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VIEWPOINT

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Elemental Mastery

Read about the Singapore public health crisis, alchemical notation, histories and geographies of water knowledge, and East African soil science.

BSHS

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Dengue in Singapore• Alchemical Characters• Histories of Water• Soil Science Space • Book Excerpt • Interview

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Editorial

Welcome to the spring issue of Viewpoint! In response to our seemingly constant buffet by the weather, this issue focused on "elemental mastery".

We start with an article from Deborah Cohen about the prizes that the BSHS has recently issued before Timothy Sim kicks off our theme with his research on the mosquito-borne Dengue virus crisis in Singapore (air). Ellen Hausner then most directly speaks to our overall theme by taking us through her research into alchemical characters in historical manuscripts. This is then followed by Simon Naylor, Tara Jonell, and Lawrence Dritsas reporting back on the BSHS funded workshop held at the University of Glasgow on mapping the histories and geographies of water knowledge (water). Theo Tomking then explores British efforts to generate soil maps in 1930s East Africa (earth), and finally we have an excerpt from Lucy Santos's new monograph on the history of Uranium (generously understood for the benefit of our overarching theme as fire!) This is then rounded out by an interview with Lucy about her work for the BSHS in the role of executive secretary.

Let us know your thoughts on this via by email. Future contributions should be emailed by Friday 29th May 2026 to viewpoint@bshs.org.uk.

Joe Holloway, Editor.

Outreach & Engagement

2025 has been a busy year for the Outreach and Engagement Committee of the BSHS. The OEC announced the winners of the three major awards it administers every two years; the Ayrton Prize to recognise outstanding web projects and digital engagement in the history of science, technology and medicine (HSTM); the Exhibiting Excellence Prize for excellence in public exhibitions, and the Hughes Prize which is awarded to the best book in the history of science (broadly construed) published in English and is accessible to a wide audience of non-specialists. In addition, the OEC has continued running its Project Grants scheme in which we give funding to outreach projects three times a year. The members of the OEC are the assessors for the Ayrton, Exhibiting Excellence and the Project Grants awards while the judges for the Hughes Prize are selected from the wide history of science community.

Aryton Prize: Digital Engagement

Heather Bennett, curator at the Science Museum and member of the OEC, led the judging of the Ayrton Prize, which was awarded to the HPS Podcast, with the Making and Knowing Project highly commended. The Ayrton Prize was established in 2015 to recognise outstanding digital engagement projects in the history of science, technology and medicine. In the ten years since it began, a lot has changed in the world of digital engagement. We've seen changing trends in formats like forums and blogs, advances in digitisation tools for archives and exhibitions, and of course, the meteoric rise of podcasts. The OEC therefore decided to update the description and criteria to welcome as many different forms of digital engagement as possible, from apps to Zooniverse projects.

We received ten entries, including data visualisations, educational resources, and podcasts. All the members of the OEC were involved in the judging, assessing criteria including originality, accessibility, and impact. Directly comparing such a diverse range of projects can be a challenge, and a single website might be far quicker to assess than a podcast with 30 episodes. We had to decide on a case-by-case basis how to evaluate a representative sample of a project, and each project was judged by at least two committee members to balance the scores as best as possible. The quality of the entries was very high, and it was a real pleasure to explore each project.

The HPS Podcast, Conversations from History, Philosophy and Social Studies of Science, developed by graduate students at the University of Melbourne, claimed first place. We were very impressed by the breadth of topics covered, the variety of guests, and the accessibility of the content for non-specialist audiences. Additionally, analytics submitted showed the podcast enjoys a global audience with a high download rate, which has been growing throughout the life of the project thus far, demonstrating a wide reach and excellent impact. The Making and Knowing project, founded in 2014 by the Center for Science and Society at Columbia University, was named highly commended. The project explores the intersections of craft making and scientific knowing. We praised the creativity and originality of the project, and the broad range of accessible educational resources it hosts.

Exhibiting Excellence: Insightful & Inspiring

The OEC received 14 entries to the sixth Exhibiting Excellence award, and we were pleased to see that, like the Ayrton Prize, they came from many places: India, the US, Europe and the UK. The exhibitions ranged from a temporary project produced with a primary school to a multi-million-dollar permanent show. This range made the judges' job a difficult but interesting challenge. A further factor facing us was that we could not, sadly, visit all the exhibitions as we did not have the travel budget. We made our decisions based on written submissions about the aims and achievements of the exhibitions and a series of photos and videos.

We split the award in the Large Exhibition category between Measuring Difference at the Collection of Historical Scientific Instruments (CHSI) at Harvard University and Breaking Ground at the Oxford University Museum of Natural History. Measuring Difference was an intriguing bilingual (English and Spanish) exhibit which we thought succeeded in its aims to reinforce that Latin America is not simply an importer of scientific ideas, but rather it has a long history of scientific innovation. The team has delivered an attractive, accessible, and creatively engaging exhibition, encouraging audiences to be reflective about the role of measurements throughout history, reminding us that before European measures there were other ways of perceiving the world, and that measurements are neither objective nor neutral, but rather reflect the values, concerns, and prejudices of the society that employs (or imposes) them.

Created around the fossils and writings of geologist William Buckland and the colourful illustrations by his wife, Mary Buckland (née Morland), Breaking Ground revealed a fascinating insight into the 19th century when the scientific community was rethinking its understanding of extinct groups of animals and plants, developing ideas that challenged the literal interpretations of the Bible. The exhibition focuses on the often-hidden hands involved in palaeontology, the networks of researchers, and the crucial roles of women, labourers and miners, in the UK and in colonised countries. The curators and designers have found imaginative ways to use the Victorian cases in the Museum to display the objects and contemporary responses including a new poem by the Poet Laureate, Simon Armitage.

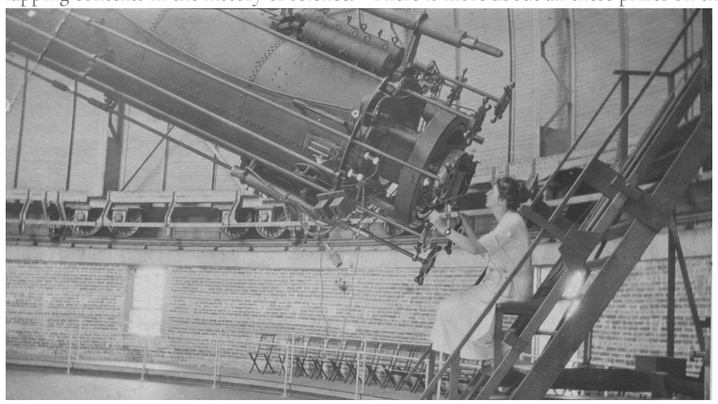
The Small Exhibition Winner was Capturing the Stars: The Untold History of Women at Yerkes Observatory, University of Chicago Library. This was an exhibit which did a stellar job in revealing the invisible work and unknown lives of women who contributed to astronomy and astrophysics at Yerkes Observatory from 1900 to 1933, a time before we learned and confirmed that our galaxy was but one among many. The curatorial team, which consisted of students and professionals, skilfully overcame the challenges created by the exhibition space with the selection and presentation of the available material, letters, books, journals, photographs, astronomical glass plates, scientific tools, and interactive features. The design succeeded in its aims to convey not only how the work of women contributed to the advancement of astronomy at Yerkes, but also their lived experiences.

Project Grants: Supporting Novel Ideas

The OEC awards Project Grants of up to £500 three times per year to support public projects that in some way disseminate or embody scholarly thinking about HSTM. Dr Allan Jones, long standing member of the OEC, and Dr Lenka Schmalisch of Durham University, administer this scheme. They say that blending current thinking about HSTM into an accessible public project is a tall order. Part of the committee's task when judging a proposal is considering whether it meets the divergent objectives of scholarship, accessibility and impact, and whether it genuinely is an exercise in outreach and engagement. Too often, projects are little more than the creation of a website of resources. This can be a useful preliminary step but is not in itself outreach and engagement. A proposal must clarify how any such resource will be deployed to attract and engage a non-specialist audience. Other considerations relate to planning details and the feasibility of targets.

Interesting recent trends are a growth in enquiries from outside Britain, and projects that explore the interaction between indigenous knowledge with formal science. Recent Project Grant winners include the reinterpretation of the collections of the Natural History Society of Northumbria (NHSN) from the point-of-view of environmental history, and the composition and performance of a set of songs about under-represented women from STEM history.

Finally, the Hughes Prize, which has been running since 1997, was awarded to Renée Bergland, Professor and Program Director of Literature and Writing at Simmons University in Boston, for her book Natural Magic: Emily Dickinson, Charles Darwin, and the Dawn of Modern Science. The jury said that it was "a brilliant, engaging, and accessible consideration of two significant historical characters and their overlapping contexts in the history of science." There is more about all these prizes on the BSHS website.



Deborah Cohen
University of Birmingham & OEC Member, BSHS.

Left:*"An astronomer at the 40-inch refractor telescope of Yerkes Observatory under the 90-foot dome". (University of Chicago Photographic Archive, apf6-4585, Hanna Holborn Gray Special Collections Research Centre, University of Chicago Library. Part of Kris Palmeiri's prize-winning exhibition – Capturing the Stars: The Untold History of Women at Yerkes Observatory.*

Cover Image: *'Elements of Nature' by Sanet_Nieuwoudt. Royalty Free. Source: https://pixabay.com/illustrations/ai-generated-crystal-ball-earth-air-8983450/*

Dengue Crisis in Singapore

Timothy Sim explores the ongoing history of the Singapore public health response.

I was born into an extended public health crisis, though I did not know it at the time. Growing up in the late 1990s and early 2000s, public health posters, pamphlets, and advertisements taught me about the dangers of the Aedes aegypti mosquito – a black insect with white stripes on its body that transmits dengue fever. Every year it seemed that there was a new outbreak of dengue being reported on the news; official warnings to stay vigilant against mosquito breeding at home would be overlayed on videos of workers fumigating drains and public housing. Of course, these proclamations blended with the various campaigns that were always being launched – against "killer litter", to save water, to be courteous and so on. The area where I grew up never became a dengue hotspot, but I was more than familiar with fumigating, or "fogging". Once every month or so, our housing block would be fogged to get rid of insects. When we heard the characteristic throttle of the fogging machine, we would rush to close doors and shut windows before the sticky, but supposedly harmless fog could billow in. Even so, a chemical sweetness would linger in the air for hours. In the next few days, bodies of dead cockroaches would litter the housing block – visible signs of an insect-killing mission accomplished.

I thus thought that dengue was a problem and a priority. So when I started studying its history in Singapore, I was shocked to find out that it had been successfully controlled in the first 20 years of the country's independence, from 1965 to 1985. During this period, the anti-mosquito practices that I would later learn in school – to turn over buckets, empty flowerpots of excess water, and properly dispose of rubbish – had been incredibly effective at reducing both Aedes aegypti densities and dengue fever. From the late 1980s through the 1990s, however, epidemic dengue returned with a vengeance, sparking a sense of crisis amongst health officials as they scrambled to explain how the disease had resurged despite low mosquito densities.

Dengue Strikes Back

In two official publications from that period, including an edited volume titled *Dengue in Singapore* (1998), multiple reasons for dengue's return were mooted. Broadly speaking, these reasons were united by the idea that Singapore was suffering from its success. Immunologically, decades of low

Above: *Aedes Aegypti Resting Position. Public Domain. Source: Wiki-media. https://commons.wiki-media.org/wiki/File:Aedes_aegypti_resting_position_E-A-Goeldi_1905.jpg.*

dengue transmission had lowered the population's immunity to the disease. Entomologically, anti-mosquito practices had chased mosquitoes away from conventional breeding spots to "cryptic" habitats that were hard to reach. And socially, repeated injunctions to change one's behaviour no longer seemed to stick in a time when people had grown tired of the endless exhortations of the "campaign country". It appeared that the success of dengue control had perversely increased the country's vulnerability to the disease. This "paradoxical" situation, as officials called it, meant that cases imported from neighbouring countries could spread faster than ever.

This paradox of success will be familiar to those versed in Singaporean politics. The ruling People's Action Party (PAP), which has led Singapore since independence, routinely argues that success can never be taken for granted. Even when success is achieved, say, in the transformation "from third world to first", according to the first Prime Minister Lee Kuan Yew, this success only generates new vulnerabilities that must be protected against – whether these be global financial shocks, terrorism, or pandemics. This "siege" or "crisis mentality" not only justifies prophylactic action by the state against projected threats, but it also compels citizens to remain constantly vigilant against the loss of their hard-won achievements. Insecurity, which exists alongside pride at the country's outsized accomplishment, forms a central tenet of the political discourse in Singapore. The dengue crisis of the 1990s appeared to be an independent confirmation of this vicious cycle – the more successful the dengue program, the more vulnerable the population, and so the more vigilance was required to guard against mosquitoes, in an endless loop.

A Crisis of Vulnerability

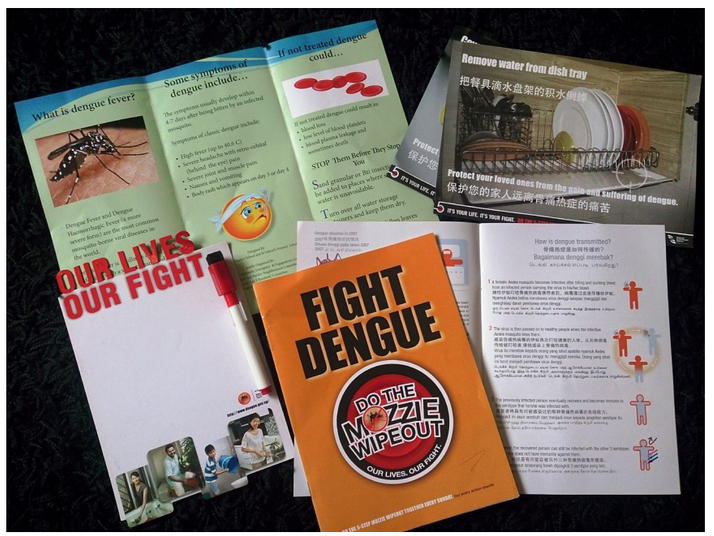
The crisis mentality of the 1990s was built on solid epidemiological foundations. Blood samples taken from the population suggested that the proportion of people immune to dengue had fallen over time; the age of first infection had risen accordingly. It also highlighted important weaknesses in the existing anti-mosquito program, which had failed to account for changes in human and mosquito behaviour as well as the lack of support for overworked health inspectors serving an expanding population. But the normalization of the crisis also limited what officials could see in the 1990s. A recent reappraisal published in PLoS Neglected Tropical Diseases suggested that dengue transmission actually fell during this period, and that the rise in reported cases could be partially attributed to better diagnosis and reporting of the disease. It also pointed to issues outside the scope of the program, such as population growth and climate change, to explain why "vulnerability" to dengue, but not overall transmission rates, had increased. From the perspective of these state scientists writing in 2023, the program was working fine enough in the 1990s – the paradox was actually that this success wasn't properly reflected in the case numbers.

The article thus complicates, if not challenges the inward-looking, self-critical accounts of the 1990s. But it also strengthens the core idea that Singapore's success at controlling dengue continues to make it vulnerable to the disease, and that constant vigilance and innovation is required to stop dengue from erupting. The release of Wolbachia-infected male mosquitoes, which are functionally sterile, is the latest tool in the Singaporean armament against dengue. These sterile mosquitoes appear to be a promising method for reducing mosquito populations without requiring too much public mobilization. However, they do not fundamentally change the fact that the population becomes more vulnerable the longer dengue is suppressed.

Biotechnical Dream

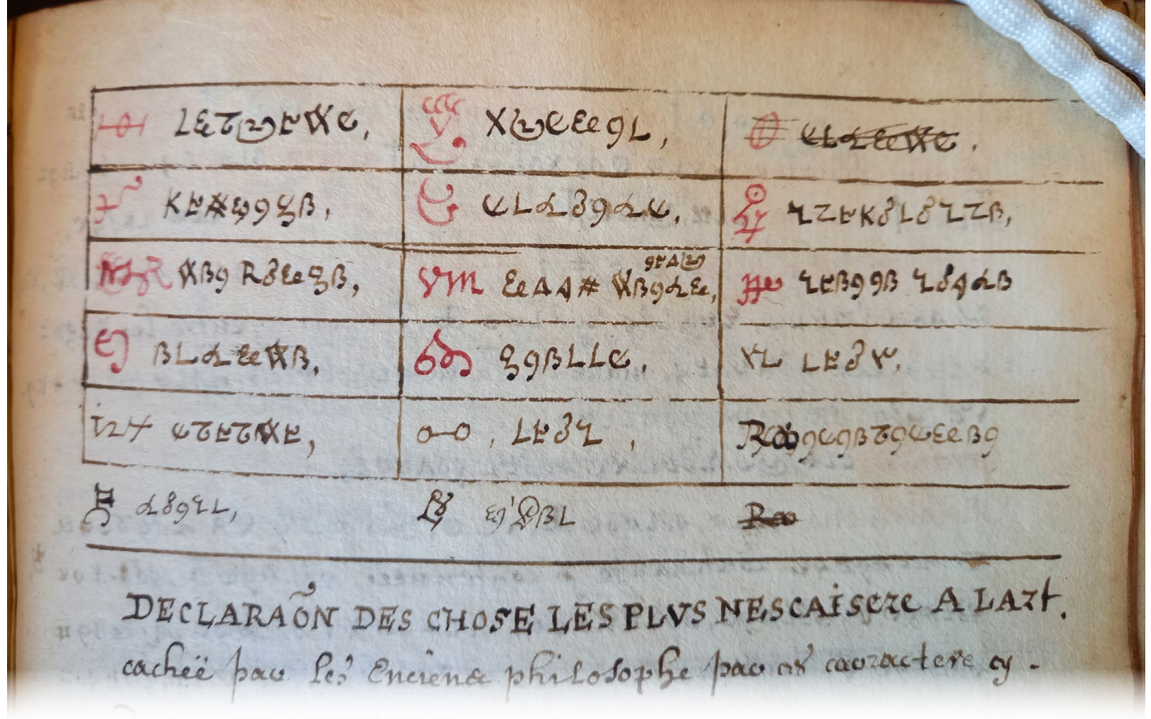
The only way out of this conundrum appears to be through vaccination – a long awaited dream that might soon become reality. Recently, the Qdenga vaccine has been licensed for use within places like the United Kingdom, Europe, Thailand, and Indonesia. However, data on its effectiveness against all four variants of dengue virus are still pending, and the WHO recommends that the vaccine be used in countries with high endemic transmission. Ironically, Singapore does not qualify as highly endemic, meaning that licensing of Qdenga will have to await further data collection. There are risks to vaccination – it looks like no single dengue vaccine will grant perfect protection – but top dengue scientists like Professor Ooi Eng Eong and Dr Shirin Kalimuddin believe that vaccines have become "good enough". In a news commentary published mere months after the 2023 reappraisal, they conclude that "in a world where dengue cases continue to surge, waiting for a perfect vaccine is neither a viable nor even an ethically justifiable strategy." Until then, it seems that the impending dengue crisis will continue.

Timothy Sim
University of Cambridge



Left: *Pamphlets distributed in 2013 by the National Environment Agency Singapore. Creative Commons. Source: Wiki-media. https://commons.wiki-media.org/wiki/File:Dengue_marketing_materials.jpg*

Above: *'Dengue fever banner (fight dengue)'. Creative Commons. Source: Wiki-media. https://commons.wiki-media.org/wiki/File:Dengue_fever_banner_(fight_dengue).jp*



Alchemical Characters

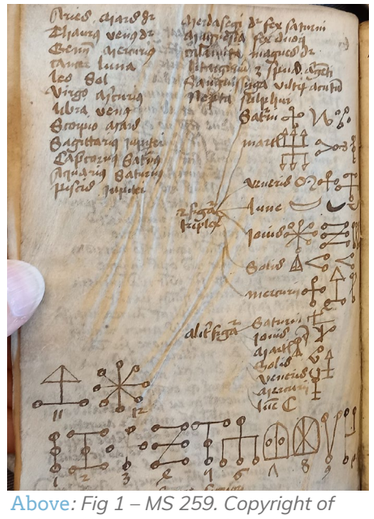
Ellen Hausner reports on her research into an innovative notation system.

I am a doctoral student in the History of Science, Medicine, and Technology Department at the University of Oxford. My doctoral project explores the evolution of notations and signs, often known in the period as 'characters,' as a method for transmitting knowledge within European alchemical texts in the period c. 1350-1700. These characters, such as the astrological glyphs of the planets to represent metals, or an upright triangle to represent fire, are pervasive within verbal and pictorial alchemical texts and should be seen as a third, visually abstract language, used to communicate meaning. My dissertation will provide a view of the use, reception, and development of characters within alchemical texts from the period. It will also explore how and why this visual language became such a vital method of expression in alchemical texts. My premise is that alchemical characters inclined towards a standardised method of communicating meaning over time. Their notations became increasingly systematised, demonstrating an attempt to codify knowledge.

My doctoral research has led me to several key archives and libraries which house alchemical texts. One of the places I needed to visit was the University of Glasgow, as their Special Collections includes the collection of John Ferguson (1837-1916), the University's Regius Professor of Chemistry from 1874 to 1915. This is an extremely important collection in the history of alchemy which contains an especially rich selection of manuscripts. The collection is catalogued online but is not digitised, so it was necessary that I go in person to study the manuscripts. I was awarded a Research Grant from the BSHS to help enable me to go to Glasgow for a week in April 2025. Alchemical characters are rarely mentioned in library catalogues, so my methodology for finding them was to examine a great number of manuscripts in a large sweep. I never know what I am going to find and am continually surprised at the ways in which characters were written and used, the purposes that they served, and how they developed and changed. In this report, I will give a few striking examples of the contexts in which alchemical characters are found within the manuscripts of the Ferguson collection.

Planets as Metals

The great interest, even fascination, with the characters which represented the seven most important metals used in alchemy is a theme that emerges



Above: *Fig 1 – MS 259. Copyright of author. Source: University of Glasgow John Ferguson Collection.*

Above: MS 94. Copyright of author. Source: University of Glasgow John Ferguson Collection.

repeatedly in the manuscript sources over the centuries. The characters for the seven astrological planets were those most often associated with these metals, but in the earliest examples from the medieval period, those characters could vary considerably. One example is found in a Latin manuscript from the fifteenth century, MS. Ferguson 259. This contains one of the earliest lists of characters I have found (figure 1). After making some equivalences of alchemical materials at the top of the page, involving substances such as litharge, silver and sulphur, the scribe added a list of the planets, labelling them 'threefold figures'. Each planet has three characters next to it. Another list of the planets is added underneath, giving alternative characters. Then at the bottom of the page, the scribe wrote a series of twelve numbered figures, which are probably the zodiacal signs. The seven metals are not named in these lists, but the brief discussion of alchemical substances on the same page, plus the very fact of being found in a manuscript of alchemical works, makes it likely that at least one of the lists of planets refers to the metals. Almost none of these characters remained in use.

Paracelsian Characters

I found several other instances of alchemical characters written in long lists elsewhere in the Ferguson collection. An example is a list within MS. Ferguson 237, written in English in the seventeenth century (figure 2). To date, I have found six versions of this list in three different libraries, including Glasgow. The prevalence of the list shows that it was in active circulation in Britain in the seventeenth century, perhaps helping to standardise the characters' notations. I tend to refer to this as the 'Paracelsian' list because two copies in the Bodleian claim the characters came from the famous physician and alchemist Paracelsus (c. 1493-1541). It could well be that the individuals who copied and worked with this list considered themselves followers of Paracelsus. The list acts as a materia medica for medical

Above: *Fig 2 – MS 237. Copyright of author. Source: University of Glasgow John Ferguson Collection.*

practitioners, providing two different versions of a character, followed by the name in Latin or English, and then a description or an explanation as to its medicinal qualities or uses as an apparatus. With its emphasis on Paracelsian healing, this list includes characters for specific medicines, such as ellament ('by kemycall artte - pure medison etc.') and diseases, such as "Frensh Pox".

Characters as Codes

Another list of alchemical characters was written in a seventeenth-century alchemical and astrological French notebook kept by an individual called A. Mereau. A particular code is used throughout his notebook; within it, the alchemical characters are usually highlighted in red, sometimes interspersed with the code. The key to the characters at the back is given in code (see the header image above). This is an example of the perceived relationship between alchemical characters and cipher alphabets. Keys of characters were often used to elucidate characters' meanings in specific texts, or in a writer's corpus, but they could also be used as a cipher: to hide meaning as much as reveal it. This list with its coded text is, in effect, a cipher of a cipher. Before they were standardised, characters were themselves a type of cipher which needed to be broken, and a key is needed for them as surely as a key is needed to break the cipher of a text. The secret writing must be decoded first; then the meanings of the characters are revealed, and only then can they be understood within the text where they are used. Alchemical characters are here one of several layers of secrecy which are so often found in alchemical texts.

Tools for Illustrations

One of the contexts in which such characters can be found is within visual media. They were used alongside, or as additions to, figurative imagery, or they became elements within diagrams. As graphic entities themselves, characters had the ability to contribute to a visualisation of knowledge. Characters' script-like forms could be evocative and add an air of mystery to an image at a time when alchemy was associated with

Above: *Fig 3 – MS 262. Copyright of author. Source: University of Glasgow John Ferguson Collection.*

secrecy and philosophical truths. MS. Ferguson 262, a seventeenth-century manuscript in French, contains four folios of beautifully executed symbolic figures in coloured inks. The images make use of the shapes of alchemical characters to create illustrations and combines them with figurative imagery (figure 3). By the time this manuscript was created, many characters had been standardised, making interpretation much easier. A list of the seven metals is given here using what became their standardised planetary characters, correlated to colours. The characters for fire, water, and antimony are combined with the three characters representing the three Paracelsian principles of mercury, sulphur, and salt. Again, by the late seventeenth century, these characters had become almost universal.

Altogether I viewed over 60 manuscripts in Glasgow, and found some wonderful examples of the many ways that alchemical characters were applied and received. The trip to Glasgow was vital for my research, and I am most grateful for the grant from the BSHS which helped make it possible.

Ellen Hausner
University of Oxford

Mapping the Histories and Geographies of Water Knowledge

Simon Naylor, Tara Jonell, and **Lawrence Dritsas** report on the University of Glasgow workshop.

On 15 May 2025 we brought together scholars from geography, environmental history, and the history of science departments across 15 academic institutions, three heritage organisations and six countries to explore the historical geographies of water knowledge and water infrastructures in Britain and Ireland. The workshop was held at the University of Glasgow and was generously supported by the British Society for the History of Science as well as the Historical Geography Research Group of the Royal Geographical Society and the Human Geography Research Group of the University of Glasgow. The papers focused on a broad timeframe, from the early modern period to the present day, examining how water infrastructures and watery landscapes, such as river systems, canals, peatlands, coastlines, reservoirs and sewer systems, were understood and constructed through social, political, and environmental knowledges. Central themes of the workshop included the production of water knowledge and the contested ways to collect information about such a mercurial substance; who were the key actors and authorities in the measurement of water and its various qualities and quantities; how did knowledge of water both affect and effect interventions in watery landscapes; and how have historical water knowledges and practices shaped responses to contemporary environmental challenges, particularly in the context of restoration, climate adaptation, and natural flood management.

Long-Term Impacts

Tara Jonell (University of Glasgow), with co-authors Simon Naylor (University of Glasgow) and Peter Jones (Nottingham Trent University) opened the workshop with a paper on the long-term impacts of mill infrastructure on British rivers. Based on a current Leverhulme Trust-funded project and drawing on historical GIS and early cartographic sources, Tara demonstrated how thousands of mill-dams and weirs fragmented river systems, altering hydrology and ecology in ways that persist today. Their work highlights the importance of understanding historical waterpower geographies to inform contemporary river restoration and policy. In the second part of the paper, Simon examined the contested historical geographies of canal construction during Britain's so-called canal mania during the 1790s. Focusing on the proposed Rochdale Canal in the north of England he explored how civil engineers like the Scotsman John Rennie developed new hydrological knowledge of water flow and water power to mediate disputes between canal promoters and millowners. The paper illustrated how environmental knowledge was produced through conflict and negotiation, and how it shaped infrastructural and industrial development. In the second paper of the day, Katja Bruisch and Lily Toomey (Trinity College Dublin) turned the workshop's collective attention to Ireland's peatlands, using the Bog Commission's early nineteenth-century maps to explore the colonial logics of land improvement. These maps, once tools of drainage and conversion, now serve as vital records for peatland restoration and climate action following extraction. Their paper offered a tripartite reading of the maps – as colonial artefacts, historical landscape records, and contemporary environmental resources – underscoring the shifting meanings of peatlands across time.

Nye Merrill-Glover (University of Bristol) opened the second session of the day with his paper on seventeenth-century Fenland drainage, which similarly interrogated the cultural and colonial dimensions of landscape transformation. Using metaphors and theories from cultural histories of the body, he showed how drainage advocates racialised Fenland inhabitants, portraying them as uncivilised and in need of improvement. This internal colonisation paralleled British imperial projects abroad, revealing how environmental change was entangled with social and political hierarchies and forms of territorial control. John Morgan (University of Bristol) moved our focus from wetlands to the legal and epistemological complexities of defining coastal saltmarshes in early modern England and Wales. Through analysis of legal disputes over saltmarsh ownership, he revealed competing ways of knowing the intertidal zone, shaped by local customs, state interests, and the mutable nature of coastal environments. These disputes illuminate broader tensions in early modern environmental governance and the role of law in shaping challenging geographies. Dr Carry Van-Lieshout (Open University) completed the morning session with an examination of how people in eighteenth-century England interacted with emerging water infrastructures in both industrial and urban contexts and in terms of excess and scarce water. Focusing on conflicts over groundwater drainage in Derbyshire mines and piped water supply in London, she showed how measurement and monetisation of water became central to disputes over control and administration of water. Her work highlighted the dual role of water infrastructures as both technical systems and sites of social contestation.

Above: "Portmore Loch, tasting and testing the water" 13 June 1879. Engraving by George Aikman. Copyright of City of Edinburgh Council – Edinburgh Libraries. Source: Capital Collections https://www.capitalcollections.org.uk/view-item?i=30403

Tasting Portmore Loch

Our afternoon talks got underway with Lawrence Dritsas (University of Edinburgh) presenting a case study of the St Mary's Loch reservoir scheme, a controversial late nineteenth-century proposal to supply water to Edinburgh. The debate mobilised a wide range of actors – from engineers and chemists to politicians and the public – and hinged on competing claims about water quality, cost, and public health. He traced how expert and vernacular knowledges shaped the outcome of the scheme, revealing the epistemic geographies of urban water planning. Rachel Dishington's (University of Nottingham) paper on the 'sewage question' in nineteenth-century Britain addressed similar issues to those explored by Lawrence. Rachel considered the role of municipal engineers in navigating technical uncertainty and in making the invisible tangible and governable. As local governments experimented with various sewage treatment systems, municipal engineers emerged as key advisors, mediating between scientific innovation, economic feasibility, and public health concerns. Her analysis underscored the political dimensions of technical expertise and the uneven geographies of sanitation reform.

Historical Practices

After a quick tea break, Neil Macdonald (University of Liverpool) gave a paper on the current implementation of natural flood management where he challenged the notion that such approaches are novel to our own time. Drawing on historical examples from Roman to industrial times, he argued that past practices of slowing and storing water in the landscape offer valuable lessons for contemporary flood mitigation. His work called for a re-engagement with historical knowledge to inform sustainable, nature-based solutions to modern hydrological challenges. Hannah Worthen and Briony McDonagh (University of Hull) followed Neil with an examination of vernacular flood knowledges in early modern England. Using administrative records and flood petitions, they reconstructed how communities understood and responded to flood risks. These petitions not only documented local experiences but also served as tools for collective action and memory-making. Connecting back to Neil's paper, their own presentation suggested that such historical practices of community resilience and knowledge-sharing have relevance for present-day risk resilience and climate adaptation efforts.

Through the exploration of complex historical geographies and the development of rich historical case studies, the speakers collectively advanced a more nuanced understanding of how past knowledges and practices shaped the building and evaluation of water infrastructures and waterscapes of Britain and Ireland, through conflict and control as well as compromise, cooperation and co-production. Whether through legal disputes, engineering controversies, or community petitions, water systems were shown to be deeply embedded within social, political, and epistemic contexts. The papers and conversations also demonstrated that historical geographies and environmental histories of water knowledge can offer crucial insights for addressing contemporary environmental challenges – for river restoration, flood management to climate adaptation and ecological justice across the community to state levels.

Simon Naylor *University of Glasgow*
Tara Jonell *University of Glasgow*
Lawrence Dritsas *University of Edinburgh*

Below: *Conference delegates. Copyright of authors.*

Creating Space for Soil Science in 1930s East Africa

Theo Tomking explores a soil scientist's attempt to use a map to create space for his discipline in East Africa during the 1930s.

During the early 1930s, the first systematic attempt to map soils across East Africa was undertaken. The project was part of ambitions to acquire knowledge that would underpin the long-term development of British territories in the region. Led by the soil scientist Geoffrey Milne, in collaboration with chemists and agricultural officers employed by colonial governments in Kenya, Tanganyika, Uganda and Zanzibar, the project took some four years to complete, culminating in the printing of a showpiece soil map by 1935.

Far from providing a complete view from above, the soil map created was patchy. Whilst the map showed the distribution of soil types in some areas in intricate detail, large spaces were left blank.

This article asks why there were blank spaces in this soil map.

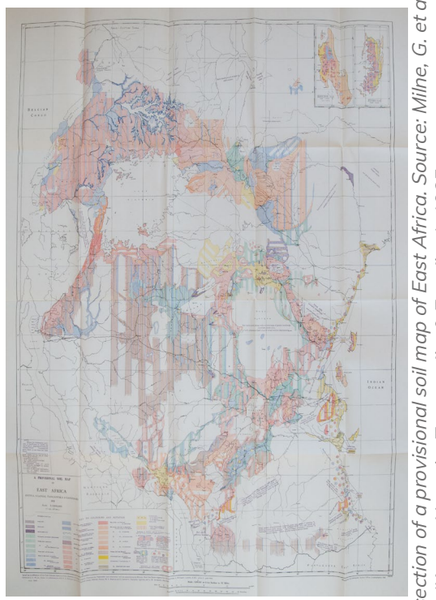
The Amani Station

The end of the First World War saw Britain acquire Tanganyika (mainland Tanzania) from Germany as a mandated territory. The 1920s soon ushered in a wave of British imperial optimism about the productive potentialities of East Africa. People such as the British politician Archibald Church, in his book *East Africa, A New Dominion* (1927), represented East Africa as a vast, virtually untouched region awaiting development and further integration into a world economy.

Scientific research was key to how colonizers imagined the development of East Africa. Research was seen as a way of building the knowledge-base upon which the region's resources could be unlocked.

It was within this context that the Amani research station, located in the Usambara Mountains in north-eastern Tanganyika, came to be afforded great significance in plans for the development of East Africa. The Amani station had gained an international reputation during the days of German colonial rule. By the mid-1920s, there were concerted efforts by the British to revive the work of the station, which had been left in a practically derelict state since the end of the War.

Among the numerous research staff employed at Amani by the late-1920s was the British soil scientist Geoffrey Milne. Yorkshire-born and trained in chemistry at the University of Leeds, Milne was in charge of soils research at Amani. At the time, he was one of only very few people in "British Africa" employed to undertake soils research full-time.



Above: *The provisional soil map of East Africa. Source: Milne, G. et al. A Provisional Soil Map of East Africa (Kenya, Uganda, Tanganyika & Zanzibar), 1935*

Above: *Close-up photograph of a section of a provisional soil map of East Africa. Source: Milne, G. et al. A Provisional Soil Map of East Africa (Kenya, Uganda, Tanganyika & Zanzibar), 1935.*

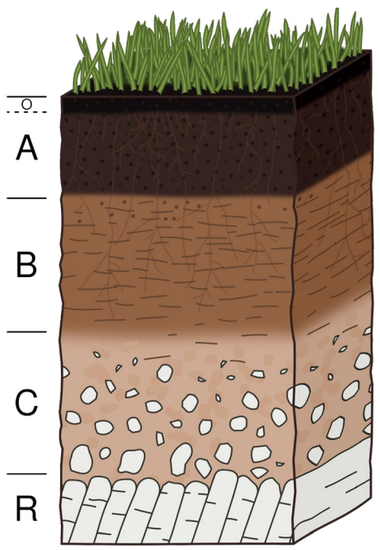
Soil Science & Development

The type of soils research that Milne saw as most valuable for colonial development was pedology — the study of soils (typically soil profiles) as natural objects to be classified and their formation, often over millennia, understood. Soil mapping was, and is, a key practice of pedologists.

Milne and others envisioned soil mapping as a way of acquiring the scientific knowledge that would inform future interventions into East African environments and agriculture. Whilst the immediate practical utility of the research might not have been apparent, soil mapping was none-the-less meant to contribute to East African development, just over the long-term. Understanding the properties and distribution of the region's main soil types held the promise of being able to plan things such as which crops to grow where, and which agricultural practices to use in particular locations.

East African Soil Map

By 1932, plans were in place to create a soil map of East Africa. In addition to colonial development, the creation of such a map was seen as a way of contributing to international science. The plan was to construct the map in time for the third International Congress of Soil Science in Oxford in 1935, where it could be showcased as East Africa's contribution to global scientific understanding of tropical soils.



Above: *Illustration of a soil profile, with horizons labelled on the left side. Creative Commons. Source: Wiki-media.*

As head of the project, Milne's initial vision was for himself, chemists, and agricultural officers throughout East Africa to map smaller areas in detail, gradually building up a bigger picture of the entire region's soils.

Milne also emphasized the importance of field observation for acquiring reliable knowledge of soils, noting how the American soil scientist, Curtis Marbut, had put together his 1923 soil map of Africa without setting foot on the continent. Milne argued that Marbut's attempt was stimulating but essentially fictitious because he had no first-hand experience of African soils in the field.

The Catch

Others involved in the project, however, thought that Milne's vision of intensive mapping was not feasible. Some chemists argued that they would not have the time and resources for Milne's approach given that they were required to balance research alongside other routine duties. They suggested that an approach that allowed more room for generalization should be taken.

At a time of economic and ecological precarity in East Africa with the Great Depression and mounting reports of rampant soil erosion, not all were convinced of the value of the so-called fundamental research being carried out by staff at Amani. The Chief Secretary in Zanzibar noted in 1934, for instance, how the inhabitants of Amani "appear to the uninitiated to live in the clouds or on the hill-tops like Greek gods 'careless of mankind'".

What sort of map would be built with a lack of personnel in East Africa with the time and resources for in-depth research, and a dearth of public support for the type of research conducted by Amani staff?

Degrees of Accuracy

It became clear that not all the areas intended would be able to be mapped as the project progressed. This was despite the cobbling together of a diverse range of sources of soil information, such as the observations of a medical officer based in Tanga on the Swahili coast, and chance observations in the diaries of colonists from decades past.

As Milne and the chemists came to put the final map together in 1934, they identified three degrees of accuracy of information; from the first (places where soils had been observed in the field, sampled and analysed), to the third (where no observations of survey value had been obtained and only deductions could be made about the soil based on information on environmental factors like the geology, topography and climate).

The final map was designed so as to show these varying degrees of accuracy. Those areas in the first degree were shown in full colour, those in the second by broken colour, and those in the third by uncoloured spaces (sometimes containing brief written notes).

Creating Space

Milne and his colleagues aimed to use this lack of knowledge to their advantage. By showing the limited extent of European knowledge of soils in East Africa, they saw the map as a way to garner more resources from their governments for soils research.

The rhetoric was in the contrast between the areas of the map with full coverage and those that were left blank. This visual contrast between knowledge and ignorance drew attention to the certainty of the knowledge of those areas that were mapped in full.

With this certainty being largely predicated upon the fact that those soils had been observed first hand in the field, the map carried with it a call for a future where Britain might be more fully in touch with that fundamental colonial resource in East Africa: soils.

Theo Tomking
University of York

Special Excerpt: *Chain Reactions: A Hopeful History of Uranium*

Lucy Santos provides an excerpt from her latest monograph.

After World War II, an intense arms race erupted between the United States and the Soviet Union, propelling both nations to develop and then expand their atomic weapons programs. To support this effort, vast quantities of uranium were required, prompting the U.S. government to establish a domestic uranium initiative, overseen by the Atomic Energy Commission (AEC) from an office in Grand Junction, Colorado.

One of the key ways this 'uranium boom' was stimulated was through the issuance of five numbered circulars by the AEC, designed to attract independent miners as well as established companies. In effect, these circulars established guaranteed prices as well as a $10,000 bonus for the discovery and production of high-grade ores.

With this lucrative encouragement came thousands of dedicated uranium prospectors tirelessly scouring the lands for the, now, coveted element. Among them were seasoned professional geologists, but there were also countless others, an estimated 10,000 at least, who pursued their objectives during their spare time.

These so-called 'weekend prospectors' were also an important part of the carefully controlled AEC narrative, which portrayed the uranium boom as a spontaneous tale of rags to riches American go-getting rather than a cynical exploitation of the land.

As droves of enthusiastic newcomers joined the burgeoning field a whole new industry sprouted to cater to their needs. One of the biggest segments of this industry was focused on providing essential tools and equipment, as well as specialised clothing. Life magazine provided cost estimates for the new uranium prospector, with a basic kit estimated to cost around $180.

The piece also featured a fashion spread that has since become a source of fascination for many. A family is photographed depicted against a fake backdrop of mountains and cactuses, dressed in what the magazine referred to as 'prospecting duds.' The father is seen sporting a stylish black outfit with red breast pockets, collar and a cap, exuding a sense of sartorial flair (well, at least a very 1950s look). The mother takes centre stage in the feature, clad in a bright orange jumpsuit referred to as the 'U-235', complete with perfectly coiffed hair and a shovel in hand. The daughter dons a smaller version of the mother's outfit, known as the 'Diggerette Jr', complete with black detailing on the pockets.

Another piece of essential equipment advertised to the new prospectors was the Geiger counter, which first went on sale commercially in the late 1920s. There were plenty of adverts, publications and catalogues offering these devices, and crucially explaining how they worked. Whilst some of these explanations were technologically complex the process was more simply described by Lucille Ball in a 1958 episode of The Lucy-Desi Comedy Hour, 'you turn it on like this. Then you hold this up to your ear … and then when it gets near uranium it starts to click.' It's a good piece of scientific communication in an otherwise madcap (is there any other kind!) episode where Lucy convinces the gang – and guest star Fred MacMurray – to go uranium hunting in the desert outside of Las Vegas.

Above: "Historical method of underground uranium mining, Nucla, Colorado, 1972" by Bill Gillette. Public Domain. Source: Wikimedia.

Left: *"Uranium building's historic storefront, 2019" by. Mramoeba. Creative Commons. Source: Wikipedia.*

Taking full advantage of this demand was the Radiac Company, who opened 'America's first Atomic age department store' for prospecting equipment on the seventh floor at 489 Fifth Avenue, New York City. They stocked many types of Geiger counter, such as the Lucky Strike, selling for $99.50, and the Ferret, which at $20 was the cheapest and smallest they offered.

The AEC and the US Geological Survey (USGS) had joined forces to publish a pocket-sized manual titled Prospecting for Uranium. Priced at just 30 cents, this little booklet became a sensation, flying off the shelves and becoming a bestseller in no time. In the first publication year alone, over 16,000 copies were sold, and by 1950 nearly 70,000 had found eager buyers. Encouraged by this success other uranium-hunting handbooks, of varying usefulness, were released including Uranium Prospecting: A Complete Manual, The ABC's of Uranium Prospecting: A Guidebook for the Amateur, the Uranium Prospecting Handbook and From Rags to Riches with Uranium.

The excitement surrounding uranium was not limited to individuals, either – entire communities were swept up in what some called 'uranium fever'.

Moab in Utah had an Atomic Café and a Uranium Office Building. The rodeo, once known as the Red Rock Roundup was rebranded as the Uranium Days Rodeo. The town even boasted a Uranium Club, where the sign in the window read 'No Talk Under $1,000,000'.

Just over 300 miles away, a uranium discovery in 1952, had changed also the town of Grants, New Mexico, completely. Like Moab, Grants had its own share of uranium-themed businesses and events. One such business was the Uranium Café, which opened in 1956 and served up the 'Finest American Chinese and Mexican Dishes'. Located in the heart of the town along Route 66, the café's sign even evoked a mushroom cloud.

In 1956 a local miner was named 'Uranium Prospector of the Year' during a citywide festival. The previous year, there had even been a 'Uranium Queen' contest, with the winner receiving a whopping ten tons of uranium ore. The 'Miss Atomic Energy' pageant was also held in the town, with another truckload of ore as the prize.

Whilst uranium prospecting was rapidly becoming the twentieth century's newest gold rush, with people vying to become 'uraniumaires' in truth very few actually made much money, and even fewer collected the bonus offered by the AEC which, proved incredibly hard to access.

For every tale of success, there were thousands more of disappointment -miners who found nothing, or who struck only veins of worthless, low-grade ore. And whilst disappointment seemed to be part of the prospector's lot in 1952, both Time and Life magazines provided readers with a glimpse of another way of commercially taking advantage of uranium with articles on the Free Enterprise Mine and its dynamic owner, Wade V Lewis. While both tell his story, it was Life magazine's introduction that truly captured the essence of Lewis and his venture, setting the tone for the rest of the article: 'Near the little Montana mining town of Boulder last week a couple of second rate uranium mines were busily marketing a new and profitable stock

in trade. Their commodity: hope.'

A striking series of black-and-white photographs accompanied the article, documenting the visitors to Lewis's converted mine shaft. He had transformed the site into a more profitable health spa, where patrons were encouraged to inhale the radon gas released during the natural decay of uranium.

Other ways to experience the supposed healing powers of uranium included tunnels, sitting houses, and so-called 'uranatoriums.' In Texas, there was even a 'Uranium Trail,' comprising 25 different sitting houses. Treatment methods varied from place to place - some featured chairs filled with uranium-rich dirt, others offered benches, while a few provided shallow troughs where patrons could bury their bare feet.

Very few of these sites had direct access to uranium deposits and instead purchased the material from mining companies. Expanding on this profitable sideline, some also sold uranium to commercial manufacturers who incorporated the ore into products such as water jars intended to make drinking water radioactive. Another popular market for uranium tailings was the production of rheumatism pads - fabric bags of various sizes filled with radioactive ore. These pads were marketed as therapeutic devices, meant to be placed on sore areas of the body to promote healing. Several brands emerged during the 1950s, including the Wonderpad range, which featured Wondergloves and Wonderpad boots 'for lounging or sleeping.' Another example, the Gra-Maze, was advertised as a 'personal radioactive uranium comforter -your own health mine in miniature.'

While the American Medical Association (AMA) had been strong advocates for the health benefits of radioactivity by the 1950s they began denouncing radon therapy as a medical hoax, labelling its advocates as quacks and charlatans. The style of uranium treatment practiced in these

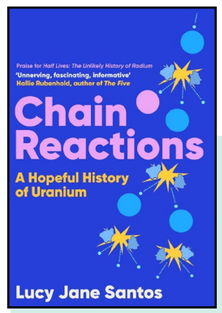
Above: *Certificate of shares in ACME Uranium Mines. Photograph by author.*

tunnels and sitting houses was dismissed with a brutal quip: 'Fascination for the gullible is [their] only known effect.'

But with so many uranium products and health mines in existence the AMA and other authorities struggled to contain and control this new form of medical quackery. Where possible they took steps to refer suspicious products to federal organisations, such as the Post Office fraud division for products shipped by mail, or the US Food and Drug Administration (FDA) if they believed it was misbranded. As the radioactivity was deemed too low to be a health hazard, this misbranding tactic was more effective in successfully stopping the sale of these products.

By the late 1950s, and with a stockpile of over 30,000 strategic nuclear warheads, the AEC phased out their previous policies that encouraged new uranium discoveries and limited purchases to already established mines. This had a devastating effect on prospective uraniumaires, some of whom were in the process of registering their strikes as the announcement was made.

Without the same level of demand, many mines were simply abandoned, with the inevitable loss of livelihood for workers. Towns, which had seen their populations grow, also found themselves in decline. And when a second uranium boom was trigged in the 1960s by the burgeoning nuclear industry it had a very different feel from the first. It was no longer possible for individual prospectors to reap the benefits and become wealthy. Time had moved on and the industry became firmly entrenched in the hands of large corporations like Exxon, Union Carbide, Kerr-McGee and Getty Oil, who increased their already established presence.



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Viewpoint Interviews...

Lucy Santos BSHS Executive Secretary

How did you get involved in the history of Science?

My interest in the history of science really began when I got the job as Executive Secretary. I'll admit - just as I did in the interview- that while I had a solid background in administration, I knew almost nothing about the field itself! But honestly, it's impossible not to fall in love with the subject when you're surrounded every day by people who are so passionate about it. My first real project in the history of science was on the history of radium, which ended up forming the basis of my first book. That project actually came about because Jeff Hughes was President at the time -and, if I'm being completely honest, I just wanted him to think I was cool.

How has the field changed since you first got involved?

One thing I've noticed more and more is the growing involvement of independent historians. While I understand the reasons behind this trend - which aren't always positive - the way the society has become more open and inclusive has been incredibly important.

What are you working on currently?

After writing two books on the history of radioactivity, I've just handed in the manuscript for my next book, Nobody's Perfect: The Making of Some Like It Hot, to my publishers. It's my favourite film, which is really the main reason I wanted to write about it – but I was also driven by the number of misconceptions and inaccurate stories surrounding its production, especially when it comes to the way Marilyn Monroe's behaviour at the time has been portrayed. I'm also fascinated by the nostalgia for the 1920s and 1930s that emerged in the late 1950s – a period often remembered as more comforting and safe compared to the atomic age.

What does your role within BSHS involve?

As Executive Secretary, my role is to manage all the behind-the-scenes administration that keeps everything running smoothly. I handle membership processing, oversee grant payments, and help coordinate the various committees and council. It's a complex, varied job – but that's exactly what makes it so enjoyable.

What are some key areas that you would like to see greater investiture in?

I'm the co-founder of the Cosmetic History and Make-Up Studies Network (CHMSN) and have a real passion for the history of cosmetics. It's a field that's far too often overlooked – especially when it comes to its connections with science, medicine, and technology – and I'd love to see more research being done in this area. If you're interested in joining the network or have ideas for potential projects, do get in touch via viewpoint@bshs.org.uk! We've got around 30 members at the moment, all working on a fascinating range of topics.

How do you deal with writer's block?

My mind works best when it is slightly overcommitted. I tend to flip between projects and that has the advantage that I can never truly get stuck as there is always something that I want to write on (usually the thing that isn't on a deadline!) At the moment that means researching our nostalgia for the 1920s and 30s, the use of uranium in pharmaceuticals and the construction of femininity in the 1950s.

What's the best field trip that you've been on?

It is honestly a toss-up between Los Angeles and Las Vegas, and the Czech Republic. In the first case, I was working in studio archives in Hollywood before heading to Vegas to track down some obscure survivals of the atomic age. Because I like to juggle several projects at once, we also visited the Mob Museum, housed in a former speak-easy, where we even tried bootleg hooch.

In the Czech Republic, I had my first radon bath at the Radium Palace Hotel in Jáchymov - the town where Marie Curie sourced the pitchblende from which she extracted radium -and visited the mines there too. That was a genuinely special experience, as I had been reading about the place for years, and seeing where it all happened brought it vividly to life. The Mining Museum there is excellent and worth a visit in its own right – even if you don't want to experiment with the health giving effects of radioactivity.

The British Journal for the History of Science

- Between education and entertainment: animation, science communication, and the Bell System Science Series. Scott Curtis.
- Museum film as a means of making museums: the Exploratorium's early years through the intermedial lens. Arne Schirrmacher.
- Within These Four Walls: televisualizing museum spaces of science, 1950–1971. Rupert Cole.
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- Visual cultures of CRISPR: intermedial figuration in science communication. Avey Nelson, Kate O'Riordan, Joshua Kim.
- Living in an intermedial world: intermediality as a methodology of historical inquiry to uncover the social dimension of science communication. Jean-Baptiste Gouyon.

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Viewpoint: the Magazine of the BSHS

Editorial

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