



SCIENCE MUSEUM GROUP

RESEARCH &
PUBLIC HISTORY
ANNUAL REPORT
2018–2019

FOREWORD

JULIA KNIGHTS

Deputy Director, Science Museum

Welcome to our fifth *Research Annual Report*, covering the academic year 2018–19, a remarkable year for the Science Museum Group.

Across the Group we have opened ground-breaking galleries and exhibitions. At the Science Museum London, we opened *Medicine: The Wellcome Galleries* celebrating the greatest medical collection in the world in 3000 objects across 3000m². We also opened *Science City 1550–1800: The Linbury Gallery*, a journey through London as it became a globally important hub of trade, exploration and science. *The Art of Innovation: From Enlightenment to Dark Matter* exhibition also opened in September, accompanied by a handsome book and 20-part BBC4 radio series. At the National Science and Media Museum in Bradford we opened *Above the Noise*, whilst at the National Railway Museum in York, *Brass, Steel and Fire* was launched. The success of this new generation of displays rests on the formal training and experience of our curators, including forms of research familiar in universities, and types specific to museums, such as provenance-hunting, object-contextualisation and audience evaluation.

Having spent 12 years of my career in the diplomatic service living and working in China, Russia and Latin America fostering joint science partnerships with the UK, I am thrilled that international research is increasing across the Group. One example is our research collaboration in China with Beijing’s Palace Museum and a raft of universities, which has contributed to *Zimingzhong*, our upcoming exhibition on Chinese clocks.

Meanwhile, our amazing One Collection project is uniting the Science Museum

Group’s reserve collection at our National Collections Centre near Swindon in a vast new building. As I write, dozens of skilled staff are researching, photographing, labelling, documenting and packing the contents of our Blythe House store in West London ready for transfer ahead of our opening in 2023. This consolidation of our stored collections and linked digitisation programme will increase access to staff, researchers and the public.

Ensuring that the Group’s research is relevant to government agendas on research, STEM and the industrial strategy, via the funding streams of UK Research and Innovation (UKRI), is key. *Towards a National Collection: Opening UK Heritage to the World* was recently launched by the Arts and Humanities Research Council (AHRC). It recognises that heritage organisations are major national assets, playing a central role in the UK’s heritage and research economies, and contributing significantly to the UK’s global influence and soft power.

This fund is a positive step towards creating a unified virtual national collection, building digital search tools, improving research capability and public engagement. The Group hopes to play a major role, alongside other heritage organisations and universities, in achieving these ambitions.

Many further examples of research activity from across the Group can be found throughout this report. At the Science and Industry Museum in Manchester, research underpins development of the Power Hall. In York and Shildon, curatorial-academic partnerships support the Vision 2025 transformation. And in Bradford, 2020 will see the conclusion of the AHRC-funded *Bradford’s National Museum*



ABOVE:
Dr Julia Knights
Deputy Director, Science Museum,
South Kensington

project, where Leeds University researchers have involved Bradford’s communities in the life and programme of the National Science and Media Museum.

Our collections will always be the centre of our research, activities and programme, and collaboration with other institutions is essential to our success; *The Art of Innovation*, for example, proudly displayed Turner’s ‘Rain, Steam and Speed’ from the National Gallery. New funding for research infrastructure, as it becomes available, will allow us to make connections between the UK’s collections and think about their role on a global scale. We stand on the threshold of an exciting new age for collaboration across the world’s museums and galleries. Our aim is for the Science Museum Group to be a leader in research on our collections and to continue to inspire futures.

FRONT COVER IMAGE:
Atmosphonia (2019), by
Rafael Lozano-Hemmer,
for Atmospheric Memory,
Manchester International
Festival 2019, at the Science
and Industry Museum.
Credit: Mariana Yáñez



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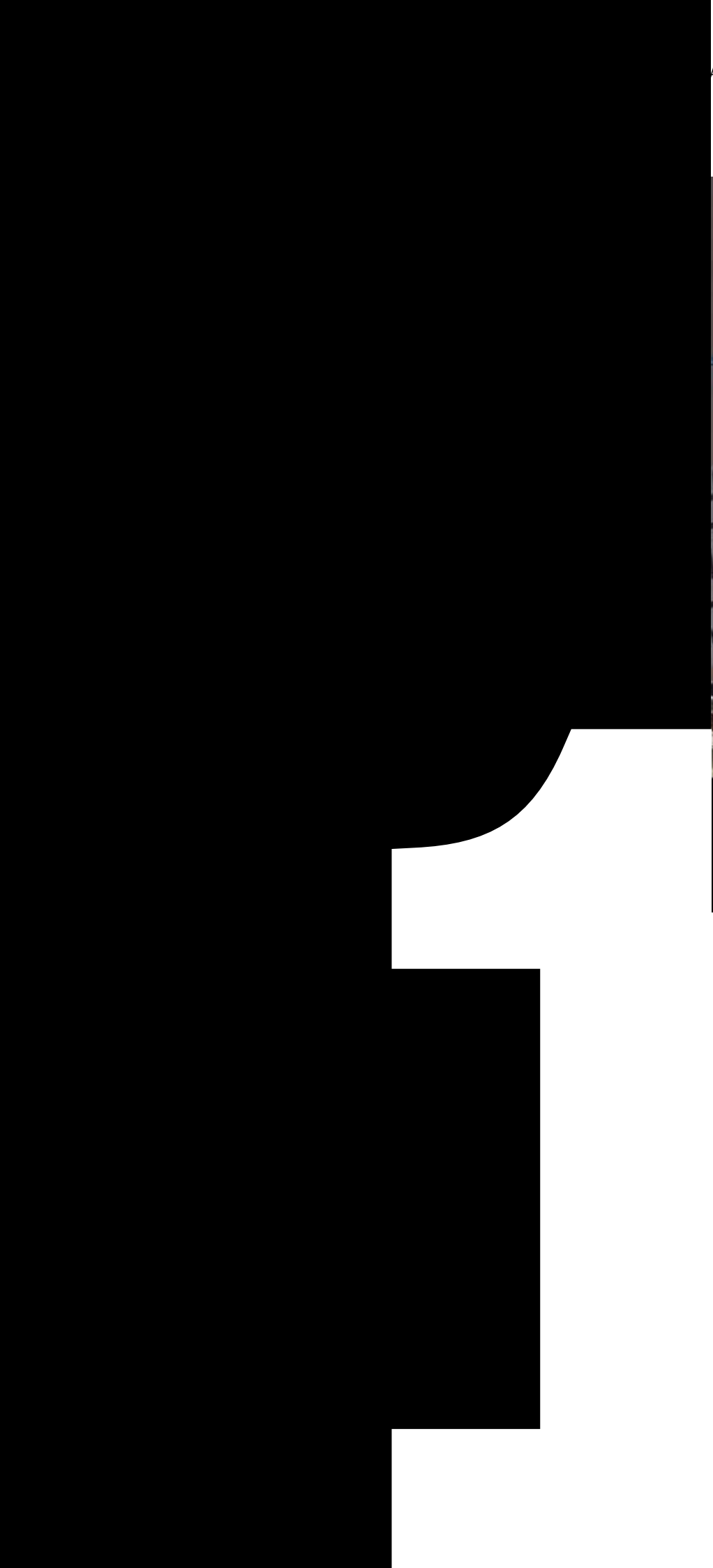
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COLLECTIONS, COLLABORATION AND RESEARCH INFRASTRUCTURE

TIM BOON

Head of Research and Public History, Science Museum



LEFT AND RIGHT:

Gallery view of *Top Secret: From Ciphers to Cyber Security* an exhibition exploring over a century's worth of communications intelligence through hand-written documents, declassified files and previously unseen artefacts from the Science Museum Group's and GCHQ's historic collections

Introducing this annual report in previous years, I have stressed how museum research is necessarily both long-term and collaborative. Each of these facets was dramatically reflected in an October 2019 government press release announcing a major funding initiative entitled: 'Towards a National Collection: Opening UK Heritage to the World'. In many ways, this £19-million fund may itself be seen as the result of long-term collaborative discussions between research-active heritage organisations and the Arts and Humanities Research Council (AHRC).

There is no reason why the long-term friendly collaboration in matters of research in the 'GLAM' (galleries, libraries, archives and museums) sector should be known outside the organisations themselves, but it has been a major factor in the development of our work. We owe a great deal to the AHRC who, in 2007, initiated the Independent Research Organisations (IROs) scheme. Under this, research-active organisations are enabled to apply for a status that confers the right to apply for research grants from AHRC in exactly the same way that universities have been able to do since the foundation of the research councils. A dozen years on, AHRC lists 22 heritage IROs, including most of the prominent museums, galleries and libraries, including the British Museum, Tate and – of course – the Science Museum Group. To say that this status has been transformative for the IROs would be an understatement, as across the sector it has enabled substantial research to support many exhibitions; has unlocked little-understood collections; and enabled new research directions to take flight, including our very own Public History of Science and



Technology strand, which has attracted several grants. Alongside the specific projects, however, has developed something just as precious: a continuing, collaborative, discussion between the IROs about the place of research within our organisations and its potency to enable our organisations to do what they were established to do, only better. The IRO Heads of Research meet at least quarterly, and there is always an exciting agenda of ideas and initiatives to share and debate. At the same time, AHRC has wanted to work still more closely with the IROs, where the benefit of arts and humanities research is evident in the enjoyment of all the millions of visitors to our world-famous venues who respond to displays and events built on a foundation of sound and innovative

research. Out of conversations between funder and funded there is beginning to emerge a shared appreciation of the kinds of research that are specific to heritage organisations, which anthropology museum curator Nick Thomas has called 'museum as method'. This term describes the kinds of everyday research that museum and gallery staff undertake, for example to understand potential new acquisitions, to catalogue existing collections more precisely, to conceive exhibition schemas and to furnish the text that will feature; or to understand the motivation and enjoyment of visitors or enhance it via new interventions, including harnessing the power of digital media; or, again, to conserve museum objects in the most sympathetic and sustainable ways.

All these and more have been investigated under funded research projects over the last decade and a half.

The new 'Towards a National Collection' funding comes from United Kingdom Research and Innovation (UKRI, the new umbrella organisation for the UK Research Councils) under its Strategic Priorities Fund, and it will be administered by AHRC. It may be seen as having arisen from a convergence of the success of the styles of research described above, and a quite different initiative, promoted by UKRI, looking into the 'research infrastructure' of the nation. Arguing that advanced economies rely on research and innovation, UKRI is keen to invest in the infrastructure that enables such research to take place. In physics, research might require the infrastructure of particle accelerators or distributed radio telescopes and, in social science, huge data repositories may be needed.

But in arts and humanities (into which heritage sector research most closely fits), it is collections that are the infrastructure. 'Infrastructure' may seem a rather prosaic and unlovely term to describe priceless oil-paintings, intriguing personal archives and unique scientific artefacts but, all the same, it is true that collections of such objects are the basis on which humanities scholarship rests. Libraries and archives, and now increasingly pictures and objects, are seen as the basis for research, whether that is conducted in universities, in museums, or by laypeople for self-fulfilment and fun. The 'Towards a National Collection' funding will support a first round of foundational projects that will demonstrate how digital techniques can link the collections of heritage organisations of all scales and kinds.

Then, in 2020, IROs working in consortia with universities and other partners will be encouraged to develop substantial 'discovery' projects that will demonstrate the new kinds of research and engagement that will be achievable once it is possible to work across collections, rather than being constrained by the silos of individual institutions.

The Science Museum Group has already been discovering the benefits of working across collections in a similar way, as readers of this Report will see, for example in Tilly Blyth's account of the 'Art of Innovation' project, which brought together objects and expertise from across the group and also from our network of colleagues and friends in the universities, heritage sector and beyond.

In our second Research Annual Report, I suggested that our 2016 inaugural Science Museum Group Research Conference was, like a railway terminus, a point of arrival from our research journey up until then, and a point of departure for our future ambitions. It seems now that the 'Towards a National Collection' funding is another such terminus, from which the outward voyage will carry us towards really significant outcomes. It's going to be an exciting journey.

THE SCIENCE MUSEUM AND THE SCIENCE MUSEUM GROUP

Since our first Report, we have featured research initiatives across the Science Museum Group and, as the volume of this work has expanded, there has been more to say about each of our sites; as the National Collections Centre in Wroughton and Locomotion in County Durham grow in status and activity in the next few years, there will be research initiatives there to report upon too. In the midst of this, it makes sense to make space in this Report for the developing research culture at each site; hence the other entries in this section passing a searchlight over each of the Science Museum Group museums and departments.

As for the Science Museum, London, 2019 has been something of an *annus mirabilis*, with several major displays opening for public engagement and enjoyment: *Medicine: The Wellcome Galleries*, *Science City, 1550–1800: The Linbury Gallery*, *Top Secret: From Ciphers to Cyber-Security* and the multimedia *Art of Innovation: From Enlightenment to Dark Matter* project. These all rest on the academic training and research of our staff, some of it in the 'museum as method' mode, and some of it following the procedures of the more academic mode more commonly seen in the universities. Alongside these kinds of research that are already visible in the galleries of the museum, there is always a significant research effort that will show itself in years to come. As Sally MacDonald mentioned in her Foreword last year, the Research Strategy commits us to supporting our colleagues across many teams to develop their research potential, and we have very recently held a Research Skills Autumn School to begin to deliver that. She also mentioned that

we want to build our research networks to support a wide range of grant applications and other collaborations. Research funding enables us to pursue more open-ended possibilities, looking beyond the immediate openings, some in the expectation that new displays will result, and others simply for the sake of gaining better understanding. The 'Time, Culture and Identity' project, for example, contributes to an existing strand of work, reported last year, that develops our understanding of Chinese science and technology at the same time as it builds connections with colleagues in China itself.

'Communicating the Material Culture of Energy' has enabled us to build a network of scholars, science communicators and energy-sector experts; we will be able to draw on these contacts as we develop our next public responses to the subject of climate change. It would be easy to lose sight, in the midst of the



LEFT: Visitors attending Top Secret Agency, a family event where visitors undertook 'training activities' to become a Museum Intelligence Officer and join the Top Secret Agency. Pictured, 'Can you Crack the code?' (puzzle sheets)

substantial research projects that are detailed in the other sections of this Report, of the ongoing work that fuels the SMG research enterprise. Across the year, in overlapping cycles, we welcome Masters students for a term of insight into how science museums work; we promote, shortlist, award, recruit to and supervise doctoral studentships across our extended consortium; we work with colleagues to submit funding bids; we solicit, referee, finalise and publish up to two dozen articles for the *Science Museum Group Journal*; and we run a sequence of conferences and workshops across our sites.

Meanwhile, colleagues develop their scholarly understanding of many subjects linked to our collections, some of them registered for postgraduate degrees as they proceed. Innovation is a core value for us, as we seek to live up to the aim articulated in our Research Strategy:

to become the world's most research-informed science museum group. Next year we will have more, and novel, initiatives to report.

If you would like to join in with SMG's research enterprise at any of our sites, we are always happy to discuss potential research projects and funding applications with colleagues and researchers from other organisations, including universities. Indeed, such discussions and the funding applications that result comprise a significant part of the Research and Public History Department's activity.

Please see 'opportunities to study and work with us' if you would like to join in with our growing research enterprise. Please e-mail research@sciencemuseum.ac.uk to join our mailing list and to hear about our events and initiatives.

NATIONAL SCIENCE AND MEDIA MUSEUM RESEARCH HIGHLIGHTS

GEOFF BELKNAP

Head Curator, National Science and Media Museum

Research is at the heart of everything we do at the National Science and Media Museum, from developing and better understanding our collections to designing new collaborative grant projects to creating new collections-focused exhibitions. The strength of our collections and in-house research knowledge has been on display through two exhibitions in particular: *Hello Universe*, which uncovered the sights and sounds of space from objects across the SMG collection, to *The Forgotten Showman: How Robert Paul Invented British Cinema*, which showcased some of the gems from our film collection.

Our major collaborative project – Bradford’s National Museum, funded by the Arts and Humanities Research Council, AHRC – has been transforming the museum by helping us engage with new communities and tell new stories on gallery. We are currently in year two of a three-year exploration of how the museum can become more open to, engaged with and better connected with Bradford. This collaboration resulted in a ground-breaking co-curated exhibition called *Above the Noise: 15 Stories from Bradford* which worked with different communities in Bradford to supply the narrative of how they have used image and sound technologies to bypass mainstream media and tell their own story about the place in which they live.

We were successful this year in a new grant bid for a project titled ‘Responsive Interpretive Storytelling project’ from the Creative Industries Cluster. National Science and Media Museum represents the museum and heritage sector as a partner in the £15 million *XR Stories* Creative Industries Cluster, investing in Yorkshire as a centre for world-leading, innovative digital storytelling. The Responsive Interpretive Storytelling project has been developed to answer the first call from *XR Stories*, for funding applications from R&D collaborations between regional SMEs, academic researchers and cultural organisations.

This particular project, led by Annie Jamieson, Curator of Sound Technologies, will combine for the first time two established technologies – a ‘ColliderCase’, which allows the projection of digital content onto cased objects to create innovative interpretation without detracting or distracting from the object itself, and ‘The Cutting Room’ object-based media tool, which allows for the development of content in response to an individual’s circumstances, preferences and devices. Working with Bright White Ltd and DC Labs, at the University of York, we will create an exhibit which will display an iconic object from National Science and Media Museum’s collections – the Marconi/BBC AXBT ribbon microphone, c. 1944 – in a new

way, to create an engaging and surprising interactive to delight and inspire visitors to our forthcoming *Shape of Sound* exhibition (April 2020 – January 2021).

We are also awaiting the results of two funding applications. The first is called ‘Sonic Futures: Collecting, Curating and Engaging with Sound at the National Science and Media Museum’. This is a project submitted by Annie Jamison (Co-I) and James Mansell (PI) of the University of Nottingham for an AHRC Follow-on Funding bid which will deliver an interactive public engagement programme designed to involve audiences in the creation of new approaches to curating sound technologies at National Science and Media Museum.

The second project builds on the successful ADAPT project which explored the history of TV production. The bid was submitted by Helen Langwick, Head of Exhibitions and Interpretation, and John Ellis from Royal Holloway University to explore the use of Augmented Reality (AR) and Virtual Reality (VR) technology as an interpretive technique in exhibition and gallery development.

We have welcomed two new collaborative doctoral students through the Science Museum and Archives Consortium (SMAC) scheme. Francesca Strobino is working on

‘Investigating Talbot’s Experiments in Photomechanical Printing’, which is a partnership between the National Science and Media Museum and De Montfort University to explore the history of W H F Talbot’s interest in photomechanical printing. Jayne Knight is doing her PhD in partnership with the University of Brighton and NSMM on a project entitled ‘A Museum within the Museum: The Kodak collection at National Science and Media Museum’. The project investigates the history of the Kodak collection as a key to understanding and displaying the vernacular use of photography in the 20th century. Edd Wilson-Stephens, who successfully transferred to the second year of his PhD programme on the SMAC scheme, has been going from strength to strength. He spent five weeks in North America this year visiting sound-related collections and exhibitions at museum and galleries, including the Exploratorium in San Francisco, and NAMM in Anaheim, the world’s largest trade-only event for the music products, pro audio and event tech industry. He also spent time with Communications Curator Tom Everrett, at the Canada Science and Technology Museum in Ottawa, learning about the design and operation of their dedicated sound gallery.

One of the biggest research projects for the curatorial team this year has

LEFT:

This is the last extant camera used by Francis Griffiths and Elsie Wright around the time of the Cottingley Fairies. It is a Folding plate ‘Cameo’ camera. This camera was given to Frances by Edward Gardiner and Arthur Conan Doyle in 1920, around the time that they took their fifth and final photograph of fairies in their back garden in Cottingley, Yorkshire

BELOW:

Visitors get a chance to interact with the animation collections in the Insight Collections Centre at the National Science and Media Museum during British Science Week



been continuing to develop the content for two new permanent galleries which tell the integrated histories of sound and image technologies. These exciting new galleries will uncover how photography, film, television and sound technologies shape how we hear and see the world. These new galleries – which we plan to open in 2022 – will focus on three pillars: to tell authentic stories through our historical collections; incorporate interpretation which focuses on how our technologies were made and used; and to collaborate with different people and communities to make more impactful and relevant galleries.

The curatorial team has continued an active year of research publication and engagement, too. Members of the team contributed stories on Anna Atkins,

Edward Muybridge, and polaroid to the Science Museum Group *Art of Innovation* programme; we hosted the first curatorial organised Lates evening at the museum – focused on sound technologies called ‘Good Vibrations’; and we attended international conferences and presented work from the collections in Los Angeles, New Haven, Copenhagen and London.

This year Geoff Belknap published an article on scientific illustration in *Nature* and Elinor Groom published a chapter on the history of the Bush TV 22 in the edited volume *Hands on Media History*. We look forward to continuing to embed a strong research culture at the museum as we develop our collections, galleries, exhibitions and public programmes.

NATIONAL RAILWAY MUSEUM RESEARCH HIGHLIGHTS

ED BARTHOLOMEW

Senior Curator, National Railway Museum

OLIVER BETTS

Research Fellow, National Railway Museum

Over the last year, as Masterplan has increasingly come to govern the museum's priorities, research has continued to play a critical, developing, role. We've welcomed a growing number of researchers to our Archives and Stores, hosted new academic events and begun fruitful collaborations, as staff and volunteers have continued to build their skills as researchers and story-tellers.

One of the great joys of working with railway history is the sheer variety that it brings. Staff have been involved in research projects that span from Bob Gwynne's work on railways and computers from the early 20th century to the 1980s, to Anthony Coulls's publication on road traction steam engines. One of the most exciting research collaborations is with the Friends of the National Railway Museum. Angélique Bonamy, Film and Sound Curator, has been working with Frank Paterson, president of the Friends of the National Railway Museum, and his volunteers to create the *British Railways All Change* oral history archive. Charting the complexity of railway privatisation,

this project is also helping us to understand the deeper context of new aspects of the collection, including the newly arrived High Speed Train power car and Pacer train. Working in partnership with academics at the York Management School, BRAC is revitalising the museum's already outstanding collection of oral history recordings by bringing the story up to date.

With Thomas Spain and Andrew McLean leading research into the Great Hall redesign and Karen Baker researching the Station Hall development, we are looking again at nearly every aspect of the collection. This has meant working on challenging new stories and collecting ideas; something touched upon in the recent *Mobility of Things* conference hosted at the museum. Both projects aim to weave together the human and the technological stories of railways, and new directions of research have included meeting the family of the first female train driver, Karen Harrison; thinking anew about the railway mania that swept Britain in the 1840s; and

re-examining the collection of bravery awards that tells a complicated story of risk, danger and industrial heroism among railway workers.

Just as Britain's railways spread around the world, so too have our international connections come back to York this year. Leena Lindell, our Associate Archivist, has completed the cataloguing of the Kenneth Cantlie archive. Cantlie, a railwayman with a career spanning more than fifty years, travelled the globe for his work and had a special relationship with China's tumultuous 20th-century. At the time of writing we are hoping this will translate into a collaborative PhD working with China specialists at the University of York. This archiving has also generated an article, published in the *Journal of Transport History* by Oliver Betts and Thomas Spain, and helped contribute to the museum's *One Billion Journeys* exhibition of Chinese railway photography. We have also welcomed researchers from Egypt, Uganda, the United States and, perhaps most importantly, our friends from the Sierra Leone Railway Museum.



LEFT:

Worker in the Great Northern Railway's mineral audit office at Doncaster, January 1916

RIGHT:

Inter-City 125 train on display at the National Railway Museum



PHD STUDENTS:

Amanda Stevens is now approaching the end of her PhD and has been working with STEAM Museum in Swindon and the National Railway Museum archive staff to understand the layouts of the railway carriage kitchens that changed the face of passenger experience in the early 20th century. Much of her work has involved getting to grips with the underloved small object collections in the museum, from knives and forks through to fabric samples for seats and curtains.

Sophie Vohra has been conducting interviews and uncovering new archival material relating to both previous and upcoming commemorations of the Stockton and Darlington Railway. She has been an active presence in organising conferences, and presenting papers, at the museum, the University of York, and further afield in Germany as part of the York-Bielefeld-Lund collaboration.

Ciaran Johnson has been continuing his research on Britain's Upland

Railways with field trips and archival research in and around the Dartmoor area. He has also been working with other academics interested in technological and infrastructure developments in rural areas of Britain.

Johanna Rustler started her PhD on Britain's Railways in the First World War in spring this year. As a social and military historian, she began by examining the changing role of railway stations, railway factories and their staff during the war. In September, she presented her first findings at the International Association for Railway History conference in Cluj-Napoca, Romania, where it was well-received.

New acquisitions for the National Railway Museum collection offer significant potential for research projects. For example, the Leonard Raisbeck archive was created by a key figure in lobbying for a transport link between the Durham coalfields and the towns of Darlington and Stockton.

As a local landowner and lawyer, Raisbeck was hugely influential in bringing the Stockton and Darlington Railway to the region in 1825. His

extensive archive of letters, memos, legal indentures and accounts, covering over sixty years, sheds a light on the difficulties of bringing the line to fruition and offers new insights into the dawn of the coming of the railway.

Finally, this has been a year of academic outreach for the museum. Most recently we've received the news that the next phase of our Railway Cultures collaboration with the University of Sheffield has been funded. *Archive to AR Immersive Storytelling* builds on museum expertise in telling the stories of railways past by rendering these as digital, engaging adventures in collaboration with Sheffield based ICT company HIVE and creative writers from the university. The *Piston, Pen, and Press* project held a conference in June 2019 in Tampere – 'Finland's Manchester' – on industrial heritage. Museum staff have also presented papers at numerous conferences and workshops, including the T2M annual conference on Transport, Traffic & Mobility, held in October 2019 in Paris, where heritage was one of the major themes.

SCIENCE AND INDUSTRY MUSEUM RESEARCH HIGHLIGHTS

GEORGINA YOUNG

Head of Collections & Exhibitions, Science and Industry Museum

The Science and Industry Museum's involvement in interdisciplinary research and practice has deepened across the past year. Our focus on digital possibilities – and on art and science in combination – was given form and purpose through the co-commissioning of Rafael Lozano-Hemmer's *Atmospheric Memory* for Manchester International Festival 2019. This landmark work brought us closer to potential research partners and demonstrated the potential of the Science and Industry Museum and the Science Museum Group collection to enrich and contextualise projects exploring this new territory. In parallel, the museum and the University of Salford Studio for International Media and Technology secured support from the North West Consortium Doctoral Training Partnership for a project titled *Developing Methodologies of Play: Curating Digital Interactive Content and Experience for a Science Museum*, recently taken up by Christina Buckingham. Meanwhile, on gallery, Luke Harrison of the University of Salford School of Arts and Media experimented with rapid prototyping of soundscapes for heritage spaces as a prelude to future gallery development in our 1830 Passenger Station.

The museum has also grown into its role as research convenor this year, not least as host venue for the 2019 Science Museum Group Research

Conference. The Manchester site, collections and research community also provided food for thought for the *Science Museum Group Journal* Editorial Board, stimulus for the Photographic Collections Network as they explored the interpretation of photographic collections, and a platform and case study for the *Energy and Public Communication Conference* organised by Dr Hiroki Shin (Science Museum of London and Birkbeck College) and Dr Heather Chappells (University of British Columbia) as part of the *Communicating Material Cultures of Energy* network.

A new openness about our process – in line with Science Museum Group's collections engagement ambition – has led to improved collections awareness and new research potentials. One example of this shift was Archivist Jan Shearsmith's blog, *Can you help us with a spectacular collections find?*, which detailed – and posed questions about – a set of four early Victorian textiles swatch books produced by Williamson Brothers of Manchester for international markets. The blog was picked up internationally and received a strong and informed response, improving our catalogue and building renewed research interest in our textiles industry collections. Commerce, trade and global reach are embedded in these exceptional collections and remain areas in which

we are keen to support and initiate further research. Our collaborative doctoral researchers have continued to dive deep into the collections, whether it be the interdisciplinary, situated approach to computing and calculating objects taken by Charlie Southerton (*Transitions in the technologies and practices of office work: Manchester's administrative industries 1960–2017*) or Francesca Elliott (*Power-assisted learning? Exhibiting, interpreting and teaching on technology in the twentieth century industrial city*) reconstructing object biographies for engines located in the Power Hall and securing a prestigious Smithsonian Fellowship to expand her thesis by bringing in international parallels. Both research projects are intrinsically and strategically linked with planned gallery developments proposed under the Science and Industry Museum's *Revolution Manchester* vision, City of Ideas and the Power Hall, respectively.

The Science and Industry Museum team's research outputs have included contributions to the *Science Museum Group Journal* (*From 2D to 3D: the story of graphene in objects*, Sarah Baines, Issue 10, autumn 2018) and the *Art of Innovation: from Enlightenment to Dark Matter* exhibition, publication and radio series. Conference papers and public engagement activities ranged from Jan Hicks on *The Hybrid Record Keeper* at Archives and Records Association UK

annual conference to collaborative doctoral researcher Erin Beeston telling a story of archive discovery at Manchester Museum's annual *European Researchers* Night event.

Over this past year we have shared in the successes, but also the sadness, of our research collaborators and inspirations. With the death of Jeff Hughes, a leading figure in the international history of science and technology community and close colleague in the Centre for History of Science Technology and Medicine at the University of Manchester, the museum lost an important friend and ally. With the death of Rev Dr Richard Hills, the founding curator of the Science and Industry Museum (then the North Western Museum of Science and Industry), we lost an industrial heritage expert and repository of museum history. As we look ahead to the next phase of the Science and Industry Museum's research journey, we pay our respects to all those who have helped us travel so far.

RIGHT:

Archivist Jan Shearsmith retrieves/
examines textile swatch books
Photo Science Museum Group/
Drew Forsyth



LEARNING AND AUDIENCE RESEARCH

KAREN DAVIES

Head of Learning Research and Resources, Science Museum

JANE RAYNER

Audience Research Manager, Science Museum

The Science Museum Group Learning department continues to be involved in a number of research projects across the Group and externally. Academic research partnerships continue through *Move2Learn* in partnership with UCL and the Horizon 2020 European Union Funding for Research & Innovation Project *COMnPLAY*, and this year the Audience Research team are contributing to a greater understanding of the impact of community participation at the National Science and Media Museum through the AHRC-funded *Bradford's National Museum* project in partnership with Leeds University.

Learning research continues to develop under the umbrella of the expanded Science Academy. This year we have focused on getting Science Capital research into practice within Science Museum Group and externally through CPD for teachers, a collaboration with ASDC *Science Capital in Practice* and through professional development for Science communicators such as the Horizon 2020 European Union Funding for Research & Innovation POLKA project.

Finally, over 20 years of our own practitioner research into audience experience of digital interpretation and digital interactive exhibits has been collated ready for dissemination in collaboration our colleagues in the Digital Media department. This unique

and comprehensive insight into everything we have learned about the use of digital technology in museum learning is unparalleled and will be invaluable to our exhibition developers present and future as well as our many partners across the sector. You can read more about that in the Digital Research article in this report.

MOVE2LEARN

The Move2Learn project is a three-year international academic researcher-museum practitioner collaborative project. It is exploring how the rich sensorimotor experiences which children can have through interactions with exhibits help them to develop improved science understanding in the early years. It is funded by Wellcome, Economic and Social Research Council and National Science Foundation, and involves academics and museum/science centre practitioners from the UK and US. The Science Museum, London is one of the research sites in the UK.

In this second year of the project we are examining how findings from the initial work could be applied in the context of young children's interactive experiences in the Science Museum's *The Garden* gallery. *The Garden* is a hands-on space created for children under the age of six. The researchers have been inviting children to talk about their everyday experiences with

water, before and after they visit *The Garden's* interactive water experience. They have also been observing how children interact with the water table so that they can see how this experience might support the way young children think and communicate about water.

Drawing on the design guidelines which have emerged from the work so far, the researchers – in consultation with Science Museum staff – are identifying objects with different sensorimotor properties for engaging with the water table.

Objects relating to pumps and the movement of water; objects relating to damming and water flow; and objects relating to waterwheels and highlighting the role of blades in the mechanism of the wheel have been selected for testing.

Over the next few months the research team will be introducing children to these objects and exploring how different sensorimotor experiences influence children's abilities to think and communicate about these phenomena. In particular we will be exploring how different objects might foster and shape children's gestural communication around science, providing insight into their underlying models of understanding.

Based on this stage of the research we aim to develop more refined guidelines

of how the findings from our research can inform exhibit design in science museum settings, provide guidance for facilitator interaction, and demonstrate how gesture can be used to get a better understanding of how children process their museum experiences.

The project aims to contribute both to learning theory and the practical and intentional design of science exhibits that will engage our youngest museum visitors in science concept development.

Another outcome of the project will be a new practitioner/researcher interaction model to strengthen future collaborations between informal learning practitioners and academic researchers.

ABOVE:
Science Capital in
Practice programme
Training Academy



MOVE2LEARN PHD RESEARCH PROJECT

Minna Orvokki Nygren, PhD researcher on the *Move2Learn* project, and Professor Sara Price have studied how we may design playful digital whole body interaction environments for young children's meaning making about the physics of sound.

As part of her work Minna has developed an audio-visual movement-based prototype installation called EPESonic ('Engagement Platform for Embodiment'), with which she studies different aspects of body-based interaction and science learning.

In EPESonic, children interact with different aspects of sound through their movements. Over the past summer 2019, Minna conducted two co-design workshops at the Science Museum and at the National Science and Media Museum.

Over 20 members of staff from a number of departments participated in these interactive workshops to exchange ideas about what is valuable in designing for movement-based digital interaction environments and science learning. Over the course of the next year, Minna will develop the EPESonic platform further and is planning to tour it at science-themed public events to engage new audiences in embodied science learning research.

COMnPLAY

The *COMnPLAY SCIENCE* project aims to help Europe better understand the new ways in which non-formal and informal science learning is taking place through various coding, making and play activities that young Europeans are increasingly engaged with, outside school and higher education science classrooms, beyond the formal boundaries of science education.

Our role in the project is to advise on the practice of informal science activity. During the course of the project many varied examples of informal and non-formal practice will have been studied to understand how they contribute to the development of a science identity in young people. Once established, we will use this research to inform our own best practice and to underline the importance of these types of activities in young people feeling that science is for them. Creative playful science-based activities it seems are key.

More detail on the project and all the partners can be found on the dedicated website
<https://comnplayscience.eu/>



LEFT:
The Garden is an interactive gallery created especially for our very youngest visitors, an ideal place for 3–6 year olds to discover science by playing in an exciting, multi-sensory environment

SCIENCE CAPITAL IN PRACTICE

This programme is a collaboration between the Science Museum Group and the UK Association for Science and Discovery Centres. We are working with 15 science centres and museums from across the UK to help increase diversity and inclusion in science by applying a science capital research-informed approach.

The Science Museum Group’s strategic ambition is to build science capital in individuals and society. We know that ‘growing science capital in individuals and society’ can’t be achieved by one organisation alone; it requires support and adoption from the wider informal science learning sector which is why this programme is so significant.

The science centres/museums involved are:

1. Aberdeen Science Centre
2. Dundee Science Centre
3. Glasgow Science Centre
4. Eden Project, Cornwall
5. Royal Botanic Gardens Kew, London
6. International Centre for Life, Newcastle
7. National Coal Mining Museum, Wakefield
8. Catalyst Science Discovery Centre, Widnes
9. Cambridge Science Centre
10. Oxford University Museum of Natural History
11. Science Oxford
12. Thinktank (Birmingham Museums Trust)
13. Woolsthorpe Manor, Lincolnshire
14. Winchester Science Centre
15. Techniquet Glyndŵr, Wrexham, North Wales

Each organisation received a grant, training, mentoring support and additional resources to allow them to apply the concept of ‘science capital’ to their STEM engagement activities, and to incorporate this learning more broadly into their organisation.

In June, we kicked off our ‘Science Capital in Practice’ programme with a two-day training academy at the Science Museum led by the Academy team. It included input from Professor Louise Archer from UCL, who was updating on the latest science capital research and sharing her new Informal Science Learning Equity framework with participants, and Dr Heather King from King’s College London.

The primary aim of the programme is to help build a community of good practice, and we’re excited to see how everyone’s programmes grow and develop. Over the next 18 months we will be in regular contact with everyone and will be following, and sharing, their journeys through evaluation of the project. The Transforming Practice blog ‘Science Capital in Practice’ series shares updates on the progress of organisations involved in the programme. We look forward to sharing more about these projects at a national seminar in Spring 2021.

POLKA PROJECT AND PUBLIC ENGAGEMENT

The Science Museum Group are associate partners in a European-wide Horizon 2020 European Union Funding for Research & Innovation project called POLKA (POLlution Know-how and Abatement) co-ordinated by Keele University (<https://polka-eu.org/>). We are responsible for supporting the early career researchers with the public-facing elements of the project.

This European-wide project’s mission is to develop hydrogen combustion technologies (for example, hydrogen boilers, hydrogen-powered cars) for pollution-reduction, with academic and industrial collaboration, while also training scientists of the future. Combustion of hydrogen from renewable sources is an emerging technology that can replace fossil fuels and so provide carbon-neutral energy.

Given the sustained interest in and controversial discussion of the prospects of hydrogen, the project team are keen to be engaging the public with their work. The Science Museum’s Academy team will be delivering public engagement training for the early career researchers on the programme. Involving the public in research can have a wide range of benefits: for the researchers; the organisation employing them; the public; and society more widely. Some argue that if research is publicly funded, society has a right to shape research agendas and be involved in decisions about how discoveries are used. In the case of young people, public engagement is an effective way of stimulating interest in a subject and encouraging young people to consider research careers. This benefits the individual students, and society as a whole, as young people are encouraged to become more skilled and engaged citizens.

So one of the important ways the Science Museum Group can help support scientific research projects is to share our know-how in engaging the public with STEM through science capital-based research, our own audience research insights and wider education research.

ARCHIVES: ACQUISITIONS AND RESEARCH

NICK WYATT

Head of Library and Archives, Science Museum

The process of acquiring, appraising, arranging and cataloguing archives can involve significant research before a collection is made available for use. In order to properly describe collections and their significance, archivists must learn about the lives, activities or organisational history of their creators or collectors. They must uncover their legal ownership, their intellectual property rights (which can be complex for companies that have been dissolved or taken over), or whether there are issues around confidentiality or other access restrictions. This report focuses on Science Museum archive acquisitions and the impact of the Blythe House clearance.

The formal acquisition process can take several months to complete. Our Archive Collections Manager, Beata Bradford, manages this for new acquisitions. The following archives completed this process this year and are now available for use.

1. John Milne papers relating to seismology, transferred from the Library's Milne Collection, including photographs showing the impact of earthquakes (MILN).
2. Manuscript paint recipe book used in the Paint Works at Haltwhistle in Northumberland. This contains around 100 recipes for different paints, specifying ingredients and quantities required for their preparation (MS/1936).

3. Collection of documents relating to the Portsmouth to Admiralty semaphore line designed by Captain Sir Home Riggs Popham, Royal Navy commander and scientist, circa 1811 (MS/1937).
4. Collection of documents relating to the 1925 Schneider Trophy Race, which was designed to foster the development of commercial seaplanes. This complements our existing archive and object collections (MS/1942).
5. Several memorabilia albums for the *SS Arandora Star's* voyage to the West Indies, 1930 (MS/0744); *SS Alcantara's* voyage to South America, 1936 (MS/0745); *RMS Alcantara's* voyage to South America, 1936 (MS/0746); and, Union-Castle line cruise to South Africa, outward on *RMMV Winchester Castle*, and return on *MV Carnarvon Castle*, 1931–1932 (MS/0747).
6. Collection of documents relating to Arthur John Bohringer, automobile engineer and designer, dating from 1918–1927 (MS/2199). One surprise within this collection are designs for the London Marionette Theatre!

This year the museum received the final batches of the Geoffrey Perry Archive relating to operation of the Kettering Group (KET). Its origins date from 1960, when schoolteachers Geoffrey Perry and Derek Slater incorporated practical satellite tracking exercises that focused on Soviet satellites into their science lessons at Kettering Grammar School.

Most of Beata Bradford's cataloguing time this year was spent on processing this collection and there are now around 400 records on Adlib, about a third of the collection, with just a small proportion published online; the rest are still being edited. Progress was slower than expected, mostly because the papers needed to be cleaned and rehoused, which takes a very long time. Despite this, the archive was extensively used by Doug Millard, who presented a paper based on the collection at the 70th International Astronautical Congress in Washington DC. The clearance of Blythe House has released a significant quantity of material, some of which is being accessioned formally as part of the archive collection. In many cases legal title had not passed to the museum so ownership has had to be confirmed. Our Assistant Archivist, Jack Garside, has been managing their formal acquisition. The following archives have at least a collection-level description on the catalogue.

1. Photo album entitled 'A Souvenir from Ludham: Dan England (Millwright) & His Shop'. These show this Norfolk workshop around Christmas 1932 (MS/1940).
2. Accounts between Coates & Wright of Ingleton and Peel, Williams & Peel of Manchester regarding the purchase of two steam engines (MS/1941).



LEFT:
Autograph letter
from Otto Lilienthal
to T J Bennett,
dated 4 March 1895

3. Letter from Otto Lilienthal to T J Bennett and 20 contemporary photographs, concerning early flying machines, 1890–1900 (MS/1943).
4. Various contracts and agreements relating to London Docks, 1884–1907 (MS/2201).
5. Papers of Henry Joseph Round, concerning radio direction finding and ultrasonic anti-fouling, 1919–1966 (MS/2202).
6. Lourdes-Cresswell Collection of Tramway Photographs showing trams in Southampton from 1898–1949 (MS/2204).
7. Technical material collected by John Edward Kingsbury relating to the development of telephone equipment, 1879–1932 (MS/2205).
8. Photograph album entitled 'Some Examples of Engineering and Architectural Works' produced by the consultant engineering and architectural firm C.W. Glover and Partners, 1927–1944 (MS/2206).
9. Collection of Research Reports and Studies Produced by Elliott Brothers (London) and Elliott Automation, 1950–1970 relating to computers, radar and other electronic systems (ELLREP).
10. Papers of the General Electric Illumination Group, 1925–1990, including work on street-lighting (GECIG).
11. Collection of General Electric Company Hirst Research Centre Research Reports, 1937–1965, including the development of radar equipment (GECHRC).
12. The Whitcombe Collection of Tramway Photographs, 1880–1943 (HAW) showing trams and tramways and other forms of public transport.
13. Collection of Mullard Limited Reports Relating to Semiconductors, 1954–1964 (MUL).
14. Farnborough Archive brought together by the Royal Aircraft Establishment's museum relating to its history, 1904–1994. This very large collection, in 292 boxes, is not catalogued (FARN).
15. Papers of Mervyn O'Gorman, 1890–1958, relating to aviation and motoring, not catalogued (OGOR).

The Blythe House clearance also yielded papers collected by former curators for their own research. These will remain un-accessioned collections known as the Curatorial Research Papers. They are not catalogued on Adlib, but are described in the collections database, Mimsy. Cate Watson, Library and Archives Collections Assistant has sorted and described 63 such collections covering many subjects. Some were associated with the former Wellcome Historical Medical Museum and can complement the new Medical Galleries.

Examples include:

1. Personal research notes such as the collection of botanical research notes and papers from the late 19th century to the early 20th century (SCM/100/0006).
2. Dr David Hooper's manuscript notebooks on botanical drugs from around the world 1930s–1940s (SCM/100/0007). Hooper was curator in the Indian Museum, Calcutta, and economic botanist to the Botanical Survey of India.
3. Newspaper cuttings and journal articles from the 1960s–1970s, on medical education in Britain and overseas (SCM/100/0008), addiction and toxicology (SCM/100/0023), population (SCM/100/0030), and preventative medicine (SCM/100/0031).
4. History of medicine collections such as Biblical Medicine (SCM/100/0036) and Ancient Egyptian medicine (SCM/100/0035).
5. A very extensive collection on medical biographies comprised of articles, research notes and press cuttings from 1900s–1970s (SCM/100/0018).

RARE BOOKS AND THEIR PROVENANCE

NICK WYATT

Head of Library and Archives, Science Museum

The provenance of rare books in the Science Museum Library has received greater attention as we seek to understand the life-histories of individual copies and their acquisition by the Library or its predecessors. Careful research can reveal interesting histories as we trace former owners by examining bookplates, book stamps, annotations, booksellers' labels and sale catalogues. Rarely do we discover their full history and usually we are left with just snapshots, but these can provide useful clues to how they were once collected and used through sometimes turbulent times.

Many of these books came from the Museum of Practical Geology, established as the Museum of Economic Geology in 1837. Some had been donated by the geologist Sir Henry de la Beche, its first director, including Charles Lyell's *Principles of Geology* (London, 1830–33), given to him by the author. His copy of *De la Richesse Minérale* by Antoine-Marie Héron de Villefosse (1774–1852) published in Paris in 1819, contains his armorial bookplate (pictured), the book stamp of the Museum of Economic Geology (received 21 January 1843) and the bookplate of the Library, Museum of Practical Geology.

Lorenzo Ventura's alchemical book *De Ratione Conficiendi Lapidis Philosophici* (Basel, 1571) was once in the monastery library of Weissenau Abbey in Germany, which was broken up in 1802–3. It next

appears in London, where it was sold sometime after 1838 by the bookseller Hippolyte Bailliere, possibly to the Museum of Economic Geology. This copy is notable for its annotations.

The Library's copy of the catalogue of the Museum of Practical Geology Library is marked up to indicate which books were to be transferred to the Science Library and, for some, the date this happened. There is also a catalogue for the South Kensington Museum's Educational Library, which is marked up in a similar way. Its books contain the stamp of the Educational Museum. One example, *The Newtonian System of Philosophy... being a Series of Six Lectures Read to the Lilliputian Society* by Tom Telescope (London, 1787), is now on display in *Science City*. Another example is a bound set of catalogues of the first to fourth national industrial exhibitions in Paris. The first of these, *Exposition Publique des Produits de l'Industrie Française, Catalogue des Produits Industriels ...* (Paris, 1798) is signed by 'M. Digby Wyatt, 1849' with an inscription 'To the Library, South Kensington from M. Digby Wyatt. Catalogue of the first French exhibition, of the very utmost rarity as I could never find another ...'. Wyatt was an architect and art historian and Secretary to the Great Exhibition of 1851.

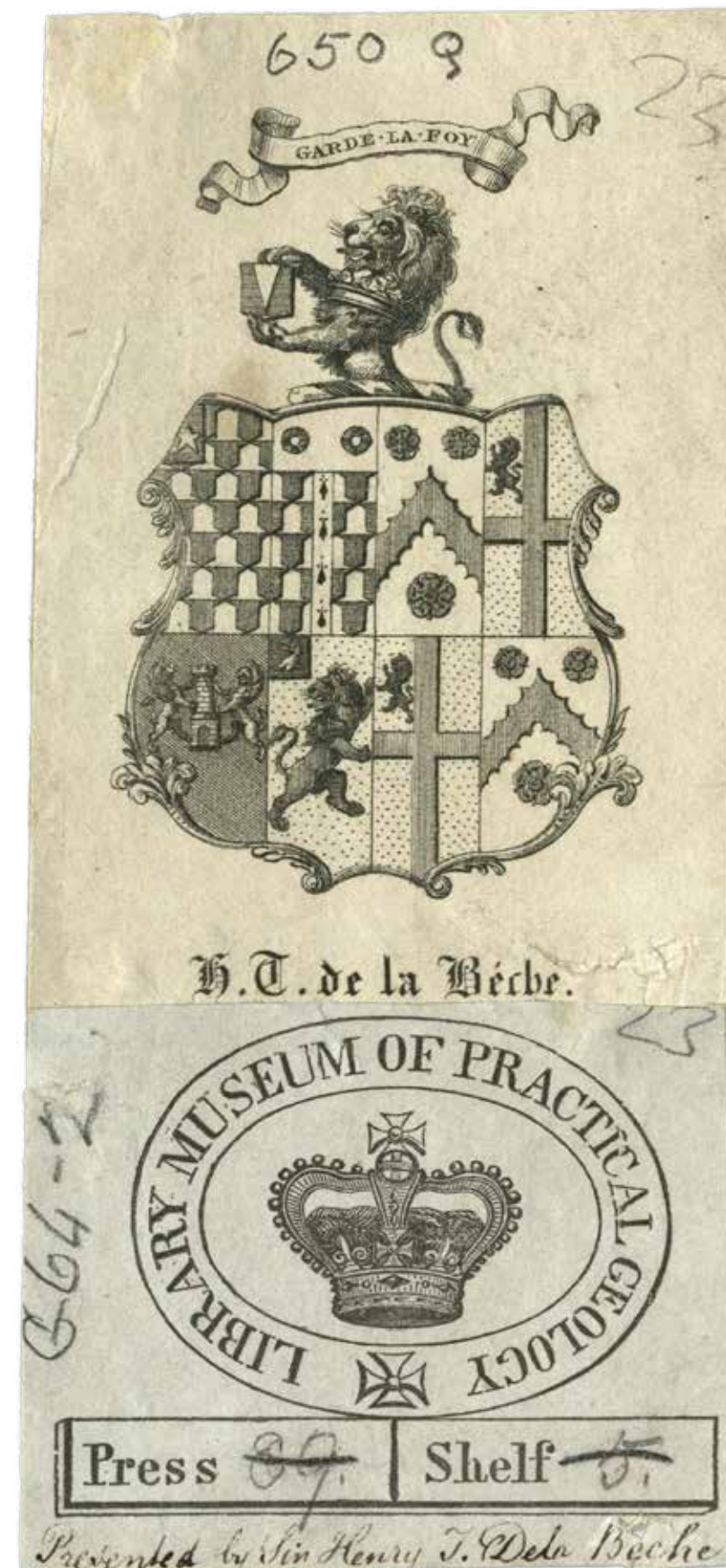
In 2019, Kevin Tracey gained his doctorate based on his survey, research and interpretation of the

library's early mathematical books. He found extensive evidence of previous ownership and of the use of these copies. He was able to trace the library's collecting behaviour over the years, including the purchase of books from Sion College Library in 1938. Several of these had been previously owned by Nathaniel Torporley (1564–1632), Anglican clergyman, mathematician and astrologer.

Sometimes books were acquired together with objects and in 1951 the museum purchased 55 books from the estate of Thomas H Court, a historian and collector of scientific instruments, two of which are now on display in *Science City*. Another major purchase took place between 1978–81, when the library received a special grant from HMSO, its purchasing agent, to bid for over 120 books from Robert Honeyman's collection being auctioned by Sotheby's. This added many significant books by Nicolaus Copernicus, Galileo Galilei, Johannes Kepler, William Harvey and others.

The evidence of previous owners can so often be lost when books are rebound or damaged. Signatures of former owners may be obscured or crossed out, book plates may be removed or covered, so the researcher needs to refer to other historical evidence. One Honeyman acquisition, Thomas Everard's *Stereometry Made Easie* (London, 1684) was once owned by Sir Isaac Newton. This is not obvious from the book, but it has the bookplate of James Musgrave of Barnesley Park, Gloucester, obscuring the bookplate of Charles Huggins of Chinnor, whose father John purchased Newton's books for £300 in 1727.

Many earlier owners cannot be identified in the historic record, the only evidence of their lives being their signature within a book. But more prominent owners can be identified, some being contemporary with the author, others as later owners. Nicolas Louis de la Caille had just 120 copies of his *Astronomiæ Fundamenta* (Paris, 1757) printed, which he gave to friends, including one of his students, the French chemist, Antoine Lavoisier (1743–1794), who lost his head in the Revolution. Lavoisier's library was broken up and the whereabouts of



many books is still unknown; our copy has Lavoisier's bookplate and was another Honeyman acquisition. Galileo's *Opere* (Bologna, 1656) is signed and dated 1740 by the French naturalist Georges Louis Leclerc Buffon (1707–1788). His library was acquired by the Comte de Mirabeau (1749–1791), the 'intellectual pathfinder of the French Revolution' whose books were sold in 1792 and the sale catalogue still exists. This copy was later acquired by the Museum of Economic Geology.

Sometimes scattered copies from libraries are reunited. Both Lazarus Ercker's *Fleta Minor* (London, 1683) and Newton's *Method of Fluxions* (London, 1736), were owned by Edward, Duke of Norfolk and Earl Marshall of England (1686–1777) but were acquired by the library at different times. His bookplate consists of his name and coat-of-arms.

Some historians have recorded all remaining copies of early editions of books such as *Euclid's Elements*, Copernicus's *De Revolutionibus Coelestis*, Harvey's *De Motu Cordis* and Andreas Vesalius's *De Humani Corporis Fabrica*. The library's copies have been included in these published surveys. Information about provenance and annotation is also being added to the library catalogue and Kevin Tracey has added information on 878 works thus ensuring this information is available for future researchers.

The library's rare books are rich with microhistories of personal and institutional libraries, revealing new insights into their distribution and impact, but much more remains to be rediscovered!

LEFT:
Bookplate of Sir Henry de la Beche & Library, Museum of Practical Geology, detail



ANNUAL RESEARCH CONFERENCE 2019 HIGHLIGHTS

ABIGAIL WILSON

Associate Curator, Science Museum

This year's annual research conference took place at the Science and Industry Museum on 4 and 5 November 2019. Exploring the theme 'The Place of Industry', the conference looked at place-based approaches to science and industry as well as the interfaces and juxtapositions of industry with other disciplines and frames. Over the two days, we heard from colleagues from across the group in addition to researchers engaged in work that speaks to the Science Museum Group's collections and concerns.

The director of the Science and Industry Museum, Sally MacDonald,

welcomed everyone to the event and placed the theme in the context of the vision for the museum and its internationally important historic industrial site. With ambitious plans underway to transform how the museum tells the story of Manchester – the world's first industrial city – and to reconnect the museum site with the rest of the Liverpool Road goods station, soon to house The Factory arts venue, the conference was particularly timely.

The first session was a panel convened and chaired by Francesca Elliott, a collaborative doctoral student at the

University of Manchester and the Science and Industry Museum. Drawing on work from her PhD thesis project, Francesca brought together curators from across the country to discuss 'Models and Replicas'.

First up, Anthony Coulls, Senior Curator of Rail Transport and Technology at the Railway Museum, spoke about his work on finding a new way to display locomotive models in the exhibition *Brass, Steel and Fire*. Next, Rachel Webster, Curator of Botany, and David Gelsthorpe, Curator of Earth Sciences, both at Manchester Museum, discussed the use and display of models at

LEFT:

Brass, Steel and Fire exhibition at the National Railway Museum, includes models through 100 years of rapid technological change

Manchester Museum and how their purpose has shifted over time. Finally, Emily Malcolm, Curator of Transport and Technology at Glasgow Museums, used examples from Glasgow Museums' collection to look at how they had historically been received.

For the second session, the conference split into two parallel sessions on 'Post-Industry' and 'Place and People'. In 'Post-Industry', Sarah Rawlins from the Exhibitions team at the Science and Media Museum introduced the *Above the Noise* exhibition and its co-curation approach as part of Bradford's National Museum Project. Next, Norman Redhead examined the re-use of industrial buildings in Manchester. Meanwhile in 'Place and People', Dominic Sagar, Senior Lecturer at the Manchester School of Architecture, explored the similarities between Manchester and Detroit, and Richard Brook, Reader at the Manchester School of Architecture, examined the physical sites of Manchester's post-war computing industry.

After lunch, Andrew Connolly presented his work with linguist Rebecca Woods on 'Technically speaking: a corpus linguistic study of the value of technicians' to a plenary session. Andrew has been advising colleagues working on the Technicians gallery at the Science Museum and the reinterpretation of the Power Hall at the Science and Industry Museum.

Splitting into parallel sessions again, papers were presented on 'Bringing Industry to Life' and 'Industry and Society'. For the session on 'Bringing Industry to Life', Karen Baker and Ellen Tait, Librarian and Interpretation Developer at the Railway Museum respectively, spoke about the research feeding into the plans for the redevelopment of the Station Hall. Bethan Ross from the Audience

Research Team then presented some findings from a major piece of research into digital exhibits and prototyping in the Science Museum Group. Finally, Anthony Coulls gave a paper on the Railway Museum's Operating Vehicles Strategy.

In 'Industry and Society', Joshua McMullan, collaborative doctoral student at the University of Leicester and the National Archives, kicked off with discussion of Operation Smash Hit and how this staged train crash fitted into the communication strategy of the nuclear industry. Liz Bruton, Curator of Technology and Engineering at the Science Museum, followed with an exploration of a selection of typewriters from the Printing and Writing collection and how these changed roles and workplaces for women and people with certain disabilities. Last was Bob Gwynne, Associate Curator at the Railway Museum, presenting research carried out with Jonathan Ayles of the University of Manchester. The paper looked at how Cold War computing technology was repurposed to enable efficient operation of the rail network.

The last formal session of the day was a keynote address by Mark Ball and Gabrielle Jenks of Manchester International Festival. They introduced the plans for the new arts venue The Factory and explored how their interdisciplinary focus and digital ambition would play out in this new space. The day ended with a tour of the Textiles gallery with Curator of Industrial Heritage Katie Belshaw.

The second day of the conference began with a panel on Industry and Art. Imogen Holmes-Roe, Curator of Historic Fine Art at The Whitworth, kicked off with a look at how its foundation by a leading industrialist has affected the development of its collections. Next, Katie Belshaw considered how Lowry's paintings have influenced how people see industrial spaces. Lastly, Luke Harrison from the University of Salford introduced his project investigating how 360 video and ambisonic audio could be used in rapid prototyping to create soundscapes for heritage spaces, using the 1830 Station as a case study.

The conference split into two parallel panels for the second session of the day: 'The Industrious Spaces of Knowledge and Practice in Early Modern London' and 'People and Place'. 'Industrious Spaces' was a panel arising out of the 'Metropolitan Science: Places, Objects and Cultures of Practice and Knowledge in London, 1600–1800' project at the University of Kent in partnership with the Science Museum. Keeper of Science Alison Boyle chaired the panel which included papers on the Royal Mint by Jasmine Kilburn-Toppin; Sir Samuel Morland by Jim Bennett; Trinity House and the oversight of navigation in London by Rebekah Higgitt; and the navigational business of the East India Company by Noah Moxham.

The parallel panel on 'People and Place' saw Abi Wilson present on the impact of Joseph Whitworth's philanthropy on Manchester's built environment. Then Ben Russell explored how the workshops of London engineers in 1800–1830 may have influenced their work and networks. Finally, Professor Margaret Littler introduced a new project looking at how Germans contributed to the development of science, industry and culture in 19th-century Manchester.

After lunch, the attention turned to Humphrey Jennings. In a session on 'Representations of the Industrial Revolution', Matthew Watson from Bolton Museum investigated to what extent Humphrey Jennings and the Mass Observation movement constructed an image of the industrial north. Then Tim Boon introduced a selection of documentary films from the mid-20th century which evidenced a "virtual dictionary of visual, sonic and verbal tropes" utilised when depicting the Industrial Revolution. Drawing together many of the strands of the conference, Jennifer Tucker, Associate Professor at Wesleyan University, drew proceedings to a close with a keynote on Humphrey Jennings' *Pandaemonium* and its significance as a source in the long history of the visualisation of industrial modernity.

BELOW:

Tea Trolleys, from Becky Peacock's *Uncovering the secrets of Canadian Pacific* (Issue 10, Autumn 2018)
Credit: Dennis Holdaway



SCIENCE MUSEUM GROUP JOURNAL REPORT AND REFLECTIONS

MICHAEL FLYNN

Science Museum Group Journal Guest Editor

As the *Journal* enters its seventh year it does so in a state of robust good health. Submission rates continue to grow, both from within and outside of the Group, and there has been a corresponding rise in readership. During the academic year 18–19, the *Journal* received 44,000 views (up from 30,000 in 17–18), while the number of subscribers now stands at 5,300.

In keeping with our ambition to represent the broad interests of the Science Museum Group, we have featured articles from our research fellows alongside those of permanent staff. Most encouragingly, we have also seen external submissions rise to a level where they now represent upwards of eighty per cent of the total submissions; this year alone we have published contributions from Russia and the USA – as well as Leeds, Oxford, Cardiff and Kent.

Topics covered have been equally broad. Over the course of Issues 10 and 11 we've published a wonderfully illustrated discussion of the Crystal Palace dinosaur models, an investigation into the provenance of a beautiful 17th-century medical chest, an exploration of the art and science of displaying the medieval past in 19th-century London, the story of graphene as told through 3D objects, an evaluation of the use of a card game to communicate the history of science to

nurses, and a review of three exhibitions by artist Tacita Dean.

The rise in submissions has also allowed us to plan several issues in advance, enabling us to continue our practice of bringing together 'mini-collections' of papers grouped around a common theme. Issue 10 (published in autumn 2018) celebrated both a century of women's suffrage and the Year of Engineering with a mini-collection of articles exploring the role of women in STEM from the late 19th to the mid-20th century. Readers were given the opportunity to explore the under-acknowledged role of women in the railways in the early-20th century, discover what photographs can say about attitudes towards female scientists, and determine the extent to which *Wikipedia* under-represents women engineers today.

Issue 11 featured a mini-collection on the theme of wounds, featuring, among other delights, some frankly gruesome descriptions of early modern facial surgery, a discussion of Ambroise Paré's innovative treatment of gunshot wounds, and an examination of the importance of processions as a response to episodes of plague in 16th-century Mantua. In fact, the extraordinary range of subjects covered this year is perhaps best illustrated by our two most popular articles, from Issues 10 and 11 respectively: *The life*

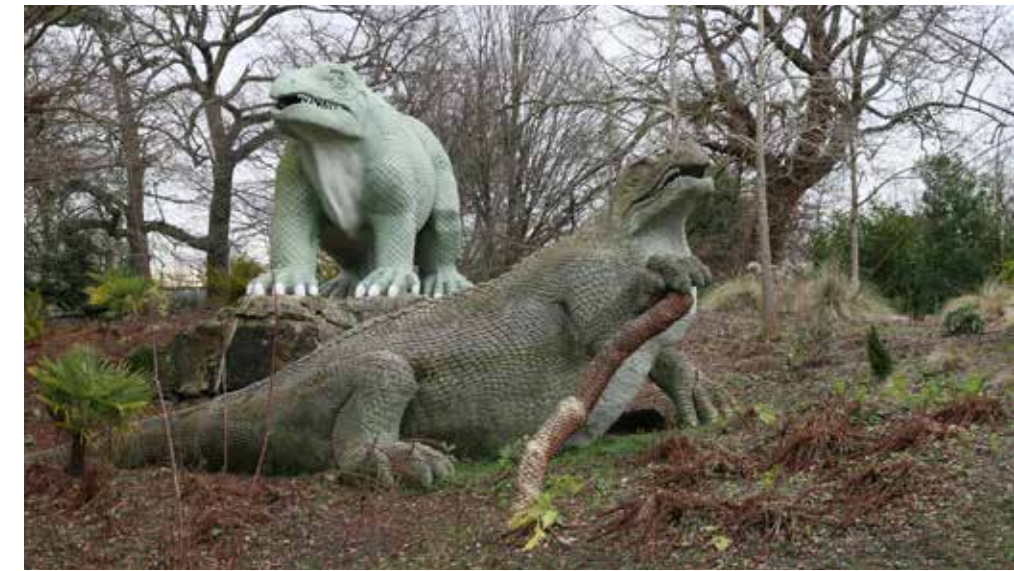
and material culture of Hertha Marks Ayrton (1854–1923): suffragette, physicist, mathematician and inventor by Elizabeth Bruton, and *A history of amulets in ten objects* by Annie Thwaite.

In keeping with the wide scope of subjects covered, the range of authors has been equally broad. In addition to publishing articles from established academics, we continue to provide a platform for those who are just setting out on their careers. Back in 2016, the *Science Museum Group Journal* introduced a competition to encourage and reward research articles written by talented early career scholars. Since then, a prize of £500 has been awarded annually to the author of the best original research article – as judged by our esteemed editorial board – which addresses research focused on science history, heritage, exhibitions, communications and public engagement.

In Issue 11 we were very proud to include the previous year's winning entry, from Jules Skotnes-Brown. His article 'From the White Man's Grave to the White Man's home?' impressed the judges with the way he had cleverly compared visitor accounts and curatorial intentions for the 1924/25 British Empire Exhibition, challenging our understanding of



LEFT:
Genoese medicine chest, c. 1565, from Julie Ackroyd's *The provenance and context of the Giustiniani Medicine Chest* (Issue 11, Spring 2019)



RIGHT:
Iguanodon models at Crystal Palace, from Alison Laurence's *A discourse with deep time: the extinct animals of Crystal Palace Park as heritage artefacts* (Issue 11, Spring 2019)



ABOVE:
Prisoner Pair, 2008 by Tacita Dean, from Katy Barrett's *Tacita Dean: LANDSCAPE, PORTRAIT, STILL LIFE* (Issue 10, Autumn 2018)

how the exhibition was actually experienced by audiences. The impact of the article was further enhanced by the way the author had taken advantage of the *Journal's* capacity to feature rich imagery and multi-media, featuring as it did several embedded pieces of contemporary footage from the exhibition plus links to external websites offering supporting material for the piece.

As part of our own development in this area, and in keeping with our desire to innovate and improve, this coming year will see the unveiling of a new look and feel for the *Science Museum Group Journal*. In addition to alterations on the back-end functionality, we trust that our new format will improve both user experience and engagement. Changes to the Content Management System will see hugely improved integration with Collections Online while allowing us to extend our capabilities further, thus increasing research outputs over the coming years. The ability of the *Journal* to provide a peer-reviewed, open access and visually beautiful platform for research related to collections and practice in museums is clearly attractive to external scholars and museum practitioners and in the coming year we shall continue to provide an enriching and engaging space for all interested parties.

EVENTS

21 September 2018 – National Railway Museum’s collecting policies

Ed Bartholomew gave an introduction to the National Railway Museum’s collecting policies and programme to the Museums for Profusion conference organised by Heritage Futures and the University of York’s Sociology department at the National Railway Museum.

28 September 2018 – Attingham Trust Visit (National Railway Museum)

The museum hosted a visit from the Attingham Trust group of curators and researchers on tour from the USA, with this year’s theme for their trip being ‘Transport and Travel’. Tours of collections and discussions of content planned for redevelopment helped them understand work in progress at the museum.

2 October 2018 – National Science and Media Museum Research Seminar

Edd Wilson-Stephens (National Science and Media Museum Collaborative Doctoral Student) gave a presentation titled ‘Synthesizers, Speakers and the Side Man’.

15 October 2018 – Photographic Collections Network workshop (Science and Industry Museum)

Organised by the Photographic Collections Network and hosted by Science and Industry Museum with the museum’s object and archive content, a half-day workshop looking at how to interpret photographic collections in different settings.

24 October 2018 – Communicating Material Cultures of Energy Electricity Quiz (Science and Industry Museum)

Organised by the Communicating Material Cultures of Energy network as part of the Science and Industry Museum Power Late.

22 November 2018 – Institute of Railway Studies Seminar (National Railway Museum)

Professor Richard Dennis, Emeritus Professor of Geography at University College London on the Metropolitan Railway and Dr Nicola Kirkby, Royal Holloway University on Thomas Hardy’s Laodicean and the Channel Tunnel.

28 November 2018 – Technologies of Romance Symposium (Science Museum)

A day-long symposium to mark the publication of *Technologies of Romance – Part II*, the new book by Paul O’Kane. The day featured a diverse and dynamic range of artists, lecturers, historians, students and curators from various institutions, exchanging ideas and contributing artworks, performances, videos and academic papers on the symposium’s title and theme.

17–18 December 2018 – Mobility of Things: Pasts, Presents and Futures (National Railway Museum)

A two-day conference which explored the theme of ‘Movement of Things’ in past, present, and future contexts.

18 January 2019 – Environment and Geography Department students visit (National Railway Museum)

Led by Dr Katherine Brookfield (University of York) this student visit for c.40 undergraduates took them on a collections and archives tour along the theme of ‘Travel and Tourism’.

January – March 2019 – Institute for the Public Understanding of the Past student placements (National Railway Museum)

Oli Betts and Sophie Vohra (CDA student) supported three student placements from the MA course at University of York. They researched the various histories of British Rail and presented to the wider curatorial team, many of whom had helped them during the course of the placement.

5 February 2019 – National Science and Media Museum Research Seminar

Cameron Tailford (Science and Industry Collaborative Doctoral Student) gave a presentation titled ‘“Nurse Your Set”: Women’s work in the early electronics industry in Britain’.

27 February 2019 – Vision 2025 masterplan (National Railway Museum)

Dr Oli Betts and Ed Bartholomew led a seminar on the National Railway Museum and its Vision 2025 masterplan for 13 students on York University’s Institute for the Public Understanding of the Past taught Masters programme.

5 & 6 March 2019 - Eighteenth Century English Medicine, A Tour of the Science Museum Library’s Rare Books (Science Museum)

A tour of six highlights from the museum’s collection of pre-1800 medical books, focusing on the stories of the books, both as objects owned by real people and institutions, and as key texts in the history of medicine.

8 March 2019 - Strategies for Digital Curating (Science Museum)

Held in collaboration with the Contemporary Art Society and Serpentine Galleries, this seminar explored the different roles that the ‘digital’ holds within institutions. Through looking at the ways in which different institutions manage digital projects, we discussed the following: digital and tech literacy; the hybridity of technical and curatorial skills; and collaboration between departments.

13 March 2019 – Exhibition planning session (National Railway Museum)

Dr Oli Betts, Dr Thomas Spain, Ed Bartholomew and National Railway Museum collaborative doctoral student Sophie Vohra led tours and an exhibition planning session with 15 first-year undergraduate History students from the University of Huddersfield.

28 March 2019 – Representing the Medical Body (Science Museum)

A one-day workshop reflecting on the unique ways in which the body has been represented in relation to health and medicine through the history of art and visual culture. The workshop brought together artists, scientists and historians of art, science and medicine and contributions took a variety of forms including papers, artists’ talks, films and performances.

11 April 2019 – Chemistry in Albertopolis (Science Museum)

This one-day conference featured sessions and tours celebrating the institutions which helped to make chemistry a key facet of intellectual and public life in West London and beyond. This event was part of ChemFest 2019, jointly organised by the Science Museum, Imperial College London, the Royal Society of Chemistry, the Victoria & Albert Museum, the 1851 Commission and the Royal College of Art.

12 April 2019 – Workshop on oral history (National Railway Museum)

The National Railway Museum and York University’s Management School held a workshop on oral history, centred on the *Britain’s Railways All Change* project on railway privatisation, attended by 34 delegates.

29 April 2019 – Sierra Leone Railway Museum visit (National Railway Museum)

Staff from across the museum hosted a visit from our sister museum, in Sierra Leone, and discussed resourcing and research issues with the delegation.

30 April 2019 – Adventures in the Archives (National Railway Museum)

Led by Dr John Bowen from the Department of English and Related Literature at the University of York. Participating students were also given museum tours and archive handling sessions.

7 May 2019 – National Science and Media Museum Research Seminar

Michelle Henning (Professor of Photography and Cultural History, University of West London) gave a talk presentation ‘Ilford Limited: Researching the British Photography Industry in the Interwar Period’.

23 May 2019 – Mechanical Medicine: Exploring the History of Healing by Exercise, Manipulation and Massage (Science Museum)

An interdisciplinary symposium on the history of therapeutic exercise, manipulation and massage – with or without apparatus – also collectively known as mechanotherapy. Papers were given by scholars from a range of disciplines and discussed cross-cultural perspectives on mechanotherapy and manual healing.

4 June 2019 – National Science and Media Museum Research Seminar

Kendra Bean (National Science and Media Museum Collections Assistant) gave a presentation titled ‘Ready for its Close-up: Caring for the Daily Herald Archive’.

5 June 2019 – Making Sense of Museums Seminar (Science Museum)

This event was part of the University of Bristol’s Centre for Health, Humanities and Science’s regular seminar series. The seminar featured short talks from a panel, including museum staff and researchers, working with collections based at the Science Museum.

5 June 2019 – Electrifying Women: Understanding the Long History of Women in Engineering launch event (Science Museum)

This lecture was co-organised with the University of Leeds to celebrate the centenary of The UK Women’s Engineering Society, the first of its kind in the world. It looked at how the First World War created new opportunities for women to participate in engineering, and how this interacted with the exciting new technologies of electrical power and lighting a whole generation earlier.

8 June 2019 – Yorkshire Sound Women Network Event (National Science and Media Museum)

Annie Jamieson (National Science and Media Museum Curator of Sound Technologies) held a ‘Level Up’ event for Yorkshire Sound Women Network, which included a day of talks, workshops and tours, based around the theme of film sound, including a Skype Q&A with sound designers from *Game of Thrones*.

20 June 2019 – The Material Culture of Health Activism Conference (Science Museum)

An interdisciplinary conference explored the history and strategy of health activism along with its material and visual culture, with a focus on considering the politics of collecting, curating and interpreting health activism in museums and other institutions. The conference included a ceremonial unfolding of Block 3 of the Dutch AIDS Memorial Quilt introduced by Jörn Wolters from the Stichting NAMENproject Nederland.

20 June 2019 – Institute of Railway Studies Seminar (National Railway Museum)

As part of our on-going seminar series, Dr Robert Demaine (archive volunteer) spoke about his work on the Jeremiah Head diary (a collaborator and employee of Robert Stephenson). He was joined by John Liffen (Science Museum) who spoke about depictions of *Rocket* in print, and Dr William Godfrey (University of Bradford) who studies anthropomorphism of railway engines in serials such as *Thomas the Tank Engine* and *Ivor the Engine*.



July – August 2019 – White Rose student placements (National Railway Museum)

Oli Betts and Sophie Vohra (CDA student), very much supported by the wider team, hosted two PhD students on a significant placement as they developed trial exhibitions and worked together to research and create content for *Vision 2025*.

4 July – The Museums & Galleries History Group annual lecture (Science Museum)

A lecture given by Professor Elizabeth Edwards entitled 'Collections, Non-Collections and Ecosystems: Case notes on photographic cultures in the Museum'. This paper considered the presence of photographs in museums as an ecosystem and how this ecosystem is characterised.

11 July – Sensing the Machine-Body Interface: A Cross-Disciplinary Workshop on Medicine, Technology & Embodiment (Science Museum)

This workshop was a collaboration between Medicine Galleries Research Fellows at the Science Museum, London, and Bristol Senses Cluster, with support from Wellcome. It explored the role our senses play across a range of medical and disability related perspectives, with a focus on the relationship between the lived body and what might be broadly termed 'the machine'.

19 July – Exploring Collaborative PhDs Networking Event (Science Museum)

This was a facilitated networking event for Science Museum Group staff and interested academics to discuss potential collaborative PhD projects within the Science Museum Group museums for AHRC-funded Collaborative Doctoral Partnership awards.

24 – 25 July – Energy & Public Communications Conference (Science and Industry Museum)

Transdisciplinary and trans-sector conference organised by the Communicating Material Cultures of Energy network, including a presentation by Jan Hicks with Electricity North West on (ENW) partnership working to communicate energy stories in a museum exhibition, focused on the partnership working between Science and Industry Museum and ENW to deliver exhibition content about the management of electricity demand and supply.

31 July – 1 August – Workshop 1 of the Culture-Space Network research project (Science Museum)

Workshop 1 of a multidisciplinary series of workshops to explore our understanding of space exploration in a cultural context. Museum and arts sector professionals as well as academics from a variety of fields met to discuss the culture of space exploration. They considered what the culture of space is, was, and could be; and how this could be displayed in a future Space gallery at the Science Museum, London.

3 September – National Science and Media Museum Research Seminar

Vanessa Torres (Conservator) gave a presentation titled 'Recent Advances in Preserving Photographs'.

12 September – Organic Systems: Science Fiction and Ecology Today (Science Museum)

A half-day event and the fourth in a series of training sessions to explore the relation between science fiction and ecology as the nexus of an emergent set of interdisciplinary research interests. These events were held in partnership with Birkbeck College and Goldsmiths, University of London.

19 September – Rethinking Human Remains in the 21st Century Museum (Science Museum)

A one-day symposium which brought together individuals whose research and practice are connected to, or inform, the contemporary research, display, and dissemination of human remains collections in UK museums. It explored frameworks to re-think the place of human remains in museums and how contemporary research and practice can be challenged through the lens of diverse approaches. This symposium was delivered in collaboration with the School of Museum Studies at the University of Leicester.

7 – 8 October – Workshop 2 of the Culture Space Network research project (Science Museum)

The Science Museum Group and European Space Agency hosted museum and arts sector professionals as well as academics to discuss the culture of space exploration. They considered what diversity means in space, for space, and in space-science museum displays at the European Space Research and Technology Centre in Noordwijk, Netherlands.

10 October – Decolonising Science Narratives (Science Museum)

This workshop brought together those working across and between disciplines and practices to critically reflect on the histories and realities of colonialism and science, with a view towards developing a set of usable practices to contest the conspicuous absences of colonial history in science narratives. Papers given engaged with the themes of historic and contemporary colonial scientific practices from all disciplines and attempted to disentangle framings of science as 'neutral', 'objective' and otherwise divorced from uncomfortable histories.

11 October – Electrifying Women Power Hall workshop (Science and Industry Museum)

Convened by Sarah Baines in partnership with the Electrifying Women impact and engagement project, focused on approaches to researching women who worked with engines and exploring how the stories of women engineers are told in museums

16 November 2019 – Untold Stories: Bringing Together Oral Histories of Britain's Railways (National Railway Museum)

Oli Betts and Ed Bartholomew from the museum hosted a one-day workshop on oral histories, with a range of speakers covering practical and topical examples of how to work in this field.

21 – 22 November – Workshop 3 of the Culture Space Network research project (Science Museum)

The final workshop in the Culture Space network series. This workshop was held at the UCL Mullard Space Science Laboratory in Dorking, Surrey. Museum professionals and academics discussed the reasons and means for humanity's exploration of outer space.

27 November 2019 – Institute of Railway Studies Seminar (National Railway Museum)

Professor Kirstie Blair (University of Strathclyde) and Oli Betts (Research Fellow) presented material from their Piston, Pen and Press collaboration and reflected on the online MOOC that they have created as part of the project.

Autumn Term – Medicine Galleries Research Seminar Series (Science Museum)

In the lead up to the opening of the new Medicine Galleries at the Science Museum in Autumn 2019, the Science Museum hosted a Medicine Galleries Seminar Series to celebrate and share the work of the Medicine Galleries Research Fellows.

LEFT:

Visitors at the Science Museum's new *Medicine Galleries*

3

THE ART OF INNOVATION: FROM ENLIGHTENMENT TO DARK MATTER



TILLY BLYTH

Head of Collections and Principal Curator, Science Museum

LEFT:

The Art of Innovation: From Enlightenment to Dark Matter Exhibition, Science Museum, London. Polaroid SX-70 Land camera Model 2, 1948–1953 and *Sun on the Pool*, Los Angeles, David Hockney, 1982

'The Art of Innovation' is a landmark 20-part radio series, exhibition and book produced in partnership with the BBC. Drawing on major stories from our collections, it examines the relationship between science and art, questioning C P Snow's 'two cultures' debate in 1959 and asking whether our scientific and artistic cultures are better understood as co-constructed and intertwined.

This is the first time that the Science Museum Group has worked with the BBC to create a cross-media experience, building supporting narratives across radio, exhibition and a publication. Each medium was used to its advantage: through the radio series the co-presenters, Sir Ian Blatchford and Tilly Blyth, strung complex stories together through contributions from curators and experts, the exhibition provided an intimate experience with the artwork or object in discussion, the book gave us the freedom to explore the specific perspectives in the relationship of art and science. The aim is that through this transmedia approach, people can appreciate that science and art develop and define each other, they are part of the same culture and that scientific objects can be appreciated aesthetically.

Our choice of works and objects came from two guiding rules: that our stories should provoke curiosity in the

'The Art of Innovation series – for once – deserves the label "landmark..."'

The Spectator

collections of the Science Museum Group and that audiences should be left with the understanding that both art and science rely on imagination and creativity. Just as Constable said in 1836, 'Painting is a science, and should be pursued as an enquiry into the laws of nature,' so Einstein crossed the imagined boundary and in 1929 claimed, 'I am enough of an artist to draw freely upon my imagination. Imagination is more important than knowledge.'

The importance of creativity and imagination, as well as rigorous experimentation and hard work, was found across both artistic and scientific practice. Both disciplines share tools and technologies, probing how to work with images.

The project features an array of work from some of Britain's most significant artists – Turner, Hepworth, Hockney, Constable, Parker and Shawcross, with many significant loans for the exhibition. One of the most important works is the wonderful loan from Derby Museums, 'A Philosopher Giving that lecture on the orrery, in which a lamp is put in place of the sun' by Joseph Wright. Here a grand orrery, showing the movement of planets around the Sun, spreads scientific knowledge onto a gathered group of adults and children. The technique of *chiaroscuro*, offering a strong contrast between light and dark, enables the light of

scientific knowledge to fall on to the faces of a gathered crowd. This rich image provides an insight into the thinking of the time, as astronomical science took a place alongside a religious understanding of the cosmos. The painting is displayed alongside a humbler wooden pulley orrery, created by the astronomer and communicator James Ferguson. He took it upon himself to travel across the country, explaining the motions of the Moon and Earth around the Sun.

We know that Ferguson visited Derby in July 1762, and it is likely that Joseph Wright would have seen his lecture. Ferguson's ambition was not to replace God's creation, just to explain it, and he published in 1756 a book to spread these ideas to the middle classes, rather wonderfully called *Astronomy explained upon Sir Isaac Newton's Principles: and made easy to those who have not studied mathematics*.

Turner's strikingly impressionistic image from 1844, 'Rain, Steam and Speed', presents a locomotive hurtling along the Great Western Railway towards the viewer. It captures that sense of awe and wonder that passengers must have felt, as they travelled along these new 'iron roads' at speeds of over 60 mph – faster than anyone on the planet had travelled before. For the first time we have been able to place this painting in pride of place, alongside our own 1/8 scale

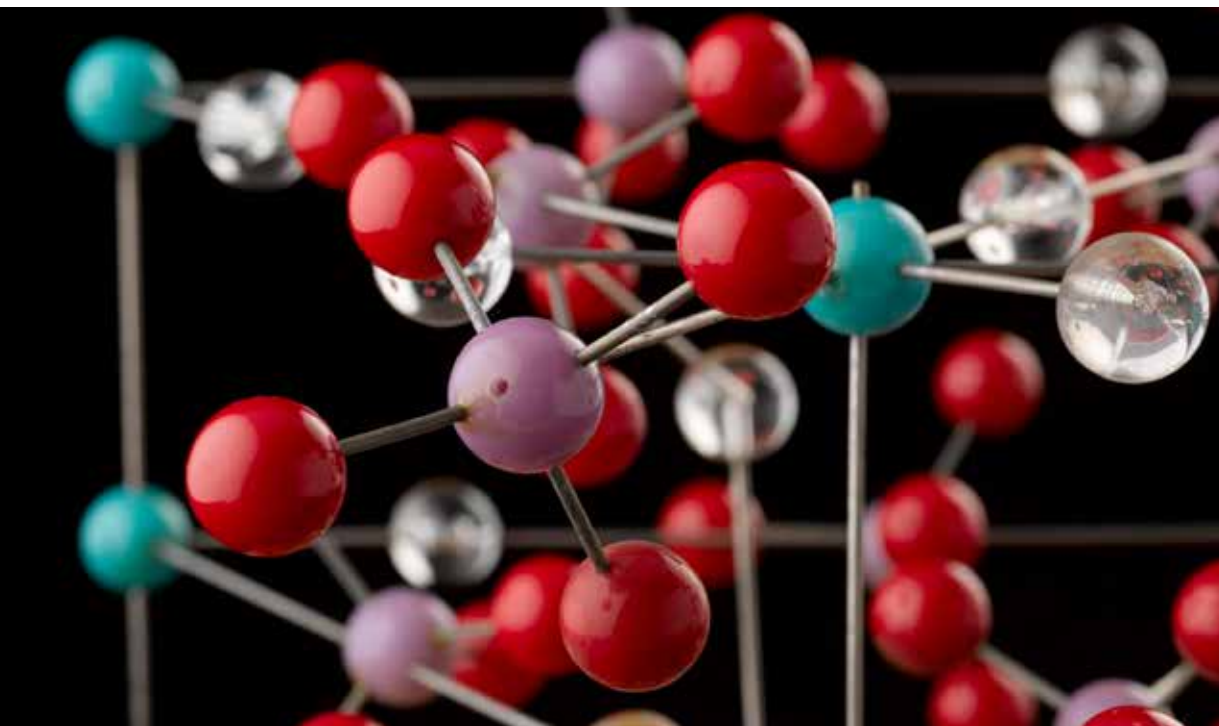
model steam locomotive, the *Firefly* made by craftsman Joseph Clement, showing the beautiful rosewood, copper and brass model, as if it's coming out of the painting.

Our stories do not shy away from complex physics, drawing on the wonderful images from X-ray crystallography that went on to inspire the designs of the Festival Pattern Group at the Festival of Britain in 1951, and looking at Einstein's ideas of gravity arising from the curvature of space and time. The latter became a focus for the artist Cornelia Parker when doing a residency at the Science Museum 20 years ago. She took as the starting point for her work a blackboard used by Einstein in 1931, which is now at History of Science

Museum in Oxford. 'Einstein's Abstracts' 2000, are photomicrographs of the chalk marks on the blackboard. Parker magnified the images of the chalk so many times that they start to look like a cosmos. For Parker, this work helped her to come closer to the physics and understanding Einstein's works. In the exhibition her images are placed next to a simple yet striking Gravity Probe, a perfect sphere placed in spacecraft to test the predictions of general relativity as they warp and twist in the presence of a large mass.

Whilst science is often thought of as calm and rational, and art is believed to be passionate and subjective, we wanted to invite audiences to interrogate these stereotypes. Through 'The Art of Innovation'

we wanted to question such an oversimplified belief to show that, just like art, science can be messy, is driven by human passion, a desire to question, and a need to compete. It's a fundamental human activity, which doesn't happen in isolation from our society and culture but is often an act of collaboration. In that way, it shares many characteristics with the arts, as artists and scientists both explore new ideas, construct new realities, but ask the same enduring questions – about the nature of our world, the impact of humanity, our desire for change.



LEFT:
Crystal model of
hydroxyl apatite,
(Dame Kathleen
Lonsdale)

BELOW:

Rain, Steam and Speed –
the Great Western Railway,
1844, JMW Turner
(National Gallery)

Model steam locomotive,
1/8 scale, Great Western
Railway 2-2-2 'Firefly' class
standard broad gauge
locomotive



AUDIENCES OF THE FUTURE: ROBOTS MIXED-REALITY EXPERIENCE

GABRIELLA GIANNACHI

University of Exeter

DAVE PATTEN

Head of New Media, Science Museum

BETHAN ROSS

Senior Audience Researcher, Science Museum

ANDI SMART

University of Exeter

JOHN STACK

Digital Director, Science Museum

DÉSIRÉE VACCARINI

Audience Researcher and Advocate,
Natural History Museum

SAMUEL VINE

University of Exeter

RIGHT:

Concept art (Ines Robin),
robot design (Jake Lunt)

The Science Museum Group is part of a consortium partnership developing two technology-based visitor experiences funded by Innovate UK. The 30-minute experiences will be live during the summer and autumn of 2020 in the Science Museum and Natural History Museum. During and particularly after the funded period, there is an opportunity to commercialise the model in several ways, including touring the experience to new locations.

The Science Museum Group received funding from Innovate UK (part of UKRI), as part of a consortium to produce an immersive experience in the 'Audience of the Future – Demonstrators' funding stream, for the 'Visitor Experience' category which aims to test large scale immersive experiences with mass audiences. The cross-sector collaboration consists of: Factory 42; Almeida Theatre; Exeter University; Science Museum Group and Natural History Museum; Magic Leap; Sky; and Intu shopping centres.

The aim is to produce a multi-room, multisensory, immersive experience in which groups will collaborate to solve a series of challenges across a robot-themed narrative. It will harness cutting-edge mixed-reality technology, combined with a unique mix of live actors, interactives, sound and sensory design to create an exciting new world driving wider engagement with scientific themes.



At the Natural History Museum, the theme of the experience will be dinosaurs.

The project tests innovative audience experiences that can tour nationally and internationally, generating income and demonstrating to the wider world the innovation and creativity in technology that resides in the UK. It will also gather audience data (using innovative technologies) and will deliver consumer insight to test the viability of the solution.

This will include evaluating the creation of new revenue streams, business models and audience experience emerging from immersive technology in both the museum setting and shopping centre venues. This research will be disseminated to the wider culture, entertainment and consumer destination sector and to academic audiences through leading international conferences.

AUDIENCE RESEARCH

Through 2019, Bethan Ross from the Science Museum Group's Audience Research department has led on the formative audience research in partnership with Désirée Vaccarini (Audience Researcher and Advocate, Natural History Museum). Ross established a set of learning outcomes for the experience and articulated how this might best be incorporated into the experience design.

The Science Museum Group has an established expertise in audience research into visitor engagement with science content in the museum context and in particular in interactivity, digital media and game play in this context. However, with many cultural institutions only beginning their journey into immersive experiences (especially those utilising mixed reality), existing research into the use and expectations of audiences

is limited. Formative research has explored potential audiences' needs and expectations from mixed reality experiences in the museum setting from both traditional museum goers and non-museum goers. It also explored what elements of an experience are crucial for it to be considered 'immersive', and whether learning occurring in this context is more effective.

Research showed that many of the previously established findings about digital interactivity in museums apply: audiences seek a social, playful experience; it is important that interactions are meaningful and engaging; and free exploration is a critical element. Furthermore, audience expectations are extremely high, although challenges emerged around how best to communicate such a novel experience.

Using early prototypes of the experiences, research will explore visitors' response to the overarching narrative of the experience, to identify barriers to audience engagement and build an understanding of audience responses to the proposed interactive activities in the experience. Research will also be undertaken into the audiences to understand their experience of the mixed reality technology, including the on- and off-boarding elements.

Once the experiences are live in the museum, summative audience research will focus on the understanding of the audiences' experiences with a focus on what they learned, what was successful in the experience but also lessons learnt from the visitor perspective, including potentially whether having taken place in such an immersive experience changes their understanding of museum visiting and their perception of the museum more widely.

Taking the question posed at formative stage of what elements are crucial for an experience to be defined and classed as 'immersive', research at this stage will also explore not only whether but also how this has been achieved. Building on the work by Digital Catapult on evaluating experimental immersive content, the research will explore aspects such as a sense of presence and memorability.

DEVELOPING AN UNDERSTANDING OF MIXED REALITY IN THE MUSEUM

Research undertaken by a cross-disciplinary group at the University of Exeter aims to generate a deep understanding of how individual and group visitor experiences in mixed reality can be designed, evaluated and described to benefit the creative industries sector. Key guidelines will be extracted to gain insight into new forms of inter- and trans-disciplinary collaborative design in immersive experiences. In particular, the research will offer insight into what types of methods are needed to understand and inform the behaviour of different kinds of audiences and to determine how mass group/shared experiences can be evaluated in this context.

A number of different perspectives have been identified that are related to understanding visitor behaviour and preference. Research will include the use of highly novel data retrieval methods relating to eye tracking obtained from within the mixed reality headset (in this instance the magic leap headset), and/or physiological data obtained via wrist-worn heart rate monitors (key dimensions of the Visitor Intelligence Datasphere). This has been formulated as a Visitor Intelligence Datasphere and includes the consideration of visitor visual attention, geospatial position (and journey), natural language feedback, physiological response (e.g. heart rate variation) as well as more traditional geographic, demographic and psychographic indicators. These data will be analysed via mathematical modelling, and findings will then be triangulated with additional self-report psychometric data, to provide a detailed insight and improve

experience design and personalisation. The team will seek to identify effective responses from the audience to inform the visitor experience and to confirm the design intentions of the development team (with respect to intended affective response). The research will also adopt more conventional methods including presence graphs and semi-structured interviews. This research aims to establish novel methods and best practice criteria for the evaluation of the visitor experience (including group experiences) and a psychophysiological assessment of users in mixed reality environments.

The identification of key value propositions for visitors, specifically related to mixed reality (MR) immersive environments, will be informed by the research and so help in building an understanding of audiences of the future. Wider benefits will include an enhanced understanding of theories of human behaviour (e.g. attention and stress) in mixed reality; knowledge about how to design and deliver learning objectives in mixed reality; the identification of guidelines for the curation, documentation and preservation of mixed reality experiences in the museum context. Furthermore, the Exeter team will document how the consortium partners work together and summarise in a framework new methods and practices for industry.

The use of virtual, augmented and mixed reality in the museum context is in its infancy, and there is limited audience research and little established best practice. This project will form the foundations of the understanding of the affordances of these new technologies in museum settings.



LEFT:
Concept art (Jake Lunt)

TIME, CULTURE AND IDENTITY

CAROL CHUNG
UK-China Research Facilitator

TIME, CULTURE AND IDENTITY: THE CO-CREATION OF HISTORICAL RESEARCH AND CO-DEVELOPMENT OF VISITOR EXPERIENCE IN CHINA AND THE UK

In December 2018, the project 'Time, Culture and Identity: the co-creation of historical research and co-development of visitor experience in China and the UK' started, with an ambition of uniting expertise from China and the UK and creating opportunities for creative industries collaboration across the two countries. The project has been awarded funding by the Arts and Humanities Research Council and the Newton Fund. The project began on 1 December 2018 and will run for 15 months, concluding on 29 February 2020.

Bringing together a team of museum curators and academics in the UK and China, this international research collaboration focuses on the Palace Museum's collection of English 18th-century clocks, watches and automata. Our interest and work can be summarised through the following strands.

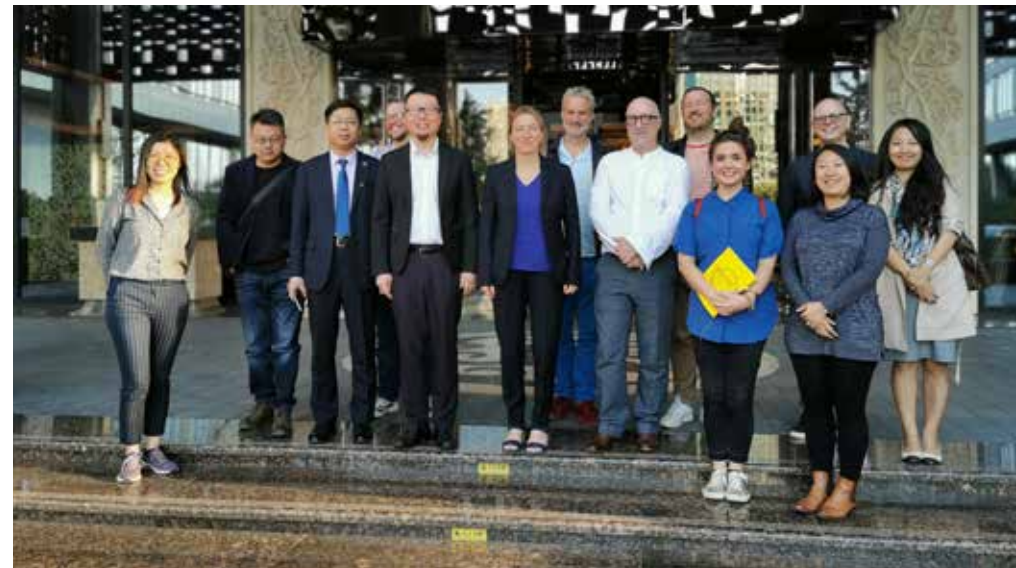
KNOWLEDGE EXCHANGE ON HOROLOGICAL COLLECTION

The project team began by carrying out original research on the Palace Museum's collection of English 18th-century clocks, watches and automata to better understand these objects and the social, cultural and technological impacts they have had in China and Britain. Emma Stirling-Middleton, UK Co-investigator to the project, and Dr Huang Xing, China Co-investigator to the project ploughed through historical archives and records on the trading of mechanical clocks and automata between China and Britain.

This enquiry further led to a workshop entitled 'Time, Culture and Identity: A Knowledge Exchange', hosted on 21 and 22 May 2019, at the Institute for the History of Natural Sciences, Chinese Academy of Sciences, Beijing. During the workshop, a cohort of historians, museum practitioners and academics in horology met and exchanged insights across five themes, including 'ancient Chinese timekeeping and technology transfer', 'British clocks and automata made for export to China', 'technology and mechanisms', 'the clock trade' and 'sharing horological collections with audiences in Britain and China'.



RIGHT:
Site visit to the
Palace Museum



LEFT:
Workshop attendees
visited Chao Centre for
Art and Technology

EXPLORING THE COUNTRY SCENE AUTOMATON

The project team is currently collaborating with a Chinese digital company, Blackbow, to develop and deliver a digital resource featuring a remarkable timepiece from the Palace Museum Collection, designed by British clockmaker James Cox – the Country Scene Automaton. This collaborative work is complemented with a study of the Automaton mechanism of the Country Scene, led by Professor Yao Yanan, China Principal Investigator and his team. We anticipate the completion of this work in early 2020, and it will be on display with the forthcoming exhibition *Zimingzhong* 自鸣钟: *Clockworks Treasures from China's Forbidden City*.

Looking into the near future, the team will begin to design an evaluation study focusing on how visitors engage with the digital resource and how it contributes to learning about the Palace Museum timepieces – an opportunity to corroborate findings of the audience research carried out as part of the project earlier. Reflecting on what the project has achieved so far, we will also be developing a 'toolbox' with a view to sharing our experience and learning from this international collaboration, which may support and enhance collaborations between academic, heritage and creative economy professionals in China and the UK in the future.

PROJECT TEAM

Tilly Blyth (PI)
Yao Yanan (PI)
Emma Stirling-Middleton (Co-I)
Huang Xing (Co-I)
Carol Chung (UK-China Research Facilitator)
The Palace Museum, Beijing (Collections Partner)

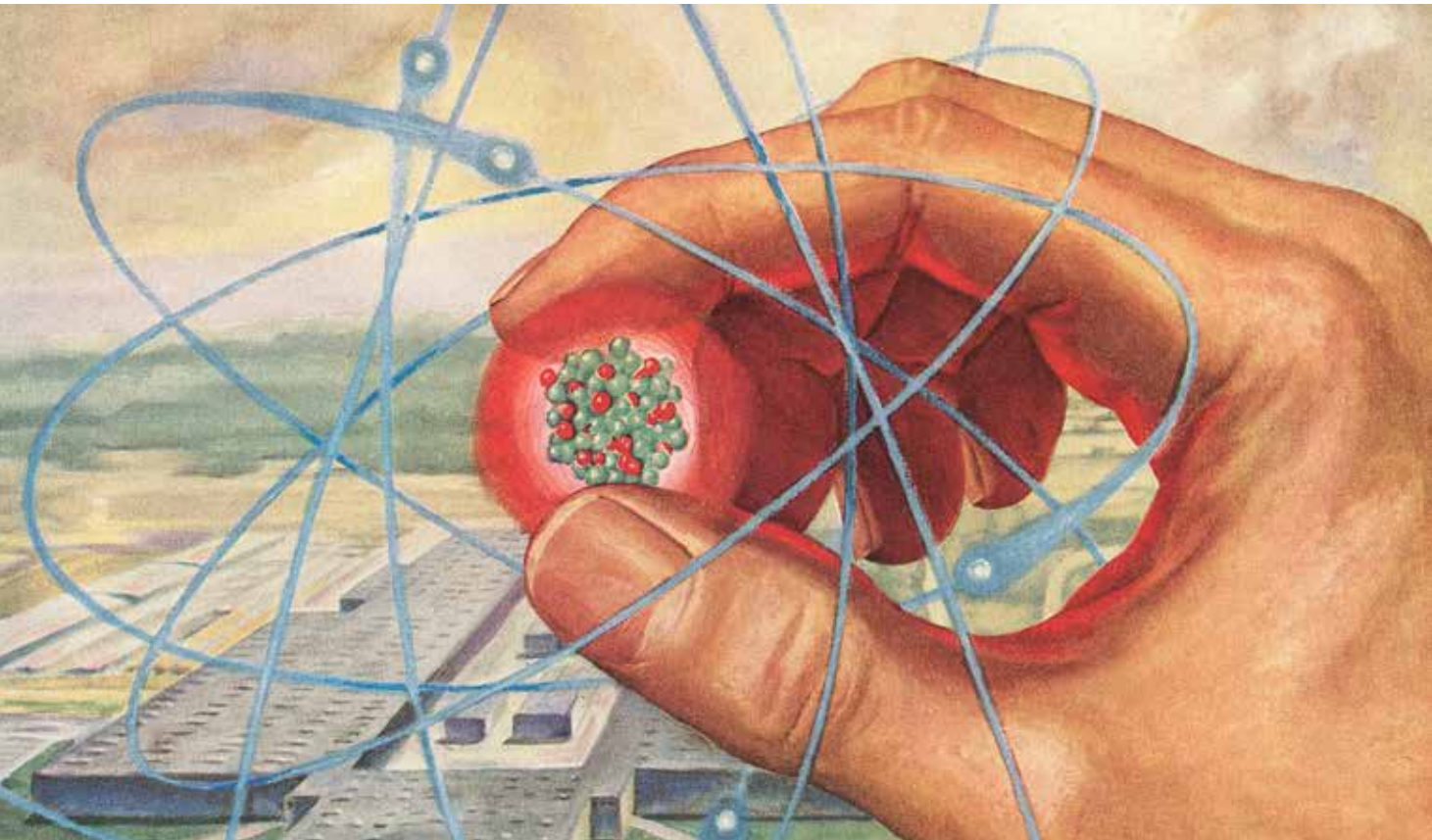
TRANSNATIONAL AUDIENCE RESEARCH TO UNDERSTAND VISITORS IN BRITAIN AND CHINA

In the hope of developing our understanding about the ways in which British and Chinese visitors engage with historic collections, an expert consultant, Terry Watkins, was appointed by the project team to complete two-phase transnational audience research in three sites: Hong Kong Science Museum, the Palace Museum in Beijing, and the Science Museum in London. The first phase of the research took place in March 2019, and the second phase in May 2019. Through this piece of audience research, we gained an understanding of how people in China and the UK relate to the Palace Museum timepieces. Although visitors from Britain and China make different connections to the Palace Museum timepieces, the clocks generate enormous curiosity for both audiences; they both desire to see the inner workings and understand how the mechanism works. This offers invaluable insights into co-designing a digital exhibit as a means of sharing the research with Science Museum audiences.

DEVELOPING DIGITAL INTERPRETATION FOR MUSEUM COLLECTIONS

Using the information gathered from the audience research and the Knowledge Exchange Workshop, we then started to collaborate with creative digital companies in Britain and China to explore how we can design and create a digital resource that will invite British and Chinese audiences to discover and learn more about the Palace Museum's timepieces. Through a workshop entitled 'Time, Culture and Identity: A Digital Exchange' we enabled academic, heritage and creative company professionals in China and the UK to collaborate on 9 and 10 October 2019, hosted at the Institute for the History of Natural Sciences, Chinese Academy of Sciences, Beijing. During the workshop, the project team brought together 11 representatives from digital agencies companies in Britain and China to exchange working practices, knowledge and ideas about digital heritage in China and the UK. As a result of the workshop, attendees reflected on the working culture and practical challenges they came across in their home countries, and successfully developed a suite of ideas for the creation of a digital resource about the timepieces.

BELOW:
*The Atom: A Love
Affair* by Vicki Lesley,
Tenner Films



COMMUNICATING ENERGY TO THE PUBLIC

HIROKI SHIN
Research Associate, Science Museum

BELOW:
Carbon City Zero card
game created by
10:10 Climate Action



THE COMMUNICATING MATERIAL CULTURES OF ENERGY PROJECT

As the climate crisis worsens, the world faces the tremendous challenge of transforming the way energy resources are harnessed and consumed. A broad consensus is emerging: a transition to a sustainable energy path requires not only policy intervention but also cooperation from individual energy users. For the public to make informed energy decisions, sound and relevant information is essential.

The Communicating Material Cultures of Energy project aimed to create a cross-sector, multi-disciplinary dialogue among energy communicators as a novel way of thinking about energy-related public communication. This one-year public-engagement project brought together more than 70 energy communicators across sectors and organisations. Writers, artists, researchers, museum curators and communication officers from energy providers, government offices and campaign organisations joined the project's various activities to consider different ways of improving energy communication.

The project entailed a series of knowledge-exchange sessions at the Dana Research Centre in the Science Museum, London, to discuss the five challenges for energy communication: object-based communication, behavioural intervention, visual media communication, participatory communication and community engagement. In these sessions, partners and collaborators talked about their experiences conducting public information campaigns and designing museum exhibitions, public events and behaviour change trials while learning the different approaches and methods used by their colleagues.

In July 2019, at the Science and Industry Museum, Manchester, communication experts from the UK and beyond attended the project's Energy and Public Communication conference. It was comprised of three academic sessions on energy communication in museums, public participation and communication media. Brian Cozen (State University of California) and Mark Atherton (Environment for Greater Manchester) delivered keynote lectures.

The conference programme also included a film viewing (*The Atom: A Love Affair* by Vicki Lesley, Tenner Films) and demonstration in which participants took part in immersive activities simulating energy emergencies, games in which players competed toward zero carbon emission goals and a creative writing session on energy spaces. Participants particularly appreciated the conference's multi-sectorial scope. As one participant noted, 'The combination of academics, industry, communicators from local municipalities and museum professionals all contributed voices to an important discussion. It is too rare to have such a variety of experts together.'

Overall, the project showcased the capacity of public museums, with their unique combination of research expertise and public communication, to serve as hubs for creating a new network of experts and expert knowledge that can respond to the urgent global challenge of creating a sustainable energy future.

The main partners of the project were EDF Energy, the UK Department for Business, Energy & Industrial Strategy, the Office of Gas and Electricity Markets, the Behavioural Insights Team, Community Energy England, Carbon Co-op, Electricity North West, the University of Salford, Birkbeck College, University of London and the National Museum of Scotland. Dr Hiroki Shin (research fellow, Research and Public History Department, Science Museum), Ben Russell (curator of mechanical engineering, Science Museum) and Professor Frank Trentmann (Birkbeck College) led the project. It was based on the research project Material Cultures of Energy (2014-2017) and funded by the Arts and Humanities Research Council.



LEFT:
Bradford Heritage
Recording Unit
recorded everyday
life in Bradford using
oral histories and
photograph
Credit: Tim Smith/
Bradford Heritage
Recording Unit

BRADFORD'S NATIONAL MUSEUM

HELEN GRAHAM

Associate Professor, School of Fine Art, History of Art
and Cultural Studies, University of Leeds



RIGHT:
Students from the
Belle Vue Girls
Academy explored
the role of
technology in
creating their own
identities and those
of their grandparents
through recording
oral histories
Credit: Nabeelah
Hafeez



In March 2019 the National Science and Media Museum opened the exhibition *Above the Noise: 15 Stories From Bradford*. It explored how different communities in Bradford have made their own worlds and have by-passed and confronted national power structures and mainstream media. In particular, *Above the Noise* explored how people from Bradford have recorded their own histories, created their own cultural spheres and made political and social change by using local-to-local and alternative distribution networks and by adapting or re-purposing available technologies. Each story was co-produced by people who had a stake in telling the story. The 15 stories included (to give just two examples) a soundscape exploring the mediation and transmission of Islamic sounds in Bradford and a collaboration with teachers and students at the Belle Vue Girls Academy which saw young women interview their relatives about their life experiences and explore how they can use technology to build a new sense of family, place and belonging.

EXHIBITIONS AS ACTION RESEARCH: REFLECTING SYSTEMICALLY

Above the Noise was a central element in Bradford's National Museum research project, which is a three-year exploration of how the National Science and Media Museum can become more open, engaged and collaborative and, through this, better connected to Bradford; the city and district in which it is based. Bradford's National Museum project is conceived and run by a collective of people based inside and outside the museum. Each of the project's external collaborators have innovative, well-established and flourishing community development approaches and extensive local networks.

Bradford's National Museum project draws on action research approaches, meaning we are exploring our core questions through trying things out and experimentation. *Above the Noise* gave us a chance to understand the dynamics of collaborative work at scale and the collaborative reflective process we've undertaken since the

ABOVE:
One of the fifteen stories was developed with
Bradford Grand Mosque, which has its own app.
Credit: Tim Smith

exhibition opened is now helping us set agendas for the final year of the research project.

A central element to the reflective process has been not only to look back in a traditional evaluative mode but rather to generate shared understandings of the issues and formulate new questions to shape the research trajectory. We approached the reflection from different perspectives. This included undertaking one-to-one conversations and running workshops with National Science and Media Museum staff, reflective interviews with people involved in the *Above the Noise* exhibition as story collaborators, workshops with front of house staff and audience research with those visiting the exhibition.

Common themes that emerged across the different groups included a sense of a shared pride in *Above the Noise* and what we had collectively achieved and a striking similarity among all project participants in terms of a vision for the future of the museum and its role in Bradford. However, between these different groups there were also differences of experience and perception.

For example, many members of staff experienced *Above the Noise* as stressful, too complex and were torn between what felt like different priorities of quality and collaboration; where story collaborators experienced the museum as not as responsive or as communicative as they would have liked. Story collaborators, front of house staff and visitors were much

more likely to foreground questions of representation of Bradford's community and in particular the role of the museum in addressing racism and islamophobia; where museum staff were more likely to refer to issues related to sound and vision technology.

In order to enable Bradford's National Museum project to move on, we needed to make visible these differences and see the experience through each others' eyes. We did this through a workshop which used small group conversations, bringing together back and front of house staff and story collaborators, to look at key quotes from different people involved in *Above the Noise* and to work together to draw out how the varying perspectives might be used to set new agendas for the research.

BELOW:

The way different technologies help make and share memories across distances was created by Bradford artists Naureen Hafeez and Rameez Khawaja

Credit: Naureen Hafeez and Rameez Khawaja



BOTH+AND: CROSS-CUTTING RESEARCH QUESTIONS

From the reflective workshop process it became clear that it is relatively simple to think about any of the different issues that arose from *Above the Noise* singly. It is not hard for any of us to think about sound and vision technology or Bradford. It is not hard for museums staff to think about quality or being responsive to new ideas and new collaborations. Yet to really address underlying issues we need to hold together different issues, a shift from either/or thinking to both+and. The five cross-cutting questions that emerged are:

How can we work with the specific strengths of the museum and of the existing networks in Bradford?

What opportunities arise from addressing questions of social justice and science and media/sound and vision technologies?

How can ideas of quality that already exist in the National Science and Media Museum be openly talked about and how might ideas of quality be co-produced with Bradford communities?

How can the museum both be part of Science Museum Group decision-making structures and develop collaborative decision-making with people in Bradford?

How can the museum prioritise the wellbeing of staff and collaborators and be responsive, brave and take risks?

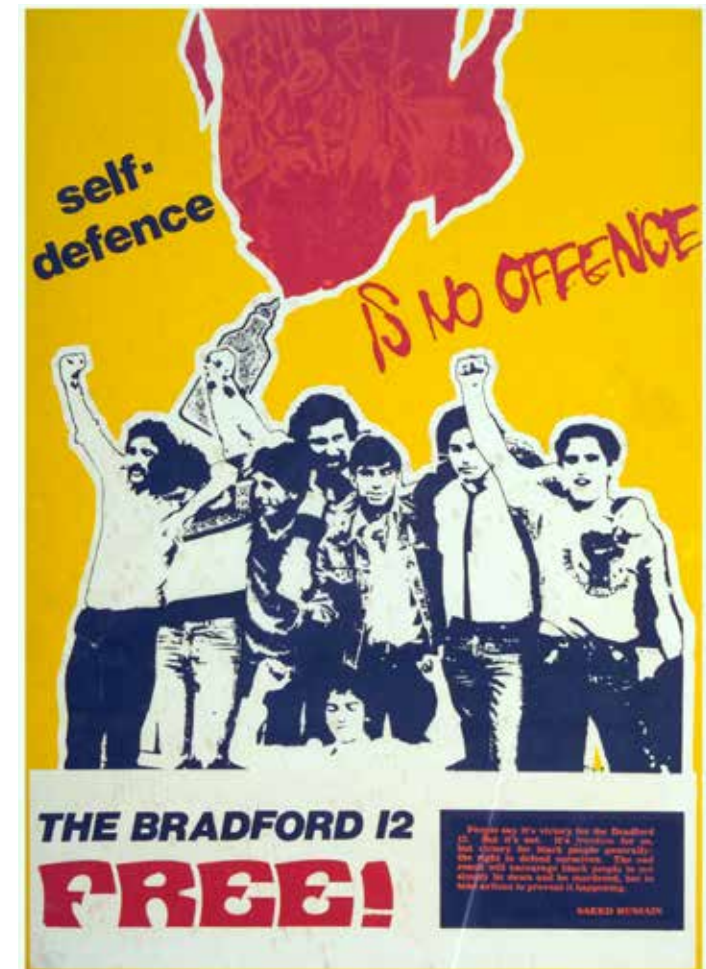
RIGHT:

DIY publications and posters were a crucial part of a story exploring the legacy of activism against racism in Bradford

Credit: NSMM

We are now using these questions to drive the final year of the research and approaches for sustaining the work beyond the end of the project. We are doing this in a number of different ways, through a new Staff Action Research Group who are linking their own everyday practice with the wider agendas of the Bradford's National Museum project, and a network which acts as a regular touch point for communication and collaboration between people in Bradford and the museum. In all aspects of the research, we are seeking to work at the knotty place where different worlds, priorities and practices intersect.

You can read more about the project and the collaborators on the project website: <https://bradfordsnationalmuseum.org>





LEFT:
Gallery view of
Science City

Metropolitan Science: Places, Objects and Cultures of Practice and Knowledge in London 1600–1800 is a three-year project funded by the Leverhulme Trust. It is based at the University of Kent and in partnership with the Science Museum. Details of the project and its team can be found at <https://metsci.wordpress.com/>.

The *Metropolitan Science* research project is now well into its final year. Our focus – mine as Principal Investigator, with postdoctoral researchers, Dr Jasmine Kilburn-Toppin and Dr Noah Moxham – is now on producing the draft of a co-authored monograph. This will explore the knowledge and practice produced within and associated with the sites and activities of three different types of London institution: the craft or trade guild; the government office; and the trading company. Chapters will focus on two institutions based at the Tower of London (the Royal Mint and the Office of Ordnance), on the halls of two Livery Companies (the Goldsmiths' Company and Society of Apothecaries) and on the London sites of two institutions with maritime interests (Trinity House and the East India Company). The team presented themes and research from this book project at the Science Museum Group Research Conference in November 2019, at a Science Museum seminar in December 2019 and in an article for the *Science Museum Group Journal* in 2020.

This September, we celebrated the opening of the Science Museum's new gallery, *Science City 1550–1800: the Linbury Gallery*, with the curatorial team. As well as having offered some advice and information to support the gallery's development, we have helped provide linked online content and contributed to the associated book:

Science City: Craft, Commerce and Curiosity in London 1550–1800, by Alexandra Rose and Jane Desborough. Alex and Jane are also on the project's advisory board and have helped ensure that we have had access to objects in store before Blythe House's closure to researchers.

A significant milestone was the publication of a special issue of the *British Journal for the History of Science*, based on selected papers delivered at a workshop at the Science Museum's Dana Centre in 2017. *London 1600–1800: Communities of Natural Knowledge and Artificial Practice* was published as the June 2019 issue, edited by me and the project's consultant, Science Museum Keeper Emeritus Professor Jim Bennett. Jim and I co-wrote the introduction and it contains articles by Jasmine, Noah and me, as well as Philip Beeley (Oxford), Anna Simmons (UCL) and Anna Winterbottom (McGill). The project's postdoctoral researchers have also each written a further article for publication, focusing on the relationship between artisans' authorship and the institutional history of the Goldsmiths' Company and on the East India Company's self-justificatory use of science and its surrounding rhetoric.

The project team have continued to share our research at seminars and conferences and with wider audiences. Noah presented papers at the University of Leeds and University of Göttingen; Jasmine contributed to conferences at the University of Warwick, New York University and Queen's University Belfast; I used research from the project to support recent talks for the Whitstable History Society, Royal Astronomical Society, Gresham College and a seminar paper at the University of Oxford.

Planning continues for the end-of-project conference. *Science in the City, 1500–1800* will be held at the Science Museum on 6–7 April 2020 and in partnership with the Institute of Historical Research's Centre for the History of People, Place and Community. There will be keynote lectures by Professor Pamela H Smith of Columbia University, on 'Making and

Knowing in Early Modern Europe', and by Dr Andrew Mendelsohn of Queen Mary University of London, on writing and knowing in scholarly, administrative and commercial contexts. The conference will include a session on digital projects, with a hands-on workshop based around the IHR's *Layers of London* mapping project. Our aim in this session will be to link entries from the museum's collections online to specific locations on the website's historic London maps. There will also be a session led by the project's co-investigator, Alison Boyle (Keeper of Science Collections), on cities and museum interpretation. On top of this, we will have eight paper sessions and tours of the new gallery.

This will explore the knowledge and practice produced within and associated with the sites and activities of three different types of London institution: the craft or trade guild; the government office; and the trading company

Over the last two and a half years, the *Metropolitan Science* project has evolved to reflect the researchers' interests, the available archives and the challenges of incorporating object collections. We have found that we have placed more emphasis on our spatial and institutional research questions, for which visual and material evidence is important for understanding the role and functions of these sites and the knowledge made within them. We have focused less on instrument makers – whose guild archives are comparatively thin – and more on other kinds of practitioner (assayers, mariners, merchants, clerks, officials), who may be less well represented by objects in Science Museum Group's collections. This in itself is an interesting outcome, helping researchers and curators to reflect on what museum collections do and do not represent.

METROPOLITAN SCIENCE PROJECT UPDATE

REBEKAH HIGGITT

Senior Lecturer in History of Science,
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CULTURE SPACE: TOWARDS A BETTER UNDERSTANDING OF SPACE EXPLORATION

DOUG MILLARD

Senior Curator, Science Museum



The success of the Science Museum's *Cosmonauts: Birth of the Space Age* exhibition (2015) prompted the question of whether its distinctive cultural treatment of Russian and Soviet space endeavour might be an approach that could be applied more broadly for exhibitions and galleries that deal with *global* traditions of space exploration. The Culture Space AHRC-funded research programme set out to investigate further this question and especially in relation to the proposed new Space gallery of the mid-2020s at the Science Museum.

The programme brought together a multidisciplinary group across three workshops to ask the questions "How and why do human cultures explore space?" and "What does it say about humankind that we go into space?", thereby developing a culturally centred conceptual framework for a better understanding of space exploration.

There is a widespread exposition of space exploration science and technology in museums and science centres around the world. While varying in size and scale, the displays all tend towards similar narratives that emphasise the technical means developed in the mid-20th century to enable spaceflight, but which include sparse acknowledgement of broader cultural factors, and disproportionately emphasise a western space narrative.

LEFT:

Gallery view of
*Cosmonauts: Birth
of the Space Age*
exhibition

The Culture Space research network was designed to investigate the potential for broader accounts of space exploration by building the multidisciplinary context and opening up the subject to new research questions that view space technologies from fresh perspectives. The ultimate purpose of this effort would be to engage a wider breadth of the public in the subject and exposition of space exploration.

The programme's first workshop was held at the Science Museum, London (31 July and 1 August 2019) and was themed on the representation of space exploration today in museums and beyond. It coincided with the museum's Space Lates evening marking the 50th anniversary of the first Apollo Moon landing. The second workshop was held at the European Space Agency's ESTEC centre, Netherlands (7–8 October 2019) and was themed on the multidisciplinary and the diverse in space exploration. The third and final workshop was staged at the Mullard Space Science Laboratory of University College London at Holmbury St Mary (21–22 November 2019) and was themed on potential displays of space exploration.

The first workshop's participants reflected on a tour of the Science Museum's Exploring Space gallery (and its shortcomings) before listening to presentations from curators representing space museums and displays in the United States, Germany, Russia and China. While some of these expositions explore alternative interpretations of spaceflight, most continue to emphasise the technical means of its enablement. The rich potential of broader, culturally-orientated approaches in future displays was made apparent both

in Alexander Geppert's keynote talk at the workshop and during presentations from other participants on the representation of space in the visual and sonic arts, cinema, television and the science fiction genre.

This potential for more imaginative approaches to the displaying of space exploration was emphasised during the second workshop at ESA's ESTEC centre. The workshop's chosen theme of diversity was addressed amply both through exposure to the work carried out at ESTEC and involving many disciplines, working practices, facilities and testing procedures, but also through direct contact with the many communities based at the centre and drawn from a number of nationalities: ESA's Chief Diversity Officer pointed out that 14 different languages are spoken at ESTEC.

An emergent theme from that second workshop, and one repeated in the third at the Mullard Space Science Laboratory, was a need to capture in new space displays the knowledge and expertise and testimony of local practitioners: those at the 'grass roots' of mission planning and delivery – the 'hidden figures' – perhaps especially those engineers and technicians that convert scientific concepts into material reality. This became very apparent with the tour of the Laboratory set in its extensive grounds in the Surrey countryside and the reminiscences of past and present staff based there. The workshop explored also the picturing of 'place in space' by those investigating cosmic locations and phenomena and how their perspectives might be made to resonate with gallery visitors, the archaeology of spaceflight, the legalities of it and also ethical factors.



MEDICINE: THE WELLCOME GALLERIES AND RESEARCH

SARAH WADE

Research Manager, Science Museum

LEFT:

Gallery view of *Exploring Medicine*, part of the new *Medicine Galleries* at the Science Museum, London

‘These Fellowships have resulted in valuable new insights about the objects in our collections and have contributed to raising the profile of the medicine collection...’

RIGHT:

Gallery view of *Faith, Hope and Fear*, part of the new *Medicine Galleries* at the Science Museum, London



Autumn 2019 saw the opening of *Medicine: The Wellcome Galleries* at the Science Museum, London. Showcasing 3,000 objects relating to the past, present and future of medicine, as well as oral histories and contemporary art commissions, this is the largest museum space dedicated to health and medicine in the world.

Alongside the creation of this world-class suite of galleries an exciting programme of research has also been taking place, informing the gallery development, contributing to the legacy of the galleries and helping establish the Science Museum as a hub for the medical humanities.

MEDICINE GALLERIES RESEARCH FELLOWSHIPS

Between 2018–2019, and thanks to funding from Wellcome, we hosted five Medicine Galleries Research Fellows to the museum to carry out programmes of research to enhance our understanding of the collections. The topics of these research projects have been wide-ranging, covering different disciplines, applying diverse approaches and resulting in various academic and public engagement outputs. These fellowships have also enabled the museum to make links with other institutions and consolidate existing relationships through

secondments, as well as to take its collections to an international audience through the dissemination of research at conferences and via publications. The scheme has also contributed to strengthening the research culture surrounding the medicine collection, drawing from the expertise of the curatorial team in various research projects and events and inviting new audiences from academia and beyond to engage with the objects in our care.

Dr Kay Nias joined the museum from the University of Exeter. Fresh from her PhD on the professionalisation of physiotherapy in the 19th century,

RIGHT:
Gallery view of
the new *Medicine
Galleries* at the
Science Museum,
London

Kay developed a project around mechanical therapy and massage using object-based research and material culture studies to provide new insight into the collections. During her time at the museum, Kay was able to locate the family of the former owner of one of the museum's exercise cycles, which provided the opportunity to enhance the object biography of this item. Dr Farrah Lawrence-Mackey developed a research project around sensory experiences of life support machines, which arose from a short-term research project she completed on the museum's Milton Roy Dialysis machine as part of the gallery content development. Through her study into patient experiences of dialysis machines and iron lungs, Farrah gathered oral histories to provide new perspectives on the uses and experiences of the objects in our collections. Studying historic newspapers, Farrah additionally discovered new provenance information relating to one of the museum's iron lungs, of which previously very little was known. Dr Angela Stienne spent the year undertaking research and public engagement work on the emotive subject of human remains in 21st-century museums. Angela's work took her around the UK and Europe to conferences, workshops and exhibitions where she developed a thorough overview of the work being done and, significantly, which still needs to be done in museums when it comes to the display of human remains to the public. The result was a workshop organised by Angela in collaboration with University of Leicester School of Museum Studies and the Science Museum to further discuss these issues. The event led to the development of an edited volume for the Routledge Leicester Reader in

Museum Studies series on human remains in museums.

The *Medicine Galleries* Research Fellowships have also enabled secondments. Shelley Saggar spent a year at the museum on secondment from Wellcome Collection to research and make policy recommendations about the storage and display of culturally sensitive objects in the collection. This important project informed curatorial practice at the museum and also contributed to increasing debate on this subject through a symposium. In addition, Dr Cleo Hanaway-Oakley, Lecturer in Liberal Arts and English at University of Bristol and convenor of a research cluster on the senses at the Centre for Health, Humanities and Science at the same university, joined the museum to explore the literary history and material culture of colour blindness. This research will be included in Cleo's forthcoming monograph. However, this secondment was equally valuable in bringing academics and museum professionals together from across the university and museum to discuss shared areas of interest, laying the foundations for future research collaborations.

These Fellowships have resulted in valuable new insights about the objects in our collections and have contributed to raising the profile of the medicine collection amongst an academic audience as well as the wider public. Museums provide a great context for academics to carry out public engagement work, which forms an important part of their impact activities. Yet object-based research can also offer new possibilities and perspectives that enrich research projects and open up new lines of inquiry as many of our Fellows found out.



WELLCOME SECONDMENT FELLOWSHIPS

This year the Science Museum has continued to host researchers as part of the Wellcome Secondment Scheme. This programme enables researchers already funded by Wellcome to spend 3–6 months at a partner institution to carry out research, policy or public engagement work complementary to their existing programme of activity. It enables Fellows to gain new skills and provides a different perspective on their research.

This year the museum was joined by two new Fellows: Hannah Bower, University of Oxford and Julia Swallow, University of Leeds. Hannah spent time studying the Library's collection of pre-1800 medical books. Her research resulted in a display and accompanying tour of some of the highlights of the collection in the Dana Library, as well as a recently published article in the *Science Museum Group Journal*. Julia Swallow, on the other hand, worked with Curator of Medicine

Katie Dabin on the early stages of developing the narrative for a forthcoming exhibition on cancer. Julia was able to gain insight to the exhibition development process as well as bring her expertise as a sociologist to the project, resulting in a mutually beneficial knowledge exchange that exemplifies what this fellowship scheme can achieve.

AN EMBEDDED RESEARCH COMMUNITY

A key part of the Wellcome-funded research programme, and indeed the aspiration of the wider team, was to make the Science Museum a hub for the medical humanities. To this end, a number of research and public engagement events have taken place over the last year, including the initiation of a reading group by Farrah Lawrence-Mackey. These have been integral to informing the research projects taking place, integrating research into the curatorial work at the museum and forging a community

of like-minded people to come together and discuss pressing issues in this field and beyond. Research events have included:

5 March 2019: *A Tour of the Highlights of Pre-1800 Medical Books* (a display and tour by Hannah Bower, Wellcome Secondment Fellow in the Dana Library)

28 March 2019: *Representing the Medical Body* (an international conference organised by Katy Barrett, Curator of Art Collections and Sarah Wade, Research Manager)

23 May 2019: *Mechanical Medicine:* (a symposium organised by Kay Nias, Medicine Galleries Research Fellow)

5 June 2019: *Making Sense of Museums*, University of Bristol (organised by Cleo Hanaway-Oakley and featuring presentations from Selina Hurley, Curator of Medicine, Cleo Hanaway-Oakley, Farrah Lawrence-Mackey, Medicine Galleries Research Fellow and Sarah Wade, Research Manager)

20 June 2019: *The Material Culture of Heath Activism* (a conference organised by Imogen Clarke, Assistant Curator of Medicine, which included a ceremonial unfolding of a block of the AIDS quilt)

11 July 2019: *Sensing the Machine-Body Interface: A Cross-Disciplinary Workshop on Medicine, Technology & Embodiment* (a workshop organised by Farrah Lawrence-Mackey, Medicine Galleries Research Fellow and Cleo Hanaway-Oakley, Lecturer in Liberal Arts and English, University of Bristol/ Medicine Galleries Research Fellow. A collaboration between the University of Bristol Senses Cluster and the Science Museum)

19 September 2019: *Rethinking Human Remains in the 21st Century Museum* (a workshop organised by Angela Stienne, a collaboration between University of Leicester School of Museum Studies and Science Museum)

10 October 2019: *Delcolonising Science Narratives* (a conference organised by Shelley Saggar, Medicine Galleries Research Fellow and Emma McNicol, Assistant Curator)

Autumn term 2019: *Medicine Galleries Research Seminar Series* (organised by Sarah Wade, Research Manager, a dedicated series of research seminars showcasing the research of the Medicine Galleries Research Fellows)

PUBLICATIONS

The curatorial team have had a busy year not only delivering the galleries but also producing two brand new publications to coincide with the launch of the galleries. *The Medicine Cabinet* (Calton Press, 2019) and *The Medicine Galleries* (Scala, 2019) are two co-authored and beautifully illustrated books bringing together expertise from across the curatorial team to illuminate the objects, collections and themes tackled on-gallery. In addition, *The Science Museum Group Journal* and the museum's blog have continued to be important platforms for disseminating research. With the new galleries now open, the possibilities for new projects are rich and exciting.



ABOVE:
Gallery view of *Faith, Hope and Fear*, part of the new *Medicine Galleries* at the Science Museum, London

'The Science Museum is a natural base for looking at science and technology as human activities embodied in artefacts rich in symbolic meaning and functional detail'



LEFT:
Gallery view of *Exploring Medicine*, part of the new *Medicine Galleries* at the Science Museum, London

ABOVE:
Visitors at a late night opening of the new *Medicine Galleries* at the Science Museum, London



LEFT:
Gallery view of the
'Self Conscious Gene'
sculpture in the new
Medicine Galleries at
the Science Museum,
London

CLEO HANAWAY-OAKLEY

Lecturer in Liberal Arts & English,
University of Bristol/Medicine Galleries Research Fellow 2019

Working with the Science Museum, London, has given me valuable insights into the mechanisms of a major cultural institution and prompted me to think about my own research in new ways.

From February to December 2019, I was a Medicine Galleries Research Fellow at the museum on secondment two days per week from my job as Lecturer in Liberal Arts and English at the University of Bristol. I was investigating the changing status and signification of colour blindness in literature and culture, c. 1860–1940, through analysing literary texts by Charles Dickens, Joseph Conrad, Virginia Woolf, and James Joyce, alongside museum objects, policy reports and medical documents.

Coming from a literary studies background, object-based research was totally new for me. My previous work had mixed theoretical perspectives with historical study, but I had got my history from texts, not objects. Given that my colour

blindness project involved unpicking the complex interconnections between subjective sensory experience and material methods for measuring and categorising sight, it seemed appropriate to incorporate some (literal) hands-on research. Indeed, I was struck by the tactility of the vision tests held in the museum. Holmgren's coloured wool test for colour blindness, which is referenced in Joyce's *Finnegans Wake* (1939), required examinees to handle – and then match-up – skeins of coloured yarn.

My new knowledge of Holmgren's test has enabled me to better understand some of the experimental textual gymnastics performed by Joyce in his notoriously tricky text. At one point in *Finnegans Wake*, St Patrick (a patron saint of Ireland) accuses Bishop Berkeley (an Irish Idealist philosopher of perception) of being colour blind.

Joyce calls St Patrick's outfit a 'holmgrenworsteds costume'. I now recognise this as an allusion

to Holmgren's wool test; the wools from the colour blindness assessment are woven into clothing. To Bishop Berkeley, the whole outfit seems to be the 'same hue'.

As well as working on my own project, I have been able to facilitate links between the museum and Bristol's Centre for Health, Humanities and Science (CHHS). My new understanding of the inner workings of the museum has helped me to better comprehend how academics and museum professionals can work together in a mutually beneficial way. Through my recently-founded *Senses Cluster*, I have hosted two joint events – one in Bristol and one at the museum. As a result of these events, there are currently four separate collaborative CHHS-Science Museum projects in development.

BELOW:
Dr Cleo Hanaway-Oakley



KAY NIAS

Medicine Galleries Research Fellow, 2018

As an Early Career Researcher, this fellowship has been invaluable both personally and professionally. As a historian, I have learned how to integrate material culture and object research into my analyses, broadening my skillset and making my work far stronger. This fed directly into the content of my research. Exploring the material culture of physiotherapy has contributed significantly to the historiography of the history of physiotherapy in Britain, including my own previous doctoral work, which was based on documentary source material alone. It highlighted the importance of engaging with material culture and museums for comprehension of this field.

The fellowship has also helped me to gain many other skills, with the mentoring and support of colleagues I have been shown how to successfully organise and curate an event to a budget, how to write for a public audience through blog posts, and how to engage with social media in a professional manner. I successfully worked with colleagues to organise and run a workshop held at the Science Museum. I have produced a number of successful outputs, two well-received blog posts and a number of papers this year, which has strengthened my CV for future ECR fellowship applications. It has also provided me with abundance of research that in time I hope to generate into further outputs in terms of talks and publications.

I have started to generate, engage with and contribute to a small research community working in the field of the history of physiotherapy across the world and have been contacted by a range of individuals for expertise including journalists, the World Confederation of Physiotherapy, museum professionals, practitioners and academics. I have also engaged with a network of inspirational and supportive colleagues at the Science Museum and beyond with whom I will stay in contact as my career progresses.



ABOVE:
Dr Kay Nias



THE COLLABORATIVE DOCTORAL PARTNERSHIP SCHEME

SARAH WADE
Research Manager,
Science Museum

THE COLLABORATIVE DOCTORAL PARTNERSHIP AT A GLANCE

The Collaborative Doctoral Partnership scheme (CDP) offers fully funded studentships for PhD study. Funded by the Arts and Humanities Research Council (AHRC), students following this route are jointly supervised by subject specialists at both a university and one of 25 Independent Research Organisations across the UK that make up the Collaborative Doctoral Partnership Consortium, including museums, libraries, archives and heritage organisations.

The Science Museum Group leads the Science Museums and Archives Consortium, comprising the Science Museum, National Science and Media Museum, Science and Industry Museum, National Railway Museum, Locomotion, BT Archives, the Royal Society and the Royal Geographical Society (with IBG). From 2020, these organisations are joined by the exciting addition of Royal Botanic Gardens, Kew. The CDP programme aims to facilitate collaboration between Higher Education Institutions and a diverse range of cultural organisations, encouraging projects and establishing links that can have long-term benefits for both collaborating partners and students alike.

Projects might take a variety of forms and appeal to students from various academic backgrounds, including but not limited to the history of science and technology, museum studies, history of art, the digital humanities and humanities-orientated conservation and learning projects. These PhDs might produce new knowledge about objects and collections across Science MUseum Group; help inform exhibitions or masterplan projects; explore digital and online museum activities; interrogate the history of the museums; explore books, papers and correspondences in the libraries and archives; create insight about audiences, participation and public engagement; or, use conservation techniques to address historical questions. The possibilities are endless and there is scope for CDP projects to take place in a whole range of departments within the group. Our aim is to develop projects that are embedded in the museums’ activities and which respond to strategic priorities across the group to benefit student, academic and museum alike.

A UNIQUE AND REWARDING PHD EXPERIENCE

To date, the Science Museums and Archives Consortium has awarded funding for 60 PhD projects, covering diverse topics. Railways, Meccano, vision aids, electronic music, scientific instruments and even false teeth have been the subject of recent PhDs. Co-supervisors are based in various university departments across the UK, reflecting the diversity and reach of the Science Museum Group’s collections and work.

Museum-based PhDs are unique in many ways, making them hugely enjoyable and equally rich and rewarding experiences. The collections, objects and displays that are available for study, as well as the museum expertise on hand, provide a brilliant resource and context for carrying out research. In addition, by being based at a national museum students are ideally placed to take advantage of the possibilities for public engagement work and developing professional skills that can be learnt at the museum. In fact, the CDP scheme provides an additional six months of funding for students to embark on just this sort of professional development activity, where they can hone particular skills based within the Science Museum Group or even carry out placements at other organisations.

The benefits of the CDP scheme are manifold for staff and students alike. For the Science Museum Group, collaborative PhDs offer a unique way to initiate an extended period of research on a specific area of interest, which might relate to the museums’ strategy, gaps in knowledge of the collections or to help inform new projects, whether these relate to masterplanning, exhibitions or collections development. They also provide a brilliant context in which museum staff can create links with colleagues in universities, by encouraging relationships to be forged and networks to be made through a shared research interest. For the Higher Education Institutes, museums across the Science Museum Group can be useful partners for public engagement and impact, which form an increasingly significant part of an academic’s role. Students themselves benefit from a wide ranging supervisory team, unrivalled access to collections and museum expertise, as well as a range of professional development opportunities throughout their studies.

BEYOND THE THESIS

The CDP scheme provides a fantastic opportunity for students to acquire new skills within a research-led, professional environment and to engage with the wider public at museums across Science MUseum Group. Students can get involved in wide-ranging work, from cataloguing collections, to public engagement through Lates events, or even writing blog posts and hosting academic events.

STUDENT DEVELOPMENT ACTIVITIES
AND RESEARCH PLACEMENTS

JOSHUA SCARLETT

As part of my student development placement, I am looking at updating records on the Science Museum’s internal database, MIMSY. Many of the records that concern objects, makers and people are automatically uploaded to the museum’s public website. As part of my PhD research into the collections, and to makers, I have been able to supply new, updated information to these records that will be of benefit and use to researchers both at and external to the museum. In some cases, biographies have been extended from a sentence to 500 words, providing much more detail. I am also working on a series of web narratives, as an editor and potential contributor, to accompany the new permanent *Science City* gallery. As the focus of my thesis is instruments made in London between 1650 and 1720, there is some overlap and there are areas where I am looking to compile a short, summative narrative on a topic connected to the gallery that can be uploaded to the website.



SARAH
MURPHY YOUNG

The International Placement Scheme (IPS) Fellowship provides an opportunity for AHRC/ESRC-funded doctoral students, early career researchers and doctoral level research assistants to access internationally renowned collections, programmes and expertise held by world-leading international institutions. I began my IPS Fellowship at the Smithsonian Institution, Washington DC in October 2019. The placement – four months in total – provide me with access to the N W Ayer & Son Advertising Agency records held by the National Museum of American History for the basis of the project, *‘Drink More Milk’: Networks of Promotion in New York State’s Milk Publicity Program, 1934–1941*. The project adds crucial breadth and depth to my PhD thesis, providing me with an opportunity to investigate the development of a vision of milk as a ‘perfect food’ in context of the transatlantic ‘professionalisation’ of the advertising industry.

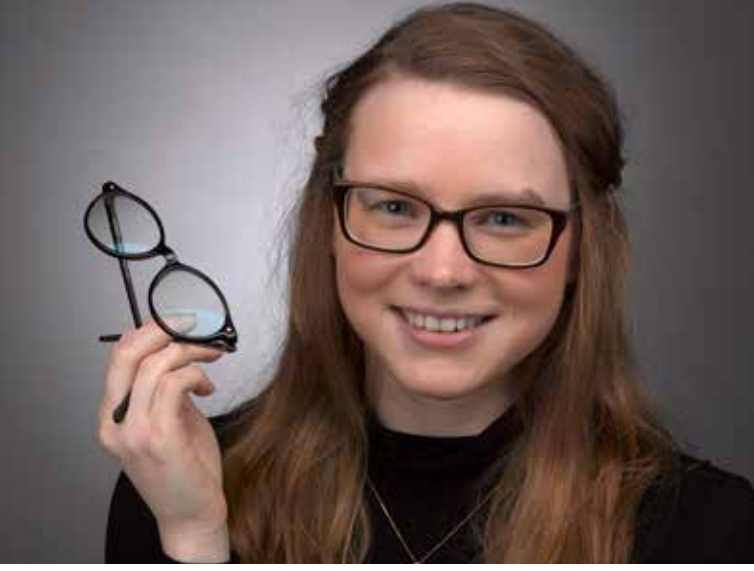


ABOVE:
Image: N W Ayer
Advertising Agency
Records, Archives
Center, National
Museum of American
History, Smithsonian
Institution



LEFT:
Spectacles and
spectacle case,
sunglasses, straight,
tortoiseshell, in
hinged cap
tortoiseshell covered
wood case, English,
1780–1860

RIGHT:
Collaborative
Doctoral Partnership
student Gemma
Almond



RECENTLY COMPLETED PHD STUDENTS

Gemma Almond: ‘Enhancing Vision in 19th-Century Britain’

This thesis drew upon 1,000+ spectacles, eyeglasses and vision testing equipment in the Science Museum’s ophthalmology and optics collections to explore how the measurement of vision and the use of vision aids changed across the century and how uncatalogued objects can be usefully used in historical research.

By analysing the retail, manufacture, design and use of vision aids it developed a three-fold argument. Firstly, that the advancement and professionalisation of opticians and medical knowledge of the eye led to the reconceptualisation of how vision aids were used, tested and sold. Secondly, that changes in manufacture and the sale of vision aids led to greater numbers being produced, and these were better suited for more long-term wear. Thirdly, that these two changes affected users of vision aids by improving their utility, as well as their accessibility. In doing so, it intersects a range of important areas of 19th-century history, including urbanisation, industrialisation, rise of print and education.

Additionally, it contributes to disability and medical history more broadly by demonstrating how an assistive technology can be used to challenge conventional thinking about impairment, medicalisation and the measurement of the body.

Kevin Tracey: ‘Calculating Value: Using and Collecting the Tools of Early Modern Mathematics’

Through detailed evaluation of the Science Museum Library’s Rare Books Collection, this thesis explores the use, ownership and subsequent collection of mathematical books produced between 1550 and 1750. Consisting of close to 1,700 titles published between 1486 and 1800 encompassing the pre-modern classification of mathematics, this subset of the Rare Books Collection represents a remarkable accumulation of the practical and the theoretical across a variety of disciplines and languages.

My thesis begins by characterising these mathematical holdings in aggregate, analysing the contents and physical features of the texts therein. Findings are supplemented by examination of accompanying provenance, including bindings, bookplates and signatures.

Discrete case studies then present key texts as part of their readers’ burgeoning mathematical practice, with chapters focusing on the spread of Ramist pedagogies of arithmetic, geometry and trigonometry in 16th-century Germany; the interconnected use of text, instrument and theory in early modern English intellectual and navigational cultures; and the value attached to the related disciplines of mathematical astronomy and chronology at the University of Cambridge in the late 1690s.

The thesis closes with a reconstruction of the library of the clergyman and mathematician, Nathaniel Torporley (1564–1632), tracing the journey of Torporley’s materials to the collection of the antiquarian Robert Brodhead Honeyman (1897–1987) and to the Science Museum thereafter. By placing the museum’s library and its holdings in their correct historical contexts, this thesis contributes to our understanding of mathematical culture in the early modern period, to the history of collecting in the modern era, and to the Science Museum’s understanding of its own holdings and of its role as an institutional collector.

OUR CURRENT STUDENTS

Current Collaborative Doctoral Award and Partnership Students

BELOW:
Studio portrait of Caroline Avery.
Collaborative Doctoral Partnership
PhD Student who is researching
'Making the pulse: the Reception of
the Stethoscope in nineteenth
century Britain, 1817–1870'



RIGHT:
Collaborative Doctoral Partnership
PhD student Rachel Boon whose
study is on The Post Office
Research Station, Dollis Hill c.
1935–1970. Photographed in the
Computing gallery



SCIENCE MUSEUM

CAROLINE AVERY

*Making the pulse: the reception of the
stethoscope in 19th-century Britain,
1817–1870*

University of Leeds

RACHEL BOON

*Dollis Hill Project B: the research life
of the established 'Station' in the 'long
Cold War' – analogue and digital era*

BT Archives, University of Manchester

CAITLIN DOHERTY

*Representations of flight: the 18th-
century imagination and modern
collections*

University of Cambridge

ALICE HAIGH

*'Research is the door of tomorrow':
the networks and culture of The Post
Office Research Stations, Dollis Hill,
c.1910–1939*

BT Archives, University of Leeds

REBECCA
KEARNEY

*'False Teeth for the Masses': artificial
teeth as technologies, prostheses and
commodities in Britain, 1848–1948*

University of Kent

GEORGINA
LOCKTON

*Science, technology and road safety
in the Motor Age*

Leicester University

FRANCES MORGAN

*Electronic music studios in musical,
commercial and international
perspective*

Royal College of Art

SARAH
MURPHY-YOUNG

*Constructing and consuming imagined
futures: advertising healthcare to
publics and professionals in 20th-
century Britain*

University of Leeds

TOM RITCHIE

Meccano: the nuts and bolts of science

University of Kent

SCIENCE MUSEUM

JOSHUA SCARLETT

Instruments and their makers: a study of experiment, collaboration and identity in 17th-century London Royal Society

University of York

OSNAT KATZ

From London to Mars, and Back to London: People, Objects and the History of UK Space Science

University College London

NATASHA KITCHNER

‘Song, Mirth, & Music’: Broadcasting before broadcasting – A comparative approach to the history of the Electrophone, 1894–1938

BT Archives, King’s College London

DOM WELDON

Mapping the historical growth and cultural context of the British fixed line network

BT Archives, King’s College London

RIGHT:
Studio portrait of Tom Ritchie, Collaborative Doctoral Partnership PhD Student who is researching ‘Meccano: The nuts and bolts of science’



NATIONAL SCIENCE AND MEDIA MUSEUM

JAYNE KNIGHT

A Museum within the Museum: The Kodak Collection at National Science and Media Museum

University of Brighton

EMILY MARSDEN

Media in the First World War

Durham University

REBECCA SMITH

The Daily Herald: popular desires and managing the production of photographs

De Montfort University

FRANCESCA STROBINO

Investigating Talbot’s experiments in photomechanical printing

De Montfort University

SCIENCE AND INDUSTRY MUSEUM

ERIN BEESTON

Spaces of industrial heritage: a history of uses, perceptions and remaking of the Liverpool Road Station site, Manchester

University of Manchester

PAUL COLEMAN

Danger – High Voltage: the rise of megavolt electricity supply in 20th-century Britain

University of Leeds

FRANCESCA ELLIOTT

Power-assisted learning? Exhibiting, interpreting and teaching on technology in the 20th-century industrial city

University of Manchester

CAMERON TAILFORD

Making electronics in interwar Britain: gendered labour in the thermionic valve industry

University of Leeds

NATIONAL RAILWAY MUSEUM

ELIZABETH ADAMS

Literary cultures, social networks and the railway worker, 1840–1920

University of Stirling

CHLOE SHIELDS

Eating On The Go: Cultures of Consumption and the Railway in Britain, 1840–1940

University of Strathclyde

AMANDA STEVENS

Home on the rails: the design, fitting and decoration of train interiors in Britain c.1920–1955

Open University

SOPHIE VOHRA

Railways and commemoration: anniversaries, commemorative cultures and the making of railway history

University of York

NEW STUDENTS STARTING IN 2019

BELOW:

Calotype negative by William Henry Fox Talbot of a statuette of a four-legged winged creature



OSNAT KATZ

From London to Mars and back to London: people, objects and the history of UK space science

This PhD project aims to untangle the unique British history of space science, which has largely been subsumed into European and American histories, or which has been interpreted from declinist and nationalist perspectives. By combining the use of oral testimony from scientists, technicians and administrators who worked at the Mullard Space Science Laboratory with objects held by the Science Museum and the Mullard Space Science Laboratory, this project will establish and interpret a social and cultural history of British space science, and will trace the influence of British space science on space missions globally.

NATASHA KITCHNER

Media convergence before convergence: the case of the Electrophone

The Electrophone has been described as the Victorian smartphone. Enabling people to listen to live theatre, music concerts and sermons from the comfort of their own home, the Electrophone was a form of broadcasting that emerged at the end of the 19th century, many years before the wireless was introduced to Britain. Using a media-archaeology approach this project will explore what the Electrophone can tell us about media from 1897–1925, as well as what relevance this early case of convergence has today.

RIGHT:

Calotype negative by William Henry Fox Talbot, copy of a portrait of a child



JAYNE KNIGHT

A museum within a museum: the Kodak Collection at the National Science and Media Museum

This research project will re-evaluate the Kodak Collection at the National Science and Media Museum. Determining its significance as a collection dedicated to popular photography I will consider where a collection as unique as this sits within broader contemporary histories of photography. I will be exploring what value this collection has to audiences and researchers alike in understanding the significance of popular photography. Examining the Kodak Collection's position and relevance to the National Science and Media Museum and its audiences at a time of dramatic change in both the photographic industry and in museum culture, this project will inform the direction of photographic collections and displays of the future.

CHLOE SHIELDS

'Eating on the Go': cultures of consumption and the railway in Britain, 1840–1940

In the decades surrounding the end of the 19th century and the beginning of the 20th, Britain's railways were at their zenith. Size, complexity and dominance over the travelling market meant that the railway experience touched all levels of society. This project will explore the social, economic and political structures that framed food and eating experiences on Britain's railways. Utilising the world-class collection of the National Railway Museum (and wider Science Museum Group) featuring disposable cups and an array of crockery to Victorian dining saloons, to explore how people ate, what they ate and how they felt about it.

FRANCESCA STROBINO

Investigating Talbot's experiments in photomechanical printing

Utilising the under-researched collections in the National Science and Media Museum of William Henry Fox Talbot's experiments with photomechanical printing, this project will investigate the history of photographic printing through an interdisciplinary approach. I will investigate this collection from the perspective of the histories of photography and science as well as through a practice-based method, which will look to recreate Talbot's photomechanical printing process.



SCIENCE MUSEUM GROUP PUBLICATIONS

Bailey, Muriel 'Contributions', in *The Medicine Cabinet: The Story of Health and Disease*, edited by Selina Hurley and Natasha McEnroe (London: André Deutsch, 2019)

'Modelling Life: Exploring the Human Body', in *Medicine: An Imperfect Science*, edited by Natasha McEnroe (London: Scala, 2019)

Baines, Sarah 'From 2D to 3D: The story of graphene in objects', *Science Museum Group Journal*, 10 (2018)

Barrett, Katy 'Experiments in Art: A New Science Gallery in London', *Burlington Contemporary*, 2019

'On My Bookshelf: Headlong, by Michael Frayn', *Museums Journal*, 2018, p 56

'Pelicans, Fossils and Fingered Lemons – Recreating the Paper Museum of Cassiano Dal Pozzo', *Apollo Magazine*, July 2019

'Project Moon: Satirising Our Satellite', in *The Moon: A Celebration of Our Celestial Neighbour*, ed. by Melanie Vandenbrouck (Harper Collins and National Maritime Museum, 2019), pp 140–45

'Royal Airforce Museum – Review', *Museums Journal*, 2018

'Tacita Dean: Landscape, Portrait, Still Life', *Science Museum Group Journal*, 10 (2018)

"Vesalius's *On the Fabric of the Human Body*" and "Barbara Hepworth's *Surgery Sketchbook*", in *The Medicine Cabinet: The Story of Health and Disease Told through Extraordinary Objects*, edited by Selina Hurley and Natasha McEnroe (André Deutsch, 2019), pp 12–13 and 108–9

Barrett, Katy, and Laura Humphreys 'Technologies of Romance: Introduction', *Science Museum Group Journal*, 12 (2019)

Blatchford, Ian, and Tilly Blyth *The Art of Innovation: From Enlightenment to Dark* (Bantam Press, 2019)

Bond, Sarah 'Contributions', in *The Medicine Cabinet: The Story of Health and Disease*, ed. by Selina Hurley and Natasha McEnroe (London: André Deutsch, 2019)

'Emotional Objects: Faith and Feeling in the Medicine Collection', in *Medicine: An Imperfect Science*, ed. by Natasha McEnroe (London: Scala, 2019)

Boon, Tim '1962: "What Manner of Men?" Meeting Scientists through Television', *Public Understanding of Science Series on 'Historic Moments in PUS'*, 2018

'Contributions', in *The Medicine Cabinet: The Story of Health and Disease*, edited by Selina Hurley and Natasha McEnroe (André Deutsch, 2019)

'Peter Bradford Obituary', *The Guardian*, 10 October 2019

Boyle, Alison 'Modern Physics in the Museum: Shaping a UK National Collection in the Twentieth Century', *Journal of the History of Collections*, 31.3 (2019), pp 487–502

Bruton, Elizabeth 'From Theory to Engineering Practice: Shared Telecommunications Knowledge between Oliver Heaviside and His Brother and GPO Engineer Arthur West Heaviside', *Philosophical Transactions of the Royal Society A: Celebrating 125 Years of Oliver Heaviside's 'Electromagnetic Theory': Physical Sciences Papers and Historical Perspectives*, 2018

'The life and material culture of Hertha Marks Ayrton (1854–1923): suffragette, physicist, mathematician, and inventor', *Science Museum Group Journal*, 10, 2018

Bruton, Elizabeth, and Graeme Gooday 'Towards a Longer History of British Women in Engineering', *Viewpoint: The Magazine of the British Society for the History of Science*, October 2018

Clarke, Imogen 'Contributions', in *The Medicine Cabinet: The Story of Health and Disease*, edited by Selina Hurley and Natasha McEnroe (London: André Deutsch, 2019)

BELOW:

Hertha Mark's Ayrton, from *The life and material culture of Hertha Marks Ayrton (1854–1923): suffragette, physicist, mathematician and inventor* by Elizabeth Bruton



Connelly, Charlotte 'Climate Hack: Rapid Prototyping New Displays in Multi-Disciplinary Museums', in *Addressing the Challenges in Communicating Climate Change Across Various Audiences*, edited by Bettina Lackner, Walter Leal Filho, and Henry McGhie (New York: Springer, 2018), pp 517–30

Connelly, Charlotte, and Claire Warrior 'Survey Stories in the History of British Polar Exploration: Museums, Objects and People', *Notes and Records: The Royal Society Journal of the History of Science*, 73.2 (a special issue 'Nineteenth-century survey sciences: enterprises, expeditions and exhibitions' organised and edited by Simon Naylor and Simon Schaffer) (2019), pp 259–74

Coulls, Anthony, 'Journey with Maps – An Early Railway in Sierra Leone?', in *Early Railways 6*, edited by Anthony Coulls (Six Martlets, 2019), pp 259–69

Stationary Steam Engines (Stroud: Amberly Publishing, 2019)

The Slate Industry (Stroud: Amberly Publishing, 2019)

Dabin, Katie 'Contributions', in *The Medicine Cabinet: The Story of Health and Disease*, edited by Selina Hurley and Natasha McEnroe (London: André Deutsch, 2019)

Davies, Jack 'Contributions', in *The Medicine Cabinet: The Story of Health and Disease*, edited by Selina Hurley and Natasha McEnroe (London: André Deutsch, 2019)

'Created Through Conflict: The Development of Military Medicine', in *Medicine: An Imperfect Science*, edited by Natasha McEnroe (London: Scala, 2019)

Desborough, Jane *The Changing Face of Early Modern Time, 1550–1770* (London: Palgrave Macmillan, 2019)



LEFT:
Ivory netsuke, in the form of a rabbit grinding with a mortar and pestle, Japanese, 18th or 19th century, from *The Medicine Cabinet: The Story of Health and Disease*, edited by Selina Hurley and Natasha McEnroe



RIGHT:
Replica of Nobel medal, 2010. From *2D to 3D: the story of graphene in objects*, by Sarah Baines

Dunn, Richard 'Using the Moon', 'The Telescopic Revolution' and 'The End of the Beginning: Imagining the Lunar Voyage', in *The Moon*, ed. by Melanie Vandenbrouck, Megan Barford, Louise Devoy and Richard Dunn (Collins/Royal Museums Greenwich, 2019)

'Muito ocupado trocando chapas: astronomia sob tendas' / 'Too busy changing plates: Astronomy under canvas', in *O Eclipse de 1919/The Eclipse of 1919*, ed. by Marília Pessoa (Observatório Nacional, Rio de Janeiro, 2019), pp 164–183

'Weighing light in the tropics: the 1919 eclipse', *Astronomy & Geophysics*, 60.2 (2019), pp 30–31

Dunn, Richard and Megan Barford 'Scientific instrument collections in the creation of the National Maritime Museum, Greenwich', *Journal of the History of Collections*, 31 (2019), pp 503–517

Emmens, Stewart 'Contributions', in *The Medicine Cabinet: The Story of Health and Disease*, edited by Selina Hurley and Natasha McEnroe (London: André Deutsch, 2019)

'Prostheses at the Science Museum – Peg-Legs, Pylons and the Pianist's Arm', in *Medicine: An Imperfect Science*, edited by Natasha McEnroe (London: Scala, 2019), pp 39–65

Hanaway-Oakley, Cleo 'Colour Blindness on the Move: A Brief Literary and Cultural History', University of Bristol, 2019

Highfield Roger, Shannon Jones, Christopher J Scott, and Chris Lintott 'The Visual Complexity of Coronal Mass Ejections over a Solar Cycle', (ePoster, AGU Fall Meeting, 2019)

Hurley, Selina 'Collecting Medicine: Routes and Roots of Medicine at the Science Museum', in *Medicine: An Imperfect Science* (London: Scala, 2019)

Hurley, Selina, and Natasha McEnroe editors, *The Medicine Cabinet: The Story of Health and Disease* (London: André Deutsch, 2019)

Lawrence, Isabelle 'Contributions', in *The Medicine Cabinet: The Story of Health and Disease*, edited by Selina Hurley and Natasha McEnroe (London: André Deutsch, 2019)

'Faith, Hope & Fear: Interpreting the Human Experience of Medicine and Health at the Science Museum', *Social History in Museums*, 2019

Liffen, John 'A Trevithick Portrait Puzzle', *Railway & Canal Historical Society Early Railway Group Occasional*, Paper 248 (2019), pp 1–4

'Premium Payments of Trevithick and Vivian's High-Pressure Steam Engine Patent of 1802', *Railway & Canal Historical Society Early Railway Group Occasional*, Paper 246 (2019), 1–13

'The Lakeside Miniature Railway at Alexandra Palace', *Hornsey Historical Society Bulletin*, 60 (2019), pp 7–13

McEnroe, Natasha editor, *Medicine: An Imperfect Science* (London: Scala, 2019)

Rose, Alexandra, and Jane Desborough *Science City: Craft, Commerce and Curiosity in London, 1550–1800* (London: Scala, 2019)

Russell, Ben 'Book review: *The Life and Legend of James Watt* by David Phillip Miller', *Science Museum Group Journal*, 12, 2019

'Object Contributions', in *The Power to Change the World: James Watt – a Life in 50 Objects*, edited by Kate Croft and Malcolm Dick, 2019

Stienne, Angela 'Egyptian Mummies and Their Stories in Museums', *Nile Scribes*, 2019

'"To Turn Round a Dead": Engagements with Egyptian Mummies in London at the Turn of the Nineteenth Century', *Papers from the Institute of Archaeology*, 28.1

'What next for Human Remains Collections at the World Museum Liverpool?', *Liverpool Museums Blog*, 2019

Vandenbrouck, Melanie, Megan Barford, Louise Devoy and Richard Dunn (eds) *The Moon* (Collins/Royal Museums Greenwich, 2019)

Wade, Sarah 'Contributions', in *The Medicine Cabinet: The Story of Health and Disease*, edited by Natasha McEnroe and Selina Hurley (London: André Deutsch, 2019)

SCIENCE MUSEUM GROUP PRESENTATIONS

Alegre Leonel, Haydn Antoniw, Stefan Fahrngruber, and Pippa Hough, 'When Is an Exhibition No Longer an Exhibition?' (presented at the ECSITE, Experimentarium, Copenhagen, 2019)

Applebaum, Vanessa 'Preserving Biodegradable Plastic Masks at the Science Museum' (presented at the New Perspectives: Contemporary Conservation Thinking and Practice (Institute of Conservation Triennial Conference), ICC Belfast, Waterfront Hall Belfast, Northern Ireland, 2019)

Atienza, Dacha, Michiel Buchel, Diana Escobar Vicent, Pippa Hough, and Weibke Rössig 'Science Engagement Organisations as Citizen Labs' (presented at the ECSITE, Experimentarium, Copenhagen, 2019)

Bailley, Muriel 'Double-Helix History: DNA and the Past' (University of Manchester, 2019)

Baines, Sarah, and Francesca Elliot "I Needed to Be as Good as the White Engineers, or Better": Bringing Diverse Workers' Voices to the Science and Industry Museum's Power Hall' (presented at the Artefacts XXIV Meeting, Edinburgh, 2019)

Barrett, Katy 'Keynote' (presented at the Visual Intersections Conference, Durham, 2019)

Barrett, Katy, and Natasha McEnroe, 'Peopling the Medicine Galleries at the Science Museum' (presented at the Curating the Medical Humanities, Birkbeck College, 2018)

Beeston, Erin 'Collaborative Doctoral Thesis Lightning Talk' (presented at the European Researcher's Night, Manchester, 2019)

Belknap, Geoffrey 'Capturing Time: Photography and the Measurement of Time in the 19th Century', 2019

'Challenges of a Photography Curator: Photography. Print Media and the Daily Herald' (presented at the Invited Lecture for the Yorkshire Philosophical Society, York, UK, 2019)

'Fixing Photography with Ink', 2019

'Making Scientific Collections Relevant' (presented at the ECSITE Conference, Copenhagen, Denmark, 2019)

Berg, Thomas B, Pippa Hough, Dobrivoje Lale Eric, Marina Leonard, and Catherine Murphy 'Using Performing Arts in Scientific Organisations' (presented at the ECSITE, Experimentarium, Copenhagen, 2019)

Binks, Chris 'Case Studies: Conservation & Restoration. "Dynamometer – a Legend Refreshed"' (presented at the ABTEM Late Autumn Seminar: Operating and Conserving Historic Industrial & Transport Collections, London, 2018)

Boal, Adam 'Bringing in the Experts without Shutting out the Public' (presented at the Playful Learning 2019, University of Leicester, 2019)

'Engagement Events in Museums' (Science Museum, 2019)

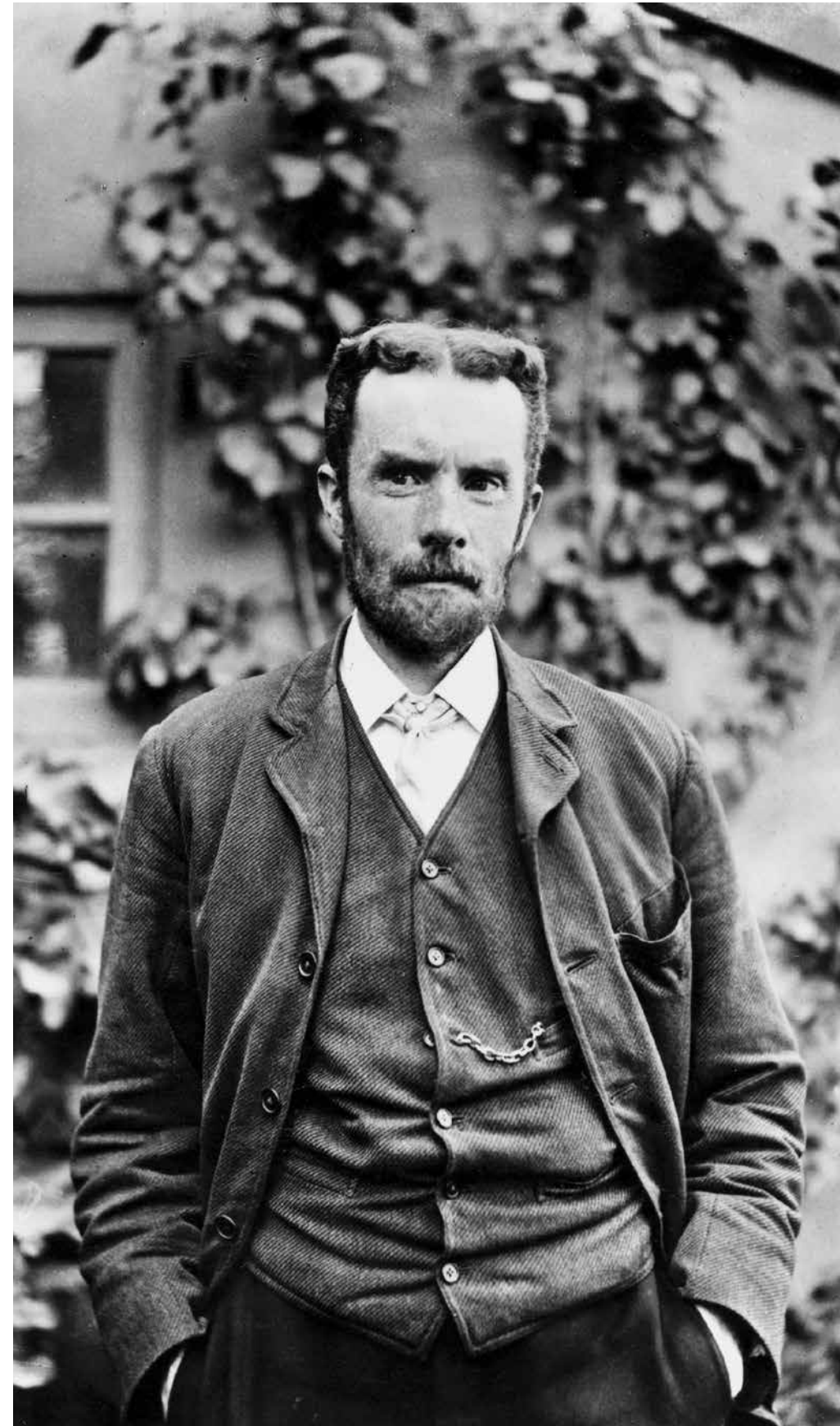
Boon, Rachel 'Institutional History, Classified Information and the Military/Civilian Divide Researching the Post Office Research Station', 2018

Boon, Tim 'Cultivating Research in the Science Museum Group', 2019

'Introduction to Screening of *The World Is Rich* (1947)' (presented at the Envisioning the World film series, Close-Up Film Centre in London, British Academy, 2019)

'Objects or Narratives?: The (Ir) Relevance of Collections at the Mid 20thc Science Museum' (presented at the Artefacts Conference, Adler Planetarium, Chicago, 2018)

'On the Early Postwar Public Culture of History at the Science Museum, London' (presented at the HSS, Utrecht, 2019)



LEFT:

Oliver Heaviside, English physicist, c 1900. Heaviside (1850–1925) was a founder of the theory of cable telegraphy, as discussed by Elizabeth Bruton

'Performing Science on Television... and Other Stories', public lecture, University of Leeds, 29 October 2018

'Science at the Royal Society's Tercentenary, 1960: International, Universal, Inductive' (presented at the AHRC/Russian Foundation for Basic Research conference, Moscow, Russia, 2019)

'Science at the Royal Society's Tercentenary, 1960: International, Universal, Inductive' (presented at the Science in Public conference, Manchester, 2019)

'Science Museums and Other Media: How They Have Interacted, and How They Might' (presented at the Museum Seminar Series, Medical Museion, Copenhagen, 2019)

Boyle, Alison 'Material Heritage on the Map: One Field, or Many?' (presented at the Scientific Instrument Symposium, Museum Boerhaave, Leiden, Netherlands, 2019)

Bradford, Jessica 'Open Up: Making More of Stored Collections' (presented at the Museum Association conference, British Museum, London, 2018)

Bradford, Jessica, and Alexandra Fullerlove 'New Frontiers for the Science Museum Group Collection' (presented at the Open Up: Making More of Stored Collections', British Museum, London, 2018)



LEFT:
'Iron lung' dialysis machine, as discussed by Farrah Lawrence-Mackey

Brooks, Lawrence 'Make Do and Digitise' (presented at the Axiell European Users Meeting, British Film Institute, London, 2019)

Bruton, Elizabeth 'From Theory to Engineering Practice: Shared Telecommunications Knowledge between Oliver Heaviside and His Brother and GPO Engineer Arthur West Heaviside' (Science Museum, London, 2019)

'Hertha Ayrton (1854–1923): An Electric Woman' (presented at the Heroine's Journey night – stories for inspiring women, London, 2019)

'The Romance Novel and Electric Telegraphy in the Nineteenth and Twentieth Centuries' (presented at the Technologies of Romance Symposium, Science Museum, London, 2018)

Bruton, Elizabeth, and Graeme Gooday 'Flying Caps and Throat Microphones: Solving the Problems of Aviation

Communication in World War 1', in *Sonic Imperium: Sound and the State in the Twentieth Century* (HSS Utrecht, the Netherlands, 2019)

Burden, Louisa 'Not Interested in Temperature Control? Environmental Parameters for Robust Collections' (presented at the Museum and Heritage Show 2019, London, 2019)

Chaillie, Laura 'SmartSourcing: Overcoming the Limitations of Smartphone Technologies' (presented at the American Institute of Conservation (AIC): Annual Conference, HeritageDot Conference, Institute of Conservation (ICON): Triennial Conference, Mohegan Sun; Uncasville, Connecticut, USA, University of Lincoln; Lincoln, ICC Belfast – Waterfront Hall; Belfast NI, 2019)

Clarke, Imogen 'Romantic Notions of Tuberculosis: Objects, Arts & Science', 2018

Cliff, Alice 'Collections and Everyday Life: An Interdisciplinary Approach to Objects and Practice', 2018

Connelly, Charlotte 'Survey Sciences in British Polar Exploration' (presented at the Forschungskolloquiums zur Neueren Geschichte, Wintersemester 2018–2019, University of Bremen/ German Maritime Museum, 2018)

Davies, Jack, and Laura Humphreys 'Tampons to Mooncups and Pads to Period Pants: Modernising Menstruation at the Science Museum' (presented at The Material Culture of Health Activism, Science Museum, London, 2019)

Elliot, Francesca 'Collaborative Doctoral Research Summary', 2019

Francescutto Miro, Adriana, and Marisa Kalvins 'Conserving World Cultures for the Medicine Galleries' (presented at the ICON 2019 Triennial Conference – New Perspectives:

Contemporary Conservation Thinking and Practice, ICC Belfast Waterfront Hall, Belfast, Northern Ireland, 2019)

Grimshaw, Fiona 'Managing Budgets, Purchasing, Tendering and Contracts' (presented at the MA International Cultural Heritage Management Workshop, University of Durham, Department of Archaeology, 2018)

Hanaway-Oakley, Cleo 'Literature and Colour Vision from Dickens to Joyce', 2019

'Multifocal Modernism: Engaged Research through Literary Lenses' (presented at the Medical Humanities Strands, University of Bristol, 2018)

'Seeing Red (or Maybe Green): Colour Blindness in Literature and Culture, c.1860–1940', 2019

'So Difficult to Render in Colourless Words': Modernism and Colour Vision', 2019

Hicks, Jan 'All Electric Housing: The Use Of Model Homes To Introduce Electricity Into The Domestic Setting In Early 20th Century Britain', 2018

'Object Based Energy Communication', 2018

'Science and Industry Museum Archive Collections and Post-War Infrastructure', 2019

'The Hybrid Record Keeper', 2018

Highfield, Roger 'IVF at 40 with Louise Brown and Prof Roger Gosden', (Science Museum, 25 July 2018)

Science Writing Masterclass (Dunn School, University of Oxford, 23 August 2018)

Interview with Baron John Prescott about Kyoto Protocol (British Science Festival, 12 September 2018)

MRC Max Perutz Prize Judge, 5 October 2018 and 17 Sept 2019

Session Curator at *Wired* Live with Angela Saini and Hannah Fry (Tate Modern, 1 November 2018)

In conversation with Sir Patrick Vallance, Government Chief Scientist, Lates, 28 November

Contributor to the *Beagle 2* meeting (Dana Library and Research Centre, 19 December 2018)

European Patent Office European Inventor Award Judge, 10 Jan 2019

Inaugural lecture as visiting professor of public engagement (UCL Department of Chemistry, 25 March)

Event with Dr Brian May and Lord Rees, Astronomer Royal (IMAX, 24 May)

Hay Festival event with Mark Miodownik of UCL and Lucy Cooke, 25 May

GCHQ event with Technical Director of NCSC Ian Levy (Cheltenham Science Festival, 5 June)

JLF event with Sir Venki Ramakrishnan, President of the Royal Society (British Library, 14 June)

Quantum computing event with Jim Al Khalili of University of Surrey, UCL CompBioMed consortium (IMAX, 25 September)

Hine, Adrian 'Accelerating Digitisation to Build an Online Museum' (presented at the Symposium: Experiences in collections digitalization: cooperation as a strategy to amplify access, Fiocruz, Rio de Janeiro, Brazil, 2019)

'One Collection: A Once in a Lifetime Opportunity to Digitise, Preserve and Make Discoverable the Science Museum Collection' (presented at the Preservation of Memory of the Electrical Energy Sector, Museu de Arte do Rio, Rio de Janeiro, Brazil, 2019)

'One Collection: Building an Integrated Inventory, Digitisation & Movement Workflow' (presented at the Axiell European Users Meeting, British Film Institute, London, 2019)

Howles, Matthew 'Staging a Demonstration: The Natural Philosophy Experiment Re-Imagined at London's Science Museum' (presented at the XXXVII Scientific Instrument Symposium, Teylers Museum, Haarlem, The Netherlands, 2018)

Hurley, Selina 'Object Talk' (presented at the Sensing the Machine-Body Interface, Science Museum, London, 2019)

'Presentation at Making Sense of Museums' (presented at the Senses Research Cluster seminar, University of Bristol, 2019)

'Retracing the Life of the Science Museum's Bed Cycle' (presented at the Mechanical Medicine: Exploring the History of Healing, Manipulation and Massage, Science Museum, London, 2019)

Kingston, Charlotte 'Displaying the Innovative, Capturing the Future' (presented at the T2M Conference: Mobilities and Materialities, Sorbonne and Campus Condorcet, Paris, France, 2019)

Lawrence-Mackey, Farrah 'Life Support Sounds: Some Thoughts on Human and Non-Human Sound on the Iron Lung and Dialysis' (presented at the Sounding the Archives Master Class, Wellcome, 2019)

'Sensing Space on Dialysis', 2019

'Sound and the Iron Lung' (presented at the European Association of the History of Medicine, University of Birmingham, 2019)

'When Wood Becomes Iron: Metaphor and Emotion in the Negative Pressure Ventilator' (presented at the Surgery and Emotions Conference, University of Roehampton, 2019)

Leksard, Marta 'The Hempcrete Museum Store – Assessing the Performance of a Prototype Low-Energy Museum Storage Building' (presented at the Auf Dem Weg Zum Plusenergie-Depot; Fraunhofer-Institut für Bauphysik IBP, Rautenstrauch-Joest-Museum, Cologne, Germany, 2019)

Liffen, John 'Webb's Wooden Rockets' (presented at the Institute of Railway Studies Seminar, National Railway Museum, York, 2019)

MacNicol, Emma, Hattie Lloyd, and Donata Miller 'One Collection and Diverse Narratives' (presented at Artefacts 2019, National Museum of Scotland, Edinburgh, 2019)

McEnroe, Natasha 'In Sickness & In Health: Exploring Medical History Collections' (Wellcome, 2018)

'Jon Baines Tours Lecture' (Royal Geographical Society, 2018)

Paquin, Sheldon 'Adapting Interpretations in Travelling Exhibitions for Diverse Cultural Contexts' (presented at the Ecsite 2019, Experimentarium (Copenhagen), 2019)

'How to Talk to the Public about AMR' (presented at the AMR ABPI Parliamentary Information Session, Parliamentary Committee Room 18, Westminster, 2018)

'Measuring the Scale of Antimicrobial Resistance in China in a Global Context' (presented at the AMR Symposium, Guangdong Science Centre (Guangzhou, China), 2019)

Rawlins, Sarah 'Above the Noise: Co-Curating Post Industrial Bradford' (presented at the Science Museum Group Research Conference, Science and Industry Museum, Manchester, 2019)

'Designing Hot Topic Exhibitions' (presented at the Museums and Heritage Show, Olympia, Earls Court, London, 2019)

'Exhibition Interpretation' (presented at the Guest seminar tutor for MA in Art Gallery and Museum Studies, and MA in Art Management and Heritage Studies, Faculty of Fine Art, History of Art and Cultural Studies, University of Leeds, 2019)

'Museums and PhDs' (presented at the Northern Bridge Consortium PhD Summer School, Raddison Blu Hotel Conferencing Suites, Durham, 2019)

Russell, Ben 'A Curator at the Height of His Powers: H W Dickinson and James Watt, 1919–1930', 2019

'Curatorial Cultures: The Professional Life of H W Dickinson, 1919–1930', 2018

'Filth, Farting and Explosions: The Pursuit of Beauty in Machine Design, 1800–1840', 2018

'Preserving the Dust: James Watt and Industrial Iconography' (presented at the James Watt: Innovation, Culture and Legacy' Conference, University of Birmingham, 2019)

'Science, Art and Machines: Benjamin Cheverton and the Mechanical Reproduction of Sculpture'

Saggar, Shelley "A Civilising Mission without Parallel": Working through the Inheritance of Henry Wellcome's Collections' (presented at the Ailing Empires: Medicine, Science & Imperialism symposium, Edinburgh, 2019)

"How Do You Solve a Problem like a Science Museum?" Researching Culturally Sensitive Items in the WHMM Collections', 2019

'Researching Culturally Sensitive Items in the Wellcome Historical Medical Collections' (presented at Postcolonial Heritage, University of Sussex, 2019)

'Restoring Mana, Recovering Story: Researching Culturally Sensitive Items in the WHMM Collections' (presented at the Medicine Galleries Research Seminar, Science Museum, London, 2019)

Sharman, Anne 'Making Data Public: Medicine, Mimsy and Collections Online' (presented at the Mimsy UK Users Group Conference, National Museums Liverpool, 2019)

Simões da Silva, Nicole 'Are You Aware of Hazard Due Diligence?' (presented at the European Registrars Conference, London, Queen Elizabeth Conference Centre, 2018)

Steinne, Angela 'Egyptian Mummies as Displaced People' (presented at the Refugee Week, New Walk Museum, Leicester)

'Egyptian Mummies in Museums: New Perspectives' (presented at the School of Museum Studies Summer School, University of Leicester, Leicester, 2019)

'Encounters with Egyptian Mummies at the Louvre' (presented at the Friends of the Petrie Museum Lecture, Petrie Museum of Egyptian Archaeology, London, 2019)

Thirlaway, Khalil, 'Race, Gender and Technology in Science-Fiction' (presented at the Science Fiction Research Association's 2019 annual conference, Maison Francaise d'Oxford, Hawaii)

Wade, Sarah 'I'm Sorry for Your Loss: Apology and Animal Death in Contemporary Art' (presented at Measuring the Silences and the Work of Mourning: Extinction and the Anthropocene, King's College London, 2019)

'Sensing Ecology with Art & Science' (presented at Making Sense of Museums, University of Bristol (part of the Centre for Health, Humanities & Science Senses Research Cluster), 2019)

'Sexy Beasts & Saving Wildlife: "Pornographic" Ecology in Contemporary Art & Visual Culture' (presented at Sex and Nature: 1800–2018, University of Exeter, 2019)

'The Extinction Effect: Ethical Animal Bodies in Contemporary Art' (presented at Animal Remains, University of Sheffield, Sheffield Animal Studies Research Centre, 2019)

Wade, Sarah, and Pandora Syperek 'Curating the Sea, Maritime Animals: Telling Stories of Animals at Sea' (National Maritime Museum, 2019)

Wilson-Stephens, Edward 'Objects of Electronic Sound and Music in Museums: Exhibitions and the Sonic-Tactile Dimensions of Objects' (presented at the Collections Management Study Day, University of Leeds, 2019)

Wolstenholme, Zoe 'Scottish Lines Societies Photographic Archive Volunteer Project' (presented at the Scottish Railway History Conference, Perth, 2019)

Yates, Emily 'One Collection: Harnessing Digital Technology for Collections Moves' (presented at the ICON Triennial Conference: New Perspectives: Contemporary Conservation Thinking and Practice, Belfast, Northern Ireland, 2019)

Young, Georgina 'Collections Development Theory and Practice' (presented at the University of Manchester Art Galleries and Museum Studies MA taught session, Manchester, 2018)

'Re-Presenting the Past at the Science and Industry Museum' (presented at the Science in Public Conference, Manchester, 2019)

BELOW:

Biodegradable plastic mask used in radiotherapy, as discussed by Vanessa Applebaum



OPPORTUNITIES TO STUDY AND RESEARCH WITH US

TIM BOON

Head of Research and Public History, Science Museum



The Science Museum Group's research ethos is intrinsically collaborative: we enjoy working with colleagues in the universities and other heritage organisations who share our passionate interest in museum collections and the public culture of science – including museum audiences and museum possibilities. This is evident throughout the pages of this report. Increasingly across the Group, we host a wide range of researchers and students, all contributing to the museums' programmes at the same time as they pursue research that will be submitted, published or performed under their own names.

THINKING OF A DOCTORATE?

Our doctoral programme is one example; each student has a supervisory team that brings together university-based researchers with museum-based professional staff. The conversations around the development of the students' projects enact the dialogue between museums and universities. Would you like to supervise a student or be a doctoral student at the Science Museum Group? Most of our students are supported by our collaborative doctoral partnership funded by the Arts and Humanities Research Council. Our consortium – which includes all the museums of the Science Museum Group alongside the Royal Society, Royal Geographical Society, Kew Gardens and BT Archives – currently awards six studentships per annum. Early each summer we publish a document outlining the subject areas in which we are most interested, and arrange meetings where potential supervisory teams can discuss potential projects.

This reflects the Science Museum Group's priority research areas, which can be found in the Science Museum Group Research Strategy

LEFT:

Archivist Jan Shearsmith in the archival collections

(see: <https://www.sciencemuseumgroup.org.uk/our-work/research-public-history/>). These priorities are regularly reviewed so that they align with the museums' forward programmes. We invite colleagues in the museums and universities to work together to propose doctoral projects that address those areas for a first-round closing date in September, with the shortlisted projects being submitted by late November.

A panel selects the best projects in January, after which the universities advertise the studentships to start in the following October. It is worth mentioning that prospective students are sometimes closely involved in writing these proposals, and that this approach provides an alternative route to self-determined study for those who have particular interests in material culture or museums. If this interests you, we can connect you with a potential supervisory team. Increasingly, we also welcome students funded under other schemes, and indeed by other funders, to work in our Research Centre and on our collections.

CONSIDERING MASTERS STUDY?

In London, we teach 'curating science and technology' a ten-week option within UCL's Science and Technology Studies MSc programme. This provides students, who may come from science or humanities first degrees, with insights into the ways in which the history of science – as broadly conceived – is done in museums. The option has a particular stress on objects, the material record of the practice of science, technology and medicine in the past – including the recent past. Students learn from a wide range of case studies taught by

a dozen curators, looking into the 95 per cent of the museum's collections not on display, and the 5 per cent that is; and exhibitions that have been completed and remain on display, as well as those in development. We consider key technologies from astrolabes to rockets and stretchers to phonographs; students learn how the museum goes about tackling the large-scale and sometimes unwieldy material culture associated with infrastructure or sound, for example. Some students stay on to write their dissertations with us; there is a near infinity of museum objects that can be the focus of a long essay informed by the readings and debate across the whole MSc.

For individuals with doctorates, at whatever career stage they have reached, we have fellowship and associateship schemes that are designed to support long-term relationships and targeted research projects. Our small number of associates are fellow travellers on particular research journeys. These individuals may be spending a research sabbatical with us, or may become fellows when funding becomes available. Our fellows are supported by a variety of agencies, including United Kingdom Research and Innovation (UKRI), the Wellcome Trust and European funding bodies.

People at all the different stages of academic experience described here have the opportunity to interact in the Research Centre, where the reading room and some limited 'hot desk' provision enables people to join our research culture, just as they do when they attend our seminars, workshops and conferences.

PUBLISHING WITH US

The Science Museum Group Journal is another example of how we like to work with colleagues in the universities, and with other museums too. We see this publication as a key home for discussion on the issues and subjects that unite everyone who loves science and technology museums, including those who work in them. We are proud of the *Journal's* mixed authorship, which unites senior faculty and early career researchers, many of whom are publishing their first article.

JOIN US IN OUR RESEARCH CONVERSATIONS

We hold academic conferences and workshops at museums across the Group, bringing together our wider research community, and also acting as venues for discussions arising from projects relevant to our subject areas, collections and priorities. The majority of these are also the fruit of collaborations with universities, and notably of joint research projects, whether the Group is Co-Investigator or Project Partner. Both at the Science and Media Museum and at the Dana Research Centre in London, we also have regular seminar programmes; we are often approached by researchers keen to discuss their work with our audience. We like to be involved in projects that shed light on our collections and the contexts in which they arose and were used. If you are an investigator in a planned or active project that you think is relevant to Science Museum Group's concerns, please get in touch.

If you would like to study or research with us, please take a look at our web pages, <https://group.sciencemuseum.org.uk/our-work/research-public-history>, or e-mail us at research@sciencemuseum.ac.uk.

OUR TEAM

TIM BOON

Head of Research & Public History

Tim is Head of Research & Public History and a historian of the public culture of science. He is responsible for overseeing and developing the Science Museum Group's Research & Public History programmes. His exhibitions include *Health Matters* (1994) and *Making the Modern World* (2000). His first book, *Films of Fact*, was published in 2008, and he is co-editor (with Frode Weium) of *Artefacts: Material Culture and Electronic Sound* (2013). He is currently President of the British Society for the History of Science, and a member of the AHRC Advisory Board.

ALISON HESS

Research & Public History Manager

Alison supports a variety of activities in the department, including applying for grant funding and assisting others to do so, working with other research organisations to develop grant applications within the heritage sector. She also manages the Collaborative Doctoral Partnership scheme and the Science Museum's relationships with Doctoral Training Partnerships. As well as her work to support the department, Alison also runs her own research projects.

EFRAM

SERA-SHRIAR

Research Grants Manager and Museum Research Fellow

As Research Grants Manager for the Science Museum Group, Efram is responsible for the development and management of all grant-based research at Science Museum Group's five national museum sites. Efram is also an historian of the human sciences and received his PhD from the University of Leeds. His research focuses on three main areas: history of anthropology, the context of Victorian science, and the historical relationship between science and religion. He has held major grants and fellowships in North America and Europe, and he has published over 25 academic papers and two books, *The Making of British Anthropology* (2013) and *Historicizing Humans* (2018). His current research explores psychological research in the modern period. Since 2006 he has been an editor and co-investigator for the John Tyndall Correspondence Project.

SARAH WADE

Research Manager (Maternity Cover)

As Research Manager, Sarah develops and oversees various strands of the museum's research activities, including the Collaborative Doctoral Partnership scheme, research events, the Medicine Galleries Postdoctoral Research Fellowship Programme, staff research training, and coordinating and teaching on the Curating Science Masters course. Sarah is also an art historian interested in the entanglements of art and ecology – particularly in the context of museum display, exhibitions and curatorial practice. She holds a PhD in the History of Art from UCL, which she is currently developing for publication as a monograph focused on artistic and curatorial strategies for representing species loss and exhibiting extinction and is co-founder of the Curating the Sea research project, with a co-edited special issue of the *Journal of Curatorial Studies* on this topic forthcoming in 2020. Over the years, Sarah has worked with various arts and heritage organisations in research, curatorial, editorial and project management capacities.

ROBERT BUD

Research Keeper

Robert is carrying out a major project on the history of the concept of applied science from the fall of the Bastille to the raising of the Iron Curtain. His latest book, *Being Modern: The Cultural Impact of Science in the Early Twentieth Century* (co-edited with Paul Greenhalgh, Frank James and Morag Shiach) was published by UCL Press in October 2018.

DANIELLE JACKSON

Research & Public History Coordinator

As Research and Public History Coordinator, Danielle oversees the administration of the Research and Public History department. She provides support and assistance across all research activities and helps coordinate events to ensure the smooth running of the department. Danielle is currently studying towards an MA in Public Histories at Birkbeck College, University of London with a focus on the presentation of the Medieval period in popular culture, particularly concerning documentaries and podcasts. Previously, Danielle has worked as a researcher at an advertising firm and as a grants officer where she worked with public sector organisations and small charities.

KATE STEINER

Editor, Science Museum Group Journal

Kate is the Editor-in-Chief of the *Science Museum Group Journal* the scholarly, open-access, online journal published by the Science Museum Group, which presents peer-reviewed articles from staff and external authors on topics of interest to science museums. Kate supports internal staff to develop writing and publishing skills as well as editing external submissions through to publication in two *Journal* issues per year. Forthcoming projects include an updating of the *Journal*'s design and architecture so that it works even better for readers and authors, and a feasibility study of ways to expand the Group's research outputs beyond the *Journal*. Kate has degrees in both history and psychology and has worked in museums for over 20 years as a Learning Officer, an Exhibition Developer and as Head of Audience Research. Her publications include King, H, Steiner, K, Hobson, M, Robinson, A, and Clipson, H, 2015 'Highlighting the value of evidence-based evaluation: pushing back on demands for 'impact'', *JCOM: Journal of Science Communication* (Vol 14, Issue 2).

RICHARD NICHOLLS

Assistant Editor, Science Museum Group Journal

Richard is the Assistant Editor of the *Science Museum Group Journal*, an online publication which presents the global research community with peer-reviewed papers relevant to the wide-ranging work of the Group. Richard has helped oversee the development of the *Journal* from its inception in 2014 through to the present day, and he is chiefly concerned with the *Journal*'s back-end functionality and editorial design. The *Journal* continues to enjoy a steady increase in readership numbers and contributions, and Richard is currently involved in a redevelopment of the *Journal* website and expansion of research outputs. He is also responsible for supporting internal staff to develop writing and publishing skills as well as editing external submissions through to publication. Richard comes from a background in science journalism and science consultancy.

HIROKI SHIN

Research Associate

Hiroki is a Research Associate in the Department of Research and Public History. He is an historian of energy, transport and finance with special interests in science communication and public history. After obtaining a PhD from the University of Cambridge, he has held research positions at the University of York, University of Manchester and Birkbeck College, University of London, working on research projects such as 'Commercial Cultures of Britain's Railways', 'Material Cultures of Energy' and 'Communicating Material Cultures of Energy'. Hiroki has published articles and book chapters on topics including 20th-century energy culture, past experiences of energy disruption and the historical development of transport marketing. He is currently developing a research project centred on the past, present and future of energy-themed exhibitions in the culture sector.

BELOW:
Gallery view of the
Gallstones Display in the
Science Museum's new
Medicine Galleries



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Newton Fund

Wellcome

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ARTS AND HUMANITIES RESEARCH
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