour economics

Dr Fabian Waldinger

University of Warwick
The economics of innovation, economic history and labour economics



Engineering

Dr Anna Barnett

University of Sussex

Semiconductor detectors for X-ray, beta particle and gamma-ray spectroscopy

Professor Cinzia Casiraghi

University of Manchester

Graphene, 2D materials, spectroscopy, ink-jet printing and flexible electronics

Dr David Connolly

Heriot-Watt University

The development of novel railway track infrastructure

Dr Alexandra Silva

University College London

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Dr Peter Vincent

Imperial College London

Computational fluid dynamics

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Dr Vanesa Castán Broto

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Urban transitions to sustainability

Professor Mark Graham

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Professor Harriet Hawkins

Royal Holloway, University of London

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Dr David Thornalley

University College London

The study of past climate

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Dr William Abberley

University of Sussex

Relationships between Victorian literature and science, especially zoology

Professor Alexandra Harris

University of Liverpool

English literature, painting and place

Dr Daisy Hay

University of Exeter

Eighteenth- and nineteenth-century literature, life writing and biography

Dr Lily Okalani Kahn

University College London

Eastern European Hebrew language and linguistics

Dr Hannah Rohde

University of Edinburgh

Pragmatics of communication: computing meaning from language in context



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In 2016 Early Career Fellowships provided fifty percent of the salary costs of a three-year research position, up to £24,000 a year, with the host university providing the balance. Research expenses of £6,000 a year were also available.

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University of Cambridge

High-resolution spatial proteomics of the model *apicomplexan Toxoplasma gondii*

Dr Martin Benning

University of Cambridge

Learning from mistakes: a supervised feedback-loop for imaging applications

Dr Radha Boya

University of Manchester

Gas separation with atomically precise designer capillaries

Dr Guillem Carles

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Seeing within extended volumes and 3D structures: 3D imaging and applications

Dr Thibaut Charpentier

University of Leeds

Nano-enabled water desalination

Dr Jeongmin Choi

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Decoding an ancient plant-microbe dialogue: the signalling role of DWARF 14 LIKE (D14L) protein in arbuscular mycorrhizal symbiosis of rice

Dr George Constable

University of Bath

Noise in ecological systems: from individual variation to ecosystem stability

Dr Andrew Crombie

University of East Anglia

Uncovering novel mechanisms for the microbial regulation of atmospheric methane

Dr Frances Davis

University of Southampton

A novel method to characterise the high strain-rate properties of soft tissues

Dr Anita Dawes

Open University

The physico-chemical properties and aggregation of interstellar dust and ice

Dr Duygu Dikicioglu

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Understanding the beneficial impact on biotechnological processes of mixed culture of multiple microbial species

Dr Tao Ding

University of Cambridge

Light-powered plasmonic actuating nanomachines: ANTs

Dr Lena Grinsted

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The social life of spiders: evolution of dispersal and group living

Dr Fang Huang

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Exploring the self-assembly and heterologous engineering of bacterial CO₂-fixing machinery

Dr Thomas Hudson

University of Warwick

A mathematical study of discrete dislocation dynamics

Dr Anna Kalogirou

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Controlling the complex behaviour of microfluidic flows using surfactants

Dr Jackie Kendrick

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Understanding the frictional behaviour of volcanic rocks and magmas

Dr Peter Keys

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The polarimetric properties of waves in the solar atmosphere

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Proton transport through atomically thin interfaces

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Game theory applications towards a green and sustainable power network

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Manganese by numbers: a 'chem-tech' toolbox for innovation

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Organic semiconductors to enable a new electronics

Dr Victor Soria-Carrasco

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Deciphering rules for optimal protein biosynthesis

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The domain structure and electrical switching behaviour of antiferromagnets

Dr Tong Zhang

Durham University

Effective bound for arithmetic line bundles in Arakelov geometry

Dr Noa Zilberman

University of Cambridge

Systems for big data applications: revolutionising personal computing

Humanities

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Witnessing, memory and poetics: trauma and the epic in anglophone and francophone Caribbean literature

Dr Naomi Billingsley

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The formation and reception of the Macklin Bible

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The war of words: quantifying the language of British politics, 1880–1945

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The problems of global finance in Britain, Ireland and Empire, 1783–1844

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Broadcasting nations: a history of the BBC German Service, 1938–1999

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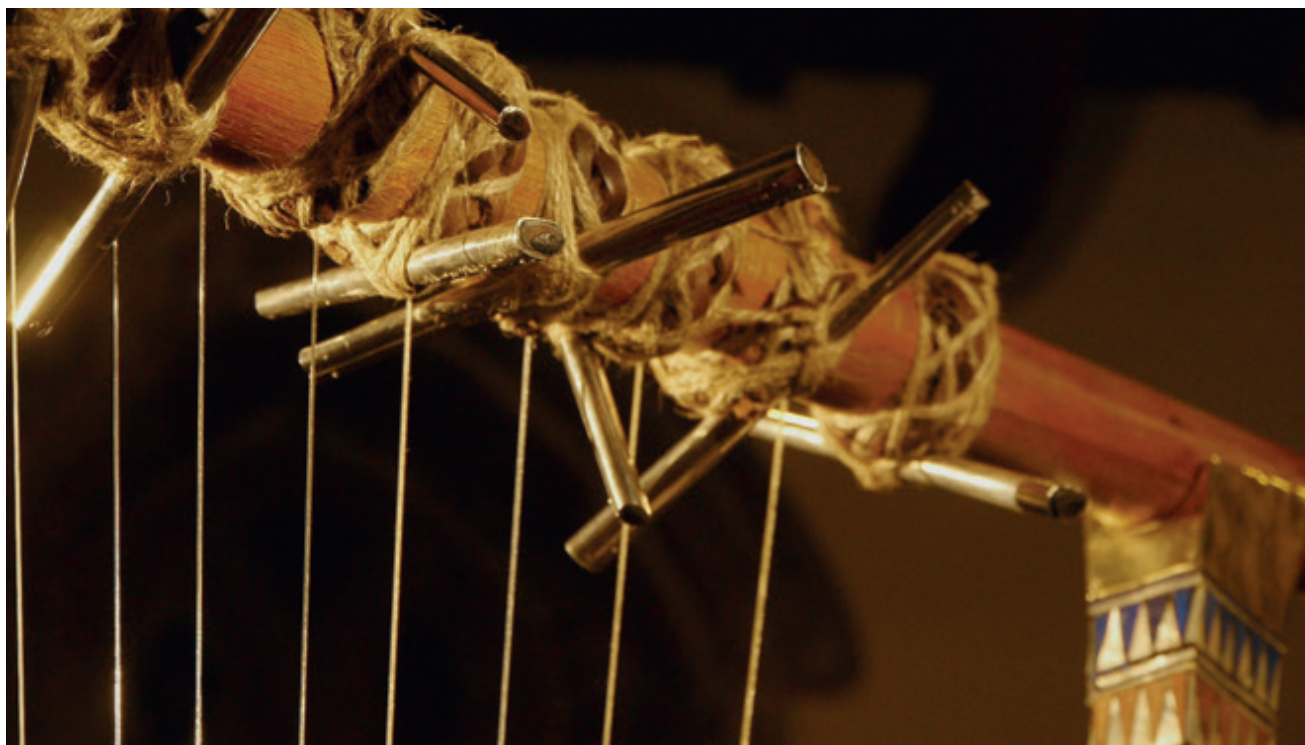
Patterns of variation and local identities in Indonesian sign language varieties

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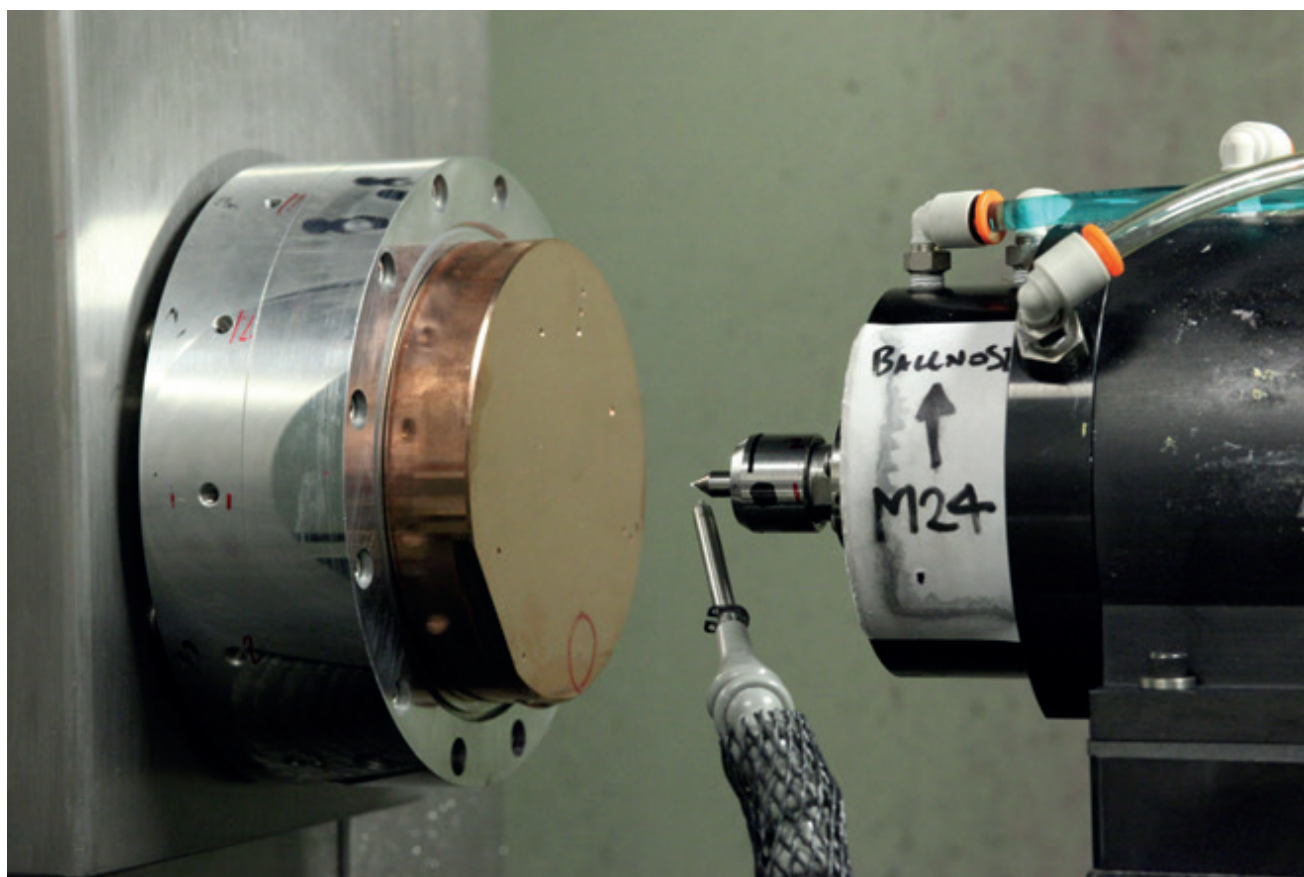
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1,8-Naphthalimide based ligands for supramolecular lanthanide spintronics – *Germany*

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MRes in coevolution of a little known brood parasite and its host: the honeyguide – *South Africa*

Dr Joanne Sampson

Complex nanomaterials from cyclic peptides – *Australia*

Miss Helen Scott

Masters in brain and cognitive sciences – *The Netherlands*

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The sound of modernity: radio education in rural Colombia, 1960–1980 – *Colombia*

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Making peace in the Brazilian Amazon and the Guianas, 1600–1820 – *Portugal*

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Masters in orchestral performance – *Germany*

Mr James Norrie

Transforming ideology and the cult of saints in the eleventh century – *Italy*

Mr Samuel O'Donoghue

The holocaust in Spanish culture under Franco – *Spain*

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Social Sciences

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Mr Matthew Bamber

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MA in European studies – *Poland*

Mr Benjamin Lawrence

Doctoral research in Cambodia's competing constitutional sites and spirits – *Cambodia*

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MSc in rural development and natural resource management – *Sweden*

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Sounding dissent: music, resistance and Irish Republicanism – *Republic of Ireland*

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Artist: Dr Laura Johnston – glass art
£15,000

Professor Lars Chittka*Queen Mary, University of London*

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£14,875

Dr Siobhan Daly*Northumbria University*

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£15,000

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£14,375

Dr Michael Gallagher*Manchester Metropolitan University*

Artist: Dr Mark Wright – sound art
£15,000

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£14,975

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£15,000

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Artist: Dr Michael McMillan – writing/drama
£14,477

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Artist: Ms Naomi Hart – multimedia
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Artist: Ms Heather Barnett – multimedia
£14,970

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Artist: Ms Hanna Tuulikki – art/music
£14,922

Dr Robert Neely*University of Birmingham*

Artist: Ms Anna Dumitriu – multimedia
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Artist: Mr Jamie Shovlin – film
£15,000

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Artist: Miss Catherine Bertola – visual art
£15,000

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Dr Amanda Rogers*Swansea University*

Artist: Dr Bridget Keehan – theatre
£13,776

Dr Tiffany Watt-Smith*Queen Mary, University of London*

Artist: Mr Mervyn Millar – puppet theatre
£12,500

Ms Cathy Williams*University of Bristol*

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Professor Rachel Woodward*Newcastle University*

Artist: Ms Paula Turner – dance/choreography
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p2 and 8. Courtesy of Unilever Archives.

p6 and 12. Photography by Rosie Hallam.

p10. Guillemot eggs, image © Tim Birkhead; *Wendy & Peter Pan* directed by Jonathan Munby, photo by Manuel Harlan © RSC; *Arabidopsis thaliana*, the plant scientist's model organism, image courtesy of K. Franklin, University of Bristol; Scanning tunnelling microscope: investigating the friction of the probe tip, image courtesy of Holly Hedgeland.

p28. Digger wasp dragging its caterpillar prey. Image reproduced under CC BY-NC-ND 2.0 from flickr user: Israel Gutiérrez. Grant holder: Thomas Collett.

p30. © Sarah Boulton.

p34. Newborn, Adobe Stock. Grant holder: Alison Stone.

p50. Left: *A London Citizen's Daughter*, right: *A London Merchant's Wife*, Wenceslaus Hollar, 1643 (9cm × 5.8cm) © Trustees of the British Museum.

p57. Bumblebees and poppies, image credit: Dr Natasha Mhatre.

p65. The United Launch Alliance Atlas V rocket with NASA's Magnetospheric Multiscale (MMS) spacecraft onboard launches from the Cape Canaveral Air Force Station Space Launch Complex 41, Thursday, March 12, 2015, Florida. Photo credit: NASA/Aubrey Gemignani.

p68. Edward Cowie composes by a process he calls 'drawing towards the music'. This drawing – Chobe Canticles 4th Study – is one of his African Series, inspired by a Leverhulme-funded field trip to Botswana's Okavango Delta. © 2015 Edward Cowie.

p75. Meteorites found in Antarctica, image credit: University of Manchester. Grant holder: Geoff Evatt.

p76. Digitised image of the network formed by a foraging fungus. Grant holder: Mark Fricker.

p79. Adult worm expressing a human Parkinson's disease related gene that is linked to a fluorescent marker. Image credit: Simon Harvey and Dr Katie Fowler, CCCU. Grant holder: Simon Harvey.

p80. Remains of the 'Heartbreak Hill' co-operative labour scheme, Margrove, Cleveland © David Petts, grant holder.

p83. Image reproduced courtesy of Howard Ramsby/Psyche Southwell. Grant holder: Sharon Monteith.

p84. Social Stegodyphus spiders cooperating in catching a prey. Photo credit: Dr Virginia Settepani. Grant holder: Lena Grinsted.

p87. A modern reconstruction of the silver 'Lyre of Ur', discovered in 1922 at the Royal Cemetery of Ur, in modern Iraq (Ancient Mesopotamia) © Mark Harmer, 2015. Grant holder: Stephanie Conner.

p88. *Indigofera suffruticosa*, Köhler, F.E., *Medizinal Pflanzen*, vol. 3: t. 36 (1890). Grant holder: Adrianna Catena.

p91. The Vale of York hoard, deposited c.927–928, was found in 2007. It is one of over 15 Viking silver hoards discovered in Britain since 2000. Grant holder: Jane Kershaw.

p92. Precision Optics: Centre for Advanced Instrumentation 2013. Film still, single-channel digital video. Artist and grant holder: Fiona Crisp.

p93. A wind-blown Ceiba tree on the north coast of Cuba. *The Cuba Review*, 1907–1931. Grant holder: Lesley Wylie.

p94. Mermaid making music in Bibliothèque nationale de France, MS français 143, f. 130v. Grant holder: Sarah Peverley.

p95. Zambian field assistant, Lazarus Hamusikili, holding a honeyguide chick. Grant holder: Luke McClean.

p96. One of the many caricatures of the Nawab of Bengal that appeared in the British press in the 1870s. Published in *Vanity Fair*, 16 April 1870. Grant holder: Lyn Innes.

