

# **ARTEFACTS XXVII**

Objects of Science and Technology in Motion

October 16–18, 2022

- Collection of abstracts -

**October 16, 2022 – Sunday**

**Silke Berdux (Deutsches Museum, Munich)**

**‘Stringless cello’. About the history of the fingerboard theremin or theremin cello**

The Theremin is the most famous among the early electronic instruments. Physicist Lev Termen developed it in the late 1910s in St. Petersburg and presented it very successfully in Western Europe in 1927 and later in the USA, where he lived from 1928 to 1938. It caused a sensation primarily through its manner of playing – sounds seemed to be generated in the air so that it was called „space-controlled“. Termen improved the instrument after he returned to Russia. However, what is not commonly known is that Termen developed two other types of the instrument with different interfaces, the keyboard and the fingerboard theremin, whose history remains widely unexplored.

The paper focusses on the fingerboard theremin also known as theremin cello. Lev Termen developed the instrument as early as ca. 1920 in Russia; several types were built during his stay in the USA, mostly in cooperation with musicians and composers, while the last model he built in the 1960s in Moscow after retiring from his job. As the space-controlled theremin, the theremin cello is one of the instruments with especially interesting non-keyboard-interfaces like the traonium, the hellertion and the Ondes Martenots emerging in the 1920s and 1930s. There are only two specimens known to have survived worldwide, one could be acquired by the Deutsches Museum some years ago.

The paper is based on thorough archival research, as well as on the recent examination of this example of this instrument, aiming to present its history in detail and to distinguish the different types unknown till now. It also discusses the instrument in its contemporary context, from performances of the Philadelphia Symphony Orchestra with Leopold Stokowski via dancing bands to avantgarde-music by Edgard Varèse. The paper further analyses the role of the instrument in the musical scene of New York in the 1930s and the circles of Termen, to which belonged many emigrants, the interaction and dependencies, the reception and the relation to discourse about new instruments, new sounds and new tonality, attempting to answer why the theremin cello didn't establish in musical life.

Silke Berdux studied musicology, history and anthropology in Göttingen and Munich, obtaining her M.A. in 1994 and Ph.D. in 2001. From 1994 to 2000 she worked as a free-lance musicologist and software-documentarist in cooperation with broadcast companies, museums, conservators and edition projects. Since 2000 she has been curator of the musical instrument collection at the Deutsches Museum. There she initiates and develops a wide range of research and digitization projects as well as education programmes. The focus of her scientific work ranges from the history of the trumpet marine through speaking machines, flutes and piano rolls to electronic instruments. In the last years, together with her team, she developed the new exhibition of musical instruments in the Deutsches Museum, which opened in July 2022.

## Moon Rocks at the Deutsches Museum Munich and Our Changing Value of the Past (and Future?)

Christopher Halm, Deutsches Museum Munich

On December 11, 1973, for the last time so far, a manned mission brought selected samples from the moon to the Earth. For a worldwide TV audience, the two sent astronauts Harrison H. Schmitt and Eugene Cernan advertised a stone they had just picked up from the moon's surface. The stone became globally known as the so-called Goodwill Rock. After returning to the Lyndon B. Johnson Space Center, this rock had been neatly cut and crushed. Its tiny pieces were encased in acrylic glass and mounted on wooden displays. Under the name of president Richard Nixon, NASA distributed these displays to all well-disposed nations, their research institutes and museums.

The history and success of the Deutsches Museum Munich are closely linked to the exhibition history of moon rocks. As early as 1970, it had already displayed a lent moon rock from the first lunar landing in its *Ehrensaal* (hall of honour). America's sense of mission met with great curiosity and astonishment among the German public. In 1984, the Deutsches Museum received its own lunar sample display, which since then has been a constant component of its exhibitions, collection management activities, and digital productions.

This story is far from being unique. In fact, it represents most cases of moon rocks in the international public domain. In light of this, I argue that the Goodwill lunar displays are artefacts that materialise a globally circulated image of an international, primarily western, American lead civilised, democratic, scientific community of the 20<sup>th</sup> century. Their auratic charisma is based on their peerless rarity, galactic exoticism, exorbitant age (3.4 billion years), and related space missions that could not yet be repeated. However, in the face of present space programmes by other nations – most notably China – and new commercial enterprises run by eccentric billionaires, these characteristics and, therefore, the public view of moon rocks and the value of its museal and techno-scientific pasts are changing. Moon rocks are no longer just recorded and depicted artefacts of political and scientific enshrinement. Instead, they have become research materials for building space stations and realising other near-future promises that have long been part of exhibitions. How does all this challenge our self-image as a global community? How is our view of the moon changing? And what role did and do museums play in this?

## Short CV – Christopher Halm

Christopher did his basic and graduate studies in chemistry, history and geography at Heidelberg University. He is a trained grammar school teacher and he completed his PhD in the history of science under Christoph Meinel and Omar Nasim at the University of Regensburg.

Christopher presented at numerous international conferences and has already published two articles concerning his research on the early history of agricultural chemistry. The German Chemical Society has lately awarded his dissertation on that topic.

Christopher is a former fellow of the Heinrich Böll Foundation and the Science History Institute in Philadelphia. He is currently a Scholar-in-Residence at the Deutsches Museum Munich and a member of the Leibniz Research Alliance "Value of the Past". He is supported by the latter two in his new project on the history of moon rocks in the laboratory and the museum.

## **Decrypting Secrets from WW2: A Story-Telling Cipher Machine SG-41**

Just a few years ago, this type of cipher machine named SG-41 was completely unknown. Since the discovery of a relic by amateur treasure hunters in 2017 and the publication of this story by the Deutsches Museum, more and more facts and stories are coming to light. This is primarily because the object itself inspires researchers to find out more.

For one thing, it is the interesting appearance of the object.

The device was found buried in the forest floor, probably having been hidden there over 70 years ago. It is corroded from the outside, but its function is still clearly recognisable. For museums and museum research, objects that show their history are particularly telling artefacts.

It soon becomes clear that the object itself, corroded and fragile in its materiality, must be particularly well protected. The keyboard is made of cellulose nitrate, a substance that is very problematic. This means that SG41 in principle has a limited time left. When will the keyboards of all existing SG41 exposit decay forever? What can owners do to stop the decay? No light, no climate fluctuations, regular monitoring.

In the cryptology exhibition of the Deutsches Museum, we use a display case with an air-conditioning compartment, which we hide in a floor staging. The material for the staging must be adapted to the special machine requirements. Sculptors and painters have to work hand in hand with the restoration research.

In addition, we use digitisation to preserve the knowledge on the object itself, even if its keyboard will decay in the centuries to come. Not only is the exterior photographed, but also CT scans of the interior are made in collaboration of the Fraunhofer EZRT in Fürth. The data can be used to build a workable 3D-model from the object. In addition to our corroded exhibit and 60 more cipher devices, we CT-scanned a fully preserved working device from a befriended collector. In the near future, we will make this data accessible to researchers worldwide as part of the eHeritage study 3D-Cipher.

On the other hand, there is the exciting fact that research was carried out in Germany during WW2 on cipher machines to produce better and more secure encryption. German cryptology has mainly been reported on by people outside Germany, because German eyewitnesses did not report on what they did during WW2. In the meantime, many documents have been declassified and made accessible to the public. It is high time to take a closer look at this chapter of history. The SG41 device provides a particularly interesting occasion for this. And indeed, this object has opened up a veritable cascade of research questions.

Since 2017, the object inspired researchers in the international crypto community to discover and publish the encryption algorithm, as well to conduct a comprehensive cryptanalysis.

It turned out that the device did indeed hold a very secure encryption algorithm for its time, a major challenge for Allied codebreakers - but who invented such a machine during WW2? The search for the inventor Fritz Menzer takes us across Germany, Austria, Russia, England and the USA, and much of the information is contained in the TICOM documents of the allied-occupying powers.

The more we learn, the more new questions arise. It is a never-ending spiral, although many archive traces end in nothingness.

More generally, a picture of German cryptology during the Second World War emerges. This story has hardly been told before, and here too there are great mysteries. If there were such good machines, why were they not used on a large scale? Will it ever be possible to shed light on such questions?

The big challenge for our museum is, how to put these stories into an exhibition:

In addition to personal guides through the gallery and small text panels, we publish content via our media guide App, and a podcast episode is also available. The inventor Fritz Menzer, and the associated archival research of many years, is honoured with a film, in collaboration with a filmmaker from Berlin. Fritz Menzer appears as a drawn avatar and leads us through his life story filmed at relevant locations.

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Carola Dahlke is Curator of Computer Science & Cryptology at the Deutsches Museum, with a great fascination for cipher machines and their history.

Previously, the geoscientist worked in environmental and climate research for many years, most recently at the Max Planck Institute for Meteorology in Hamburg.

## **Proposal for Artefacts *Objects in Motion***

### **Lappish Looms and Indian Textiles: Which Knowledge circulates when Objects migrate into Museums.**

Ellen Harlizius-Klück, Deutsches Museum, Munich  
Annapurna Mamidipudi, Technical University Berlin

At the center of our proposed contribution are two museum objects: (1) the prehistoric loom of the Deutsches Museum that migrated from Norway as a scaled-down reconstruction of a Lappish loom from the 20<sup>th</sup> century, representing the Global North, and (2) textiles from the Naga tribes of North East India stored in the Ethnological Museum, Berlin, featuring as instance of the Global South. In approaching these two objects for understanding weaving as site of technical knowledge, we demonstrate that in both cases the object does not allow to access the technical knowledge of its original users or producers.

In our research project PENELOPE, we asked for the knowledge inherent in using the ancient warp-weighted loom and disseminating into other knowledge areas like cosmology, (meta-)poetics, or mathematics. By comparative studies including handloom weaving in India, we tried to verify such knowledge transfer as a more global and not only ancient phenomenon. However, when investigating the relevant objects in museums, their presentation and explanation could not answer our questions.

The prehistoric loom is an artefact from the past, whose use in the museum seems to be to reconstruct knowledge of the past, while the object resulting from such weaving knowledge for example in India is part of a history of colonial disenfranchisement. We present the archival material that comes to frame the loom as one point in a trajectory of progress at the Deutsches Museum where the Jacquard loom is the pinnacle of weaving technology. Here we can see how the warp-weighted loom as technological artefact is bereft of knowledge visible in the fact that its product, the fabric, has no role in the display. On the other hand, fabrics collected as objects documenting indigenous communities of India, even where the curators in the Ethnological Museum Berlin interpret their traditional textiles as objects of decolonisation, the textile becomes an object of Western cultural knowledge, where we can again see it become bereft of technical knowledge.

Instead, responding to the common registers that weaving in Ancient Greece and contemporary India carry we explore how understanding the loom and the textile both as documents of the weaver's knowledge can help us to imagine a new sustainable trajectory for technology, as well as an ethical restitution of relations between curators and crafts-producers of objects in motion.



## Short biographies

**Ellen Harlizius-Klück** (Research Institute for the History of Technology and Science, Deutsches Museum Munich, Germany) is Principal Investigator of the project PENELOPE: A Study of Weaving as technical Mode of existence, funded by an ERC Consolidator Grant. Educated as mathematician, artist and philosopher, she has a specific way to look at textiles as a product of mathematical as well as aesthetic considerations leading to a philosophical understanding of weaving as a way to structure elements in a balanced order. Several Grants allowed her to pursue this unusual topic since her PhD thesis on “Weaving as episteme” in 2004.

**Annapurna Mamidipudi** (Technical University Berlin, Germany) is currently conducting a project on *Epistemologies of Craft*, funded by the German Research Foundation. Her research interests include the study of how craftspeople innovate their material practices and how they make knowledge claims to build recognition in contemporary society. Together with Dagmar Schäfer at the Max-Planck-Institute for the History of Science, she is co-editing a volume on the *Ownership of Knowledge*, to be published in the *MIT Press Inside Technology* series looking at knowledge ownership beyond IP frameworks.

## **“Gift of: ... Lieutenant, afield” – on the motion of World War I booty into a museum collection**

**Johannes-Geert Hagmann, Deutsches Museum**

### **Abstract**

In 1914, the curator of the physics collections at the Deutsches Museum, Dr. Franz Fuchs, entered active military service as a volunteer for the signal corps units of the Bavarian Army. From his deployment in the in Northern France and during the course of the war, he sent a box full of French telephones to Munich as an addition to the collections documenting foreign “technical progress”. Together with other examples of booty seized by the German forces, the objects moved into the museum’s inventory and had been forgotten for a long time, until recent efforts to expand provenance research on the collections of the Deutsches Museum brought them back into new focus.

In this contribution, we aim to embed the microhistory of these objects and their transformative transnational journey, from the occupied cities in French and Belgium warzones to a monumental German museum under construction, into a larger framework of trophy collections and exhibitions during World War I. In addition to the complexities that arise regarding the reconstruction of their exact provenance, the determination of their ethical and legal situation, more global questions surface relating to their appropriation of new meaning: Have the artefacts that used to be commodities, through their respective biographies and preservation, tacitly acquired the status of cultural heritage? What would be the consequences and could they, in the future, sendoff these objects back into motion again?

## ARTEFACTS AND ADVOCACY

Sam Alberti, National Museums Scotland / University of Stirling. [s.alberti@nms.ac.uk](mailto:s.alberti@nms.ac.uk)

Proposal for ARTEFACTS XXVII 'Objects of Science and Technology in Motion'

Technical artefacts have many meanings over the course of their use-life and museum after-life. By engaging with audiences thoughtfully and openly, science museums can use their objects' dynamic biographies to address global challenges we face today.

Not least of these is human-induced rapid climate change. Take the trusty tractor that features in the new display of the Deutsches Museum, the Lanz vehicle known as 'Bulldog' thanks to the unusual proportions of its cylinder head. As an example of the first crude oil powered tractor in the world, it was of a breed that mechanised farming in the early twentieth century. This 12-horsepower version then took pride of place as a 'legend' in the Deutsches Museum's barn-like *Agriculture and Food Technology* gallery. There it told the story of the impact of agriculture on everyday lives as part of an array of farming vehicles (albeit most of them with rather more conventional appearances). In 2014, however, curators drew on a different cultural value embedded in the Bulldog and displayed it at the heart of the *Willkommen im Anthropozän – Unsere Verantwortung für die Zukunft der Erde* exhibition to converse with visitors about climate change. This tractor illustrates the radical transformations that artefacts can experience: mighty agricultural machine; technical fetish; social history text; harbinger of doom.

The Bulldog's journey and those of other objects illustrate how museums can exploit their changing meanings to engage audiences with relevant global issues. An Atomic Energy Authority dosimeter from a hybrid civilian-military Cold War nuclear complex might be used to reflect on the context of current conflicts. A quarter-plate Cameo camera that took photographs of fairies was used in an exhibition, *Fake News*, to provoke dialogue around misinformation. A prototype Edinburgh Modular Arm System prosthetic limb was revolutionary in its time but is now part of a dialogue about *lack* of use to develop understanding of social and medical models of disability.

These artefacts have all had their own diverse technical and cultural stories; what unites them, I argue, is that they are also boundary objects used by curators to advocate for social good. Not to demand action, but rather to stimulate dialogue with audiences and other stakeholders and thereby contribute to a greater understanding of timely global issues and inform better decision-making. Visitors respect the expertise of curators, and artefacts are imbued with credibility and authority. By striking a balance between a false neutrality and the extremes of activism, museums can use their objects' changing meanings to address relevant global causes. Artefacts enable powerful advocacy.

## Samuel J. M. M. Alberti PhD FRSE: Brief Curriculum Vitae

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### Employment

- 2021–** **National Museums Scotland: Director of Collections**  
I lead the Collection Directorate, comprising over 130 curators and other professionals managing art, nature, science, history and cultural – 12.4 million items, across 5 sites. I coordinate NMS research activity, and its public engagement around climate change. I am also PI on a major AHRC-funded project on the Cold War in museums.
- 2016–21** **National Museums Scotland: Keeper of Science and Technology**  
I led the Science & Technology Department, with a team of 13 staff plus volunteers, associates and students. We had responsibility for 80,000 objects.
- 2010–16** **Royal College of Surgeons of England: Director of Museums and Archives**  
I was responsible for the public Hunterian Museum; the Wellcome Museum of Anatomy and Pathology; the RCS institutional records and deposited archives; the College artwork and special collections; and research collections.
- 2004–10** **University of Manchester School of Arts, Histories and Cultures: Lecturer in Art Gallery and Museum Studies; Manchester Museum: Research Fellow**  
I taught masters courses in the history of science, technology and medicine and in museum studies and researched the history of the Manchester Museum.
- 2001–4** **Manchester Centre for the History of Science, Technology and Medicine**  
Research Associate; Temporary Lecturer; Post-doctoral Research Fellow.

### Academic affiliations

- 2021– Fellow, Royal Society of Edinburgh  
2016–22 Honorary Professor, Heritage Studies, University of Stirling  
2016–17 Cain Fellowship, Science History Institute, Philadelphia  
2014–15 Visiting Professor in Clinical Surgery, University of Edinburgh  
2011–15 Visiting Senior Research Fellow in History, King's College London

### Education

- 1997–2000 Universities of Sheffield and Leeds; PhD in C19th Studies / History of Science  
1996–7 Imperial College, London; MSc in History of Science, Technology and Medicine  
1992–5 Durham University; BSc (Hons), Natural Sciences

### Exhibitions (selected)

- 2022 *Anatomy: A Matter of Death and Life*, National Museums Scotland  
2015–16 *Designing Bodies: Model of Human Anatomy, 1945 to Now*, Royal College of Surgeons  
2014–15 *War, Art and Surgery*, Royal College of Surgeons  
2013 *Opened Up: 200 Years of the Hunterian Museum*, Royal College of Surgeons  
2012 *Anatomy of an Athlete*, Royal College of Surgeons  
2011 *London's Lost Museums*, Royal College of Surgeons  
2007 *Revealing Histories: Myths about Race*, Manchester Museum

### Books

- 2022 *Curious Devices and Mighty Machines: Exploring Science Museums* (Reaktion)  
2014 [ed.] *War, Art and Surgery: The Work of Henry Tonks and Julia Midgley* (RCS)  
2013 [ed. with Elizabeth Hallam] *Medical Museums: Past Present Future* (RCS).  
2011 *Morbid Curiosities: Medical Museums in Nineteenth-Century Britain* (OUP).  
2011 [ed.] *The Afterlives of Animals: A Museum Menagerie* (U Virginia Press).  
2009 *Nature and Culture: Objects, Disciplines and the Manchester Museum* (MUP).

**October 17, 2022 – Monday**

ARTEFACTS 2022

ARTEFACTS XXVII "Objects of Science and Technology in Motion"

Paper proposal

**Complex object biographies in Oslos new ICT exhibition: How the first Norwegian computer turns out not as Norwegian as previously presented**

By Dag Andreassen

Historian, Curator

Norwegian Museum of Science and Technology

The Norwegian Museum of Science and Technology opened its new permanent telecom- and computer history exhibition April 7th 2022, titled I/O.

This paper will briefly present how the exhibition is designed to present complex object biographies, making it possible to use the same objects in multiple thematic routes through the exhibition, possible to change, add and develop further in the years to come.

The main part of the paper deals with the example of one of the iconic artefacts in the museum collection, presented in earlier computer history exhibitions and included in the new one, as "the first electronic computer made in Norway."

The story of this first computer construction and research project in Norway has rarely been challenged. The museums version from earlier years has been told and re-told in computer history books, and presented as a largely Norwegian "invention", and a typical tale of heroic pioneers spearheading new technology and important inventions.

Over the years, the computer, named NUSSE, took several central places in stories about computing, both in the 1950'ies newspapers, at public demonstrations on open days at the University, or as it was inducted to the Norwegian Museum of Science and Technology's collections as "the first Norwegian electronic computer", partly argued into this position by the involved researchers themselves.

The museum staff have also presented NUSSE as the real pioneering object, made into one of the important artefacts in the museum collections and exhibitions – a "must see" for visitors alongside the first steam engines, automobiles and airplanes.

One important difference here is how international technology is presented as something Norwegian, as a national achievement and an important Norwegian contribution to the world. This is admittable not true when it comes to steam engines, automobiles or ariplanes. But might it be said about one of the earliest computers?

This quality of an object, taking part as a show case for important national tales, is interesting as a part of the museum's own history and reflections over how stories about innovations in particular are linked to functions and expectations to a museum as a place for heroes and achievements as a part of the grand national narrative.

Hopefully, this role for a museum is no longer as pressing as it might have been earlier. In our new exhibition, at least, nuances have been brought to the presentation of the NUSSE computer, like the little known fact that the computer was largely a British design. For sure, the computer was modified and adapted by the Norwegian research team, but still: Does it really deserve the label “first Norwegian computer”, or has it been reborn once again, maybe even as a lesser important artefact in our new exhibition?

CV:

## **Dag K. Andreassen (b.1969)**

Main:

- Historian, cand.polit., University of Bergen, 1995
- Employed at the Norwegian Museum of Science and Technology since 1996, curator since 2000
- PhD candidate in computer history, Norwegian university of science and technology (part time 2019-2024)
- Project manager for the new permanent ICT exhibition I/O, 2019-2022

Other:

- Research experience in history of technology, industrial and post-industrial development in Norway
- Authored books on local history and the engineering profession as well as articles on food industries, fisheries and more.
- Involved in building exhibitions on medical history, oil industry, plastics, energy and transport, music, science history and the jubilee exhibition TING - democracy and technology, 2014-2015.
- Project manager for collection management registration system (Primus) 1996-1998
- Leader of the museums educational department 1998-1999
- Staff advisor, museum directors' staff 2008-2018
- Leader of the museums marketing and communication department 2017-18
- Participated in research- and science centre exhibition project on renewable energies, 2012
- Project manager for the exhibition Klima X on climate change, 2007-2009.
- Project manager for the new permanent exhibition Oil and gas, 2014
- Project manager for the renewed Oslo Science Centre, 2015
- Project manager for Akerselva Digital, smart phone app guide to Akerselva.
- Project manager for [www.industrimuseum.no](http://www.industrimuseum.no), digital content on industrial history

Simona Casonato

Media, ICT and Digital Culture curator, Museo Nazionale Scienza e Tecnologia Leonardo da Vinci, Milano

### **The mythological biography of things and its circulation: a challenge for science and technology museums.**

The work of the Artefacts network shows that today the biography of objects is a widely accepted methodology in science and technology curatorship. By following Kopytoff's seminal notion of cultural biography of things (1986) and focusing on the singularization processes of objects preserved in museums, curators gained a toolbox to overcome the abstract mobilization of artefacts in narratives of technoscientific heroism (Jordanova, 2014; Bud, 2017; Canadelli et al., 2019).

Yet, some museum artefacts seem to resist this approach. To visitors and museum stakeholders, they persist as totemic presences, embodying ideals, and identity values; their materiality is optional, as they are the protagonists of strong public narratives presenting the fixed narratological structure of contemporary mythologies (Barthes, 1957).

Throughout the case of the Olivetti Elea 9003 computer (1959) and of its rare material remains in Italian museums, I will discuss the place of curatorial interpretation in front of mainstream narratives of technological history that are not only accepted, but also beloved by the public.

The popularity of Elea 9003 has increased in the last years. Its biography has been narrated by dozens of books, newspapers articles, tv programs, exhibitions, following a fixed plot that resurfaces even in in-depth analyses conducted in the fields of industry and design history (Gemelli, 2013; Parolini, 2015; Mori, 2019). Narratives focus on the creation of Elea as one of the most advanced computers of its time, the unfortunate ending of the project, and the lost occasion of building a native electronics industry in Italy. A relevant detail: all historical reconstructions draw from the dissemination activism of the first-hand protagonists of the story—now ninety-year-old engineers and physicists—and their families.

But the careful analysis of Elea's pieces in museum collections opens the possibility to enrich the story. According to anthropologist Thierry Bonnot, the biography of a museum object accounts for the multiplicity of all the subsequent contexts and human relationships in which it has been entangled from creation to collection, which imbue it with a variety of representations and practices, all inextricably belonging to it (Bonnot, 2009). Indeed, the restoration of an Elea operator console in the collection of our museum uncovered a new "object's kinship" exceeding the restricted team of its fathers-inventors (Cappellina et al., 2017). It includes users, saleswomen, programmers and museum professionals, whose perspective risks to subdue popular heroic tones. How to propose these new entries to the passionate public of a legend? Has the museum the right/obligation to demystify? How to dialogue with the living community of the story protagonists and of their heirs?

The aim of my reflection is also to put the notion of object's cultural biography in dialogue with contemporary and bottom-up notions of cultural heritage, as proposed by frames as the Intangible Cultural Heritage Convention (UNESCO, 2003) and the Faro Convention (Council of Europe, 2005), and with the museums' effort of introducing co-curatorship at several level. In the domain of science and technology, balance is difficult: the aim to be inspired by DEIA principles do not always allow an easy connection with classical narratives proposed by our "heritage bearers" (Adell et al., 2015), who, nevertheless, are at the origins of our collections and whose interpretation of technological history has its own, legitimate reasons.

#### *Author's bio*

Simona Casonato has been working at the Museo Nazionale Scienza e Tecnologia Leonardo da Vinci since 2003, covering different roles, from audiovisual documentation specialist to collection curator. She currently collaborates with universities in Italy and abroad for teaching and research. She is one of the supervisors of the first STS doctoral course shared between the Museum, the Politecnico di Milano and the Università della Svizzera Italiana. She took part in Circuits of Practice research project (2020-21), funded by the AHRC UK and led by Loughborough University and Leicester University, in Algotcount research project (2020-22), funded by Fondazione Cariplo and led by University of Milan and Politecnico di Milano. She is the author of several papers and book chapters about the museum collections.



## **A privileged, yet hidden witness: Objects' biographies in Italy and the story of a radio broadcasting transmitter (1932-2022)**

Roberta Spada

PhD Candidate

Politecnico di Milano / National Science and Technology Museum "Leonardo da Vinci", Milan, Italy

Through the last twenty years, objects' biographies in science and technology museums (Alberti, 2005) have contributed through micro-historical approaches to complexifying grand narratives and defying myths about science and technology, scaling down big concepts, attending to users, technicians, and the local dimension of technoscience, and telling stories that would otherwise be considered unimportant. Biographies also allow us to characterise the many practices involving museum artefacts—like curation, conservation, and exhibition—and thus the multiple transformations of the objects and the narratives performed around them, where the ideas about heritage that practitioners and heritage bearers have (Adell et al., 2015; van Zanten, 2004), as well as aspects like affect and care (Geoghegan & Hess, 2015), are crucial for shaping the conceptualisation of artefacts and the narratives involving them.

Such reflections have certainly solidified in many geographical and cultural contexts, especially the UK, the USA, and northern Europe. They are becoming the standard practice when it comes to studying the stories of objects in science and technology museums. In my contribution, I would like to turn the attention to an understudied geographic context: Italy, and, in particular, the specific context of the National Science and Technology Museum "Leonardo da Vinci" in Milan.

To do it, I will refer to the biography of a radio broadcasting transmitter. This object has been a privileged witness to the history of radio in Italy but also a hidden one, both during its life as a piece of the Italian radio infrastructure and during its life at the National Science and Technology Museum.

The transmitter, a 50-kW model from Radio Corporation of America, was bought by the national broadcasting company EIAR (Ente Italiano Audizioni Radiofoniche) to broaden the newborn radio infrastructure with up-to-date pieces of technology. It started operating in 1932 in the brand-new broadcasting station of Siziano, a village close to Milan, inaugurated in the presence of Benito Mussolini. When Milan was liberated in 1945, the station and its transmitter were one of the few pieces of radio infrastructure having survived the Second World War. The transmitter was then subject to upgrading and maintenance and kept running until 1969. In 1972, EIAR (which after the war had become Rai, Radiotelevisione Italiana) donated the dismissed object to the National Science and Technology Museum, where it was displayed in the telecommunications gallery, where it is still today.

Through this story and my own experience in taking charge of it through my PhD, I wish to reflect upon the approaches to technoscientific heritage in Italy and ask an important question: Why are the biographies of technoscientific objects still hidden?

## Circulation and Digitization: Portable Quadrants in the Western Museums

Portable quadrants were employed for disciplines such as timekeeping, mathematical operations, surveying, architecture, maritime, navigation and artillery. When they were used as astronomical instruments, they had numerous elements which are manifested in the form of quadrant principles. Most of these principles were developed between the 9<sup>th</sup> and 13<sup>th</sup> centuries in the Islamic world. Throughout history, some principles were replaced by more advanced ones, transformed within different contexts, or remained in use with slight alterations for centuries. Some of these principles and the instruments carrying them are transferred into the Western Europe and India while they were mostly abandoned in the Islamic world. Some scholars (e.g. François Charette) argue that some of these abandoned principles were transferred back into the tradition in the Ottoman Empire during the 18<sup>th</sup> and 19<sup>th</sup> centuries while others (e.g. David King) disagree. In the Western culture, a divergence between the traditions in the England and Continental Europe, particularly Italy, appears to have emerged around the 16<sup>th</sup> and 17<sup>th</sup> centuries. Both the knowledge carried by the objects and the objects themselves were constantly being transferred and transformed. Some of them appears to have reborn independently while others present traces of the transmission of knowledge.

Most of these instruments have not survived over the centuries. They can only be examined through manuscripts that either were to serve as a basis for constructing instruments or as instructions for using instruments. Most of the still existing instruments remained where they were produced and used. A number of instruments found their own way into the Western collections. Most of them could have been studied more openly by experts before the digital era. With the contemporary contributions to the digitization, the historical data provided by these instruments have become more accessible to anyone who is interested.

“Knowledge and art get transferred to where they are appreciated” as Ibn Sīnā (d. 1037) said. A new paradigm of transfer of knowledge has been occurring with the digitization in addition to the historical dynamics of the physical transfer of the instruments. Transfer of knowledge has been transforming and becoming more scholarly thanks to the open network of museums. Contemporary auctions illustrate that the portable quadrants are still in circulation in different countries not as scientific instruments but as cultural artifacts. In other words, this is an ongoing process with historical aspects.

In a previous material culture study, 243 portable astronomical quadrants, 79 from the Islamic World and 164 from the Western Europe, from 10<sup>th</sup> to 20<sup>th</sup> centuries were catalogued and analysed by scanning the digitized collections. The resultant catalogue enabled the formulations of several conclusions with respect to different traditions in different time periods and different geographical regions. There is no direct evidence on the role of portable quadrants in the historical knowledge transfer, yet, there are several indications that seem to support such a role. In this talk, a cataloguing and compiling meta-data attempt of portable quadrants will be presented within the context of

circulation and digitization of historical knowledge. The several layers of knowledge transfer are going to be exemplified through this case study.

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Enes Tepe

Abstract for Artefacts XXVII, Munich, 16-18 October 2022

**A precious device for travelers:**

**An Ottoman-era portable clock with calendar function**

**Artemis Yagou**

Deutsches Museum (Munich)

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In the early eighteenth century, portable clocks and watches were among the most complex artefacts of their time. A watch with additional calendar function was a special and precious object, intended for a limited clientele. The presentation will deal with an early-eighteenth century watch with calendar, possibly made in South Germany but intended for a client from the Ottoman Empire. This is evident by the fact that the watch dial has Ottoman-era numerals, i.e. numbers used with the Arabic script. In the eighteenth and early nineteenth centuries, a wide variety of watches with this special feature were produced in Europe for the markets of the Ottoman Empire, which then occupied a vast area including most of Southeastern Europe, Asia Minor, the Middle East and North Africa. The watch originates from the collection of clock manufacturer Arthur Junghans and currently belongs to the Landesmuseum Württemberg (Stuttgart). Detailed analysis of the object itself as well as of its collection history reveals a web of associated interactions and meanings. Following a complex collection trajectory, the watch remains enchanting as a museum piece and as the focus of object-based research.

The object represents new types of artefacts that emerged in the early modern period: both practical and fashionable, and certainly highly desired. Portability meant that the objects' use was by definition intertwined with emerging forms of mobility in a world that was increasingly on the move. Watches like this example reflect evolving mobility patterns and associated novel ways of working, learning and communicating. Specific features of typology, design and interface contributed to usability, while customisation and conspicuous consumption enabled the expression of the individual identity of the owners. At the same time, the use of such an object exemplified for many users an informal, intimate and exciting connection to technology and science. Employed for both timekeeping and self-fashioning, European watches for the Ottoman markets represent a fascinating chapter of global exchanges in the domains of trade, technology and science.

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Dr Artemis Yagou is a historian of design and technology, currently a Research Associate at the Forschungsinstitut of the Deutsches Museum. Her main research interests are design history, the cultural history of technology, museums, horology, construction toys, and Greek material culture (eighteenth to twenty-first centuries).

## Artefacts 2022 Abstract

*Kristen Frederick-Frost, Ph.D. (she/her)*

*Curator of Modern Science*

*Division of Medicine & Science*

*National Museum of American History*

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### Abbe's radium: a study of the motion of particles, knowledge, and artefacts

In 1903, 150mg of radium salt purportedly extracted from Austrian pitchblende by Marie and Pierre Curie in France was imported to the United States via a chemical distributor based in New York. The recipient, a physician named Dr. Robert Abbe [1851-1928], spent decades applying this material to his patients. The radium's housing changed over the years, but the same material moved between bodies, allowing Abbe to compile medical experience as well as ways of quantifying and modifying radium's ionizing radiation. Abbe's resulting publications helped feed a rising demand for radium therapy in the U.S. and established his role as one of the pioneers in the field. This recognition helped some of Abbe's radium survive the gradual purge of this material from everyday life, as understanding of hazards associated with radium increased and shorter-lived radioisotopes became far more favored. Two of Abbe's ampoules of radium salt and other related objects were framed for display in the New York Academy of Medicine. The move from therapeutic to historical artefact fundamentally changed the spheres in which this material circulated.

The framed plaque holding the Abbe artefacts was an object of curiosity for Academy members and guests for decades until it was assessed by a professor of radiology. Within short order, its status moved from a treasured historical object to a regulated hazard. Its transfer to the National Museum of American History in 1993 satisfied a curator's desire to have an object associated with the work of Marie Curie, however loosely, and the need for this material be at an institution licensed by the Nuclear Regulatory Commission. For almost twenty-four years Abbe's radium sat in a safe in a lead shielded box, with the hope that even its most energetic particles would not travel very far. During this period of stasis, our tolerance of hazards moved lower and our expectations for museum practice moved higher. Recent research concerning Abbe's radium probes past uses, both medical and museological, revealing complex negotiations with risk. It also forces us to consider the future of these materials. The trajectory is clear. From application to bodies, to framed display, to basement storeroom, to shielded safe, to a facility for radiological hazards, Abbe's radium moves further and further away from the public. The question is, can we use history to bring it back to the people in some meaningful, safe way?

## Colonial traces

### Where does the bloom next to the diorama come from?

In prehistoric times, in the Siegerland region of Germany iron ore was processed in bloomery hearths. What emerged was a spongy clump of iron still intermingled with slag: a so-called bloom. The bloom on display here does not come from the Siegerland, however, nor does it date to the 5th century BC. This iron clump comes from Africa, where German colonial administrators obtained it for the Deutsches Museum in the interior of Togo in 1914.

The African nation of Togo was a German colony from 1884 until the First World War. In Akpafu, the region where the bloom originated and today part of Ghana, iron ore had been extracted from local deposits and worked by local blacksmiths for centuries. Under colonialism, however, domestic producers were soon squeezed out by cheaper iron from Europe. Only one smelting furnace still operated in Akpafu around 1900. It must have produced the bloom seen here.

The Deutsches Museum was interested in African ironworks for several reasons in those days. On the one hand, curators regarded African iron technology as belonging to a development stage long since left behind in Europe. With contemporary objects from Africa, they hoped to give museum visitors a glimpse of their own past. This spot in the exhibition is a relic of that way of thinking preserved to the present day. On the other hand, it was still unclear around 1910 where ironworking had originated: in the Middle East – as researchers now believe – or in (West) Africa?

In Togo, as elsewhere, the German colonial system was enforced by violence. Although the bloom was paid for when acquired in 1914, its provenance remains problematic.



Bild 1

Photo: Deutsches Museum

## Artefacts

*From use to 'magic': readjusting medical objects in the Sarnelli collection, Rome University*

Tommaso Sarnelli was an Italian physician, Africanist and collector. In the 1930s, he travelled extensively in Libya and Yemen, gathering a substantial number of *memorabilia*, mainly but not only related to medicine, therapeutics and pharmacology. In the 1950s the Sarnelli collection was transmitted by the Istituto Universitario Orientale in Naples to the Museo di Storia della Medicina at Rome Sapienza, where it is kept to this day.

The founder of the Museo, Adalberto Pazzini, shared with Sarnelli and a substantial number of Italian medical historians and anthropologists a strong interest in medical primitivism and what was called 'ethnoiatrics'. However, while Sarnelli had a direct experience interest of the medical world of the Islamic Africa and middle East, whose languages he well knew, and taught when back in Italy, this was not true for many of his colleagues. All of them, however, contributed to the shaping of a tropical and colonial medicine, the Italian way.

In crafting the project of his museum, Pazzini relied on a conventional notion of magic as permeating the medical knowledge of non-Western cultures, especially those of Northern and Horn of Africa, where Italy held shortly-lived colonies. 'Magic' was a catch-all word, used to summarily describe a set of beliefs perceived as pre-scientific. While not necessarily tainted by colonialism or internal racism (cf. e.g. the works by Ernesto de Martino, and especially *Sud e Magia*, 1959), this way of looking at medical practice in the South (both the Italian as the global South) obviously involved downplaying its meaning and effectiveness.

We will focus on objects in the Sarnelli collection, especially a small bag for the Bezoar stone, to show how ethnoiatrics repositioned and transformed everyday objects and substances in 'magical' ones, in order to respond to the implicit and explicit tenets of colonialism and primitivism. This operation, achieved by means of exhibition techniques, videos and texts, is highly visible in museum displays, as in the Museo di Storia della Medicina in Rome.

Maria Conforti, Direttore  
Alessandro Aruta, Curatore  
Museo di Storia della Medicina, Sapienza Università di Roma



## Saving Elephants – Understanding the Search for Substitute Ivory

Robert Friedel, University of Maryland, College Park

Artur Neves, NOVA School of Science and Technology, Lisbon

Few artisanal materials have had longer and more fraught histories than ivory. For all but a few consumers ivory has been exotic and expensive, and its use was a mark of luxury and taste. For millennia, it has been a preferred material for carvers and other artists, with results that are represented in museums the world over. The introduction of machinery and industrial processes at the end of the 18<sup>th</sup> century provided the foundations for a vast expansion of ivory use in the West, extending beyond art and luxury into “high class” consumer goods. This expansion was fed by the creation of trading systems that exploited imperial incursions into elephantine territories in south and southeast Asia and, most importantly, Africa. The African trade was from the start entangled with other trades, especially that in human beings. As the slave trade lost acceptability in the West, this entanglement, along with fears for elephant populations, cast a considerable shadow on the ivory trade for many Europeans and Americans.

From the middle of the 19<sup>th</sup> century, these concerns over the ivory trade were expressed more and more frequently in the Western press and elsewhere. A result of this was the intensified search for substitutes. This search yielded a range of remarkable results, and these, too, are represented in museum collections, but much less appreciated than ivory. This paper explores one or two of the most important consequences of the search for ivory replacements, using artifacts in both American and European collections.

Two classes of artifacts are the focus of our initial attention: billiard balls and piano keys. Between them, these represented the great bulk of ivory consumption in the United States by the late 19<sup>th</sup> century (and possibly Europe, but we do not yet have statistics). Ivory was the standard (but never only) material for billiard balls by the mid or late 18<sup>th</sup> century. The game expanded enormously in popularity in the 19<sup>th</sup> century, putting considerable pressures on ivory supplies. Successful substitute materials appeared by the 1870s and achieved widespread acceptance by the 1920s. Until our recent research, however, the constitution and significance of these substitute materials has been little appreciated. Close examination of objects in the Smithsonian collections and elsewhere has opened up a much richer story.

Piano keys became the object of industrial production in the United States in the mid-19<sup>th</sup> century. By the end of the century, they were the primary product of the most important ivory manufacturers in the United States. When useable imitations of ivory became available, they were quickly applied to pianos, but with grudging acceptance. The experience of the ivory (and ebony?) substitutes in piano keys contrasts markedly with that of billiard balls, and we will explore the implications of this contrast. Again, the close examination of specific artifacts is central to our analysis and interpretation.

## Curriculum Vitae

Artur Neves has a MSc in Conservation and Restoration (specialized in conservation science) granted in 2017 by the Department of Conservation and Restoration of NOVA School of Science and Technology, Lisbon, Portugal. In his master's thesis he worked on the development of luminescence and Raman spectroscopies for the assessment of cellulose nitrate degradation (1). Currently, he is a PhD student at the same institution with a fellowship granted by the Portuguese Foundation for Science and Technology (FCT). His PhD project is focused on the study and preservation of celluloid. In 2020 and 2021, he was awarded two projects in the DISCO beamline of the SOLEIL Synchrotron, France, to test deep UV luminescence for the study of celluloid degradation (2). In 2020 he received a research fellowship within the NEMOSINE European project to study the degradation of cellulose derivative cinematographic films (3,4). Between January and May 2022, Artur Neves was granted a Fulbright research fellowship with the support of the FCT. Hosted by the Department of History of the University of Maryland and under the supervision of prof. Robert Friedel, he worked with four American institutions for the study of celluloid billiard balls, dentures, umbrella handles, detachable collars and *fabrikoid*: the National Museum of American History, the Dr. Samuel D. Harris National Museum of Dentistry, the Baltimore Museum of Industry and the Hagley Museum and Library. In 2022, he was also awarded a project by IPERION HS to be performed at IPANEMA, France, for the testing of state-of-the-art imaging techniques in the study of celluloid degradation mechanisms.

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2. Neves A, Ramos AM, Callapez ME, Friedel R, Réfrégiers M, Thoury M, et al. Novel markers to early detect degradation on cellulose nitrate based heritage at the submicrometer level using synchrotron UV-VIS multispectral luminescence. *Sci Rep.* 2021;11:20208.
3. Nunes S, Ramacciotti F, Neves A, Angelin EM, Ramos AM, Roldão É, et al. A diagnostic tool for assessing the conservation condition of cellulose nitrate and acetate in heritage collections: quantifying the degree of substitution by infrared spectroscopy. *Herit Sci.* 2020;8:1–14.
4. Mohtar A Al, Pinto ML, Neves A, Nunes S, Zappi D, Varani G, et al. Decision making based on hybrid modeling approach applied to cellulose acetate based historical films conservation Fourier Transform Infrared spectroscopy. *Sci Rep.* 2021;1–13.

Robert Friedel is Professor Emeritus of History at the University of Maryland, where he taught history of technology and science and environmental history for 35 years before retiring in 2019. Before coming to College Park he was a historian at the Smithsonian's National Museum of History and Technology and was the first director of the IEEE Center for the History of Electrical Engineering. In addition to articles, both in academic journals and popular outlets, he has published books on a range of topics, from Edison's electric light to zippers to a broad-ranging survey of technological change in the West. He has been a regular participant in ARTEFACTS conferences from the beginning of the series, having delivered meeting summaries and commentaries for a number of meetings as well as occasionally contributing research and analytical papers.

#### **Publications—books (partial list)**

Edison's Electric Light: The Art of Invention (with Paul B. Israel) (Baltimore: Johns Hopkins Univ. Press, rev. 2010)

A Culture of Improvement: Technology & the Western Millennium (Cambridge, Mass.: MIT Press, 2007)

Zipper: an Exploration in Novelty (NY: W.W. Norton & Co., 1994)

A Material World (Washington: Natl. Museum of American Hist., SI, 1988)

Edison's Electric Light: Biography of an Invention (with Paul B. Israel) (New Brunswick, NJ: Rutgers Univ. Press, 1986)

Edison: Lighting a Revolution (with Bernard S. Finn) (Washington: Natl. Museum of Hist. & Tech., SI, 1979)

#### **Publications--scholarly articles (partial list)**

"Novel markers to early detect degradation on cellulose nitrate-based heritage at the submicrometer level using synchrotron UV-VIS multispectral luminescence," with Artur Neves, Ana Maria Ramos, Maria Elvira Callapez, Matthieu Réfrégiers, Mathieu Thoury6 & Maria João Melo, Scientific Reports 11.1 (2021): 1-13

"Science & Technology in the 20<sup>th</sup> Century Exhibitionary Complex," in Elena Canadelli, et al., Behind the Exhibit: displaying science & technology at world's fairs & museums in the twentieth century (Washington: SI Scholarly Press, 2019):238-247.

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"Time, Sequence, & Research in Museums of Science & Technology", in Görel Cavalli-Björkman & Svante Lindqvist (eds.), Research & Museums, (Stockholm: Natl.museum & Nobel Museet, 2008)

"Snapshots of a Discipline," Technology & Culture 36, 2 (Apr. 1995) [guest editor's introduction]

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"Artifice, Materials, & the Choices of Design," in Fiona Fisher & Penny Sparke, eds., Routledge Companion to Design Studies (London: Routledge, 2016)

"Invention," in Peter Stearns, ed., Oxford Encyclopedia of the Modern World (NY: Oxford Univ. Press, 2008)

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# ARTEFACTS Conference 2022

## Proposal

### **The “Woermann Bridge” in motion**

The “Woermann Bridge” has been a highlight of the Marine Navigation exhibition in the Deutsches Museum since 1927. Generations of children have turned the wheel and navigated the steamship safely into the port. The walk-in diorama consists of original nautical instruments used on steam ships in the 1920s. The instruments are embedded in the replicated wheelhouse of the steamship TS Adolph Woermann, which operated on the German East Africa Line in the 1920s. Behind the windows, a painting of the Port of Hamburg (painted by Günter B. Vogelsamer) completes the setting.

In the past, the wheelhouse had been presented in multiple different contexts. Before being destroyed in World War II the background painting didn't show the Port of Hamburg but the Bay of Victoria (today Limbe), Cameroon, and revealed the colonial context of the exhibit: Cameroon was a German colony from 1884 to 1916. The Woermann-Linie carried a large part of the people and goods moving between the German Empire and its African “protectorates”. The founder Adolph Woermann himself not only tolerated but also encouraged the oppressive and violent regimes in the German colonies. The intention of the background painting was to convey the connection of the steamship to “our” former East and West African colonies, which had been perceived in a positive way by the museum.

The Adolph Woermann AG has donated the original nautical instruments to the Deutsches Museum in 1927. While they represent the state of the art at the time, the instruments have not actually been on the steamship. Although the diorama is referred to as the “Woermann Bridge”, it cannot be regarded as an authentic replica of the original: it is an ensemble of exhibits of divergent origin combined with the scenery of a wheelhouse.

After the destruction in World War II, the wheelhouse had been rebuilt by the Howaldt's Werke, Kiel in 1958 and now represented the modern bridge of a freight ship. In the process, the background painting was changed to the Port of Hamburg. After a fire in the 1980s, the wheelhouse had been restored to its original state of 1927 and became the “Woermann Bridge” once again. The painting, however, still showed the Port of Hamburg, thereby concealing the colonial background of the diorama and its donor. The installation had been reduced to technical aspects.

Its other usage was that of a demonstration: Being switched to “night mode”, the painting became invisible and a projection of lights, representing the route into the port appeared. By turning the wheel, visitors could navigate the ship through the night. It is worth mentioning that the steering wheel is itself an original object from the 1920s that had been transformed into a hands-on. Today however, it seems more appropriate to regard it as an object of historical value, rather than an object of utility.

It was not until 2021, that the Deutsches Museum included information about the former representation of the bridge and about the role of the Adolph Woermann AG in the German protectorates. The shipping exhibition is currently closed for revision. The curators are planning to reinstall the wheelhouse in the new exhibition. Instead of focusing on technology, the social, societal and political aspects will be the focal point. The talk will also address the question of the main nature and the consequences for the future handling of the "Woermann Bridge". Is it a historical object, an installation, a hands-on, a diorama or all together?

Dr. Christina Newinger, Wiebke Henning

## Objects in Motion at “Kahaku” and the Historiography of Science and Technology in Japan

Hiroto Kono (National Museum of Nature and Science, Tokyo)

Nobumichi Ariga (Hitotsubashi University)

At the entrance of the first room of the Japan Gallery of the National Museum of Nature and Science, Tokyo (NMNS; “Kahaku”), an equatorial refracting telescope is displayed. This telescope with an aperture of 20 cm was made by Troughton and Simms Ltd and imported from England in the late 1870s. It was used for observation for a long period of time until the 1960s, contributing to the development of astronomy in Japan. Milne’s horizontal pendulum seismograph and Ewing’s voice reproduction device, also Kahaku’s collections of scientific objects from abroad, shed light on another aspect of the early days of Japanese science and technology: John Milne (1850–1913) and Alfred Ewing (1855–1935), who respectively contributed to the production or invention of these instruments, were among the foreign government advisors or teachers in Meiji Japan (*Oyatoi Gaikokujin*). These three objects from abroad have been honored as the Important Cultural Property of Japan and considered instruments that tell the story of science and technology in the early days of modern Japan.

Scientific instruments from abroad in more recent days are also an important part of the collection of Kahaku. The Adam Hilger Co. spectrometer purchased by chemist Yuji Shibata (1882–1980) in the 1910s was used in scientific research for more than half a century, contributing to the development of a wide range of research fields beyond chemistry, including earth science and botany. A phase contrast microscope, then the latest prototype, that biologist Jean Dan (1910–1978) purchased in the United States and brought back to Japan in 1948 for her husband, also a biologist, contributed to her own biological research as well as to the development of microscopes in Japan. Instruments from abroad seem to have always been a driving force in Japanese scientific practice.

Objects from domestic research institutions at Kahaku tell us how scientific endeavors by the Japanese grew up in the cultural context and local environment of Japan. The collection of seismology study at the University of Tokyo is an important example. Professor Seikei Sekiya (alternatively Kiyokage Sekiya, 1855–1896), who learned seismology from Ewing and Milne, designed the three-dimensional model representing the ground motion during an earthquake in 1887 consisting of three twisted copper wires. Giving the visual understanding of the complexity of ground motion, the model was exported and made his original work known worldwide. The collection also includes photographs and oil paintings related to damage caused by past earthquakes and volcanic eruptions. Digitized and restored, these materials have been widely used for disaster prevention research and education.

These objects in motion at Kahaku seem to tell a rather simple story of science and technology in Japan: Japan first accepted the Western scientific knowledge and practice through hiring

the foreign teachers and importing objects such as scientific instruments, and then nurtured its own style of scientific practices. Although it might be a perspective to see the development of science and technology in Japan, weighing a specific narrative prevents considering the complex and everchanging biographies of each object. How the diverse historiography inherent in objects can be discovered and presented is a major challenge for museum curators and historians.

Noemi Quagliati

### **Biography of a Film Mapping Camera for an Interpretation of Aerial Photography In-and-Outside Museums of Science and Technology**

The *Reihenbildner* was the first German aerial camera able to map territories through the technique of photomosaic. Designed by the film pioneer Oskar Messter during the First World War, this device took a rapid sequence of photographs that, once printed, needed to be rearranged and glued in line in order to obtain an overall map of an area. The camera was equipped with a standard cinema 35 mm film following the same principle of a movie camera. For this reason, in the last years of the conflict, this technology was propagandized in the German press as "fliegendes Kino," the flying cinema.

This paper explores the biography of this device inside and outside the Deutsches Museum collections. First, this contribution contextualizes the Rb. camera within the development of WWI aerial photo-reconnaissance and mapping techniques. Second, it analyzes the circumstances that brought this artefact to the Deutsches Museum's photographic collection and the ways aerial photography was shown in the museum exhibitions during the 20th century. The different roles that society assigned to the aerial view over time can be traced by analyzing the presence or absence of aerial cameras in/from the museum's permanent exhibitions. Finally, this paper shows present-day challenges that researchers and curators of the Deutsches Museum face in interpreting and exhibiting the early phase of "vertical photography" considering the recent popularization of the aerial and satellite "view from above" in contemporary societies.

#### **Bio**

Noemi Quagliati is an art and photo historian specialized in landscape and aerial iconography, nature photography, and museology. She is interested in the circulation of images and image infrastructures in German, American, Italian, and Polish visual cultures. After having studied at Brera Academy in Milan and Istanbul Bilgi University, she earned a PhD from Ludwig-Maximilians-Universität München, working on the project "Militarized Visualities: Photographed Landscape in WWI Germany." Noemi has been a visiting researcher at UC Berkeley and at the Research Institute of the Deutsches Museum, where she is collaborating on modernizing the museum's historical aviation section by investigating the topic of aerial photography.



**October 18, 2022 – Tuesday**

## **ARTEFACTS XXVII “Objects of Science and Technology in Motion”**

Paper proposal

By Ingebjørg Eidhammer  
Historian, Curator  
Norwegian Museum of Science and Technology

### **Brewing protocols 1860-1890 - Knowledge in Motion**

From the 1860s, several of the Norwegian breweries tried to establish an export industry to foreign markets. To achieve this, it was necessary to make a stable and durable beer with a standardized taste that could be recognized by consumers both in Norway and around the world. As early as 1865, the brewery Frydenlund proclaimed that they had made beer that could be sent to warmer countries (the Tropics).

The Norwegian Museum of Science and Technology has a substantial collection of historical archives from a variety of Norwegian industries, including all the major breweries in Oslo. This paper is based on the brewing protocols from Frydenlund Brewery (1862-90). The brewing protocol can be seen both as an artefact representing science and technology, but it is also an archive piece providing detailed historical information on knowledge of science and technology in a specific time period. Brewing protocols were introduced to assure that the brew master had control over the brew and contains detailed information on each brew. Thus, they are the "place" where the brewery's practices are gathered, containing all measurement points; parameters in the beer brewing that change over time, for example temperature (constants), sugar content or quantity ratios of ingredients. The brewing protocols can be assessed in a micro level providing detailed information on the daily work at the brewery, but it is also an entrance to see how circulation of knowledge was adapted from both national and foreign actors.

Norwegian beer was exported to Europe, America, Africa, and Asia in the last part of the 19<sup>th</sup> century. Local "place agents" at the destinations distributed the beer to local customers and returned feedback of the beer quality to the breweries in Norway. This made it possible to adapt to the market and to strive to achieve a stable brew that tasted the same in all destinations. In the brewing protocols we can see how the brew master introduces different ingredients and modern instrument in his work to perfectionise the beer. The brewing protocols are also interesting to read in a more intricate way – the circulation of knowledge is apparent for instance by the fact that the first brewing protocols were mostly written in German language, indicating that the first brew masters in Oslo were skilled craftsmen imported from Germany. Thus, it makes a good example of circulation of knowledge that was necessary to achieve the goal of making the bottom-fermented modern industrial beer in Norway. A common understanding is that the modern beer was established when the pure yeast was introduced in the 1880s. The hypothesis of this paper is, however, that the establishment of the modern beer did not occur solely because of the introduction of pure yeast in the 1880s, but rather as a result of a long-lasting knowledge circulation starting with the establishment of brewing protocols about 20 years earlier.

## Limits of global technology transfer: a bicycle for coal transport from Jharkhand/India

Mining is a global issue focused on transfer and exchange. This applies across national borders to raw materials from the globally distributed deposits as well as to technologies and mining knowledge. The large-scale landscape changes and destruction caused by mining are also a global phenomenon.

It is therefore all the more surprising that, beyond eurocentrism, global perspectives on mining have attracted the attention of historical research only in recent years. New approaches concern the transfer of European technologies as well as the local cultural and social factors that made spread and adaptation possible (Berger 2020; Steinberg 2022; Stottrop 2013). Also in focus is the role of colonialism and the exploitation of raw materials, for example ores, from non-European countries (Slotta 2012).

In order to develop a global perspective on mining history, new objects and a new perspective on mining collections are needed. This is especially true for mining technology, which is at the centre of the great Western narrative of industrial progress based on coal and steel since the 19th century. This for instance under the aspects of mine safety, mechanisation and automation.

To explain that, I will present a particular artefact in the new permanent exhibition of the Deutsches Bergbau-Museum Bochum: a bicycle used to transport coal in north-eastern India (a so called *wallah*). This comparatively primitive technology, based on muscle power, stands in stark contrast to the technology transferred to Indian coal mining from the West since the 19th century, which enabled coal production on an industrial scale. Today the state-owned company Coal India is one of the largest producers of hard coal worldwide. In this context, the bicycle operates at the lowest level of coal production. It ensures local supply to small-scale enterprises and peasant households. Since it is used to transport coal illegally "scraped out" of abandoned mines in dangerous manual labour, it also stands for an alternative, non-state supply of coal.

With a view to a global transfer of technology, the artefact "coal bicycle" allows several perspectives. First, in terms of the history of technology, it stands for the simultaneity of high technology and simple solutions. It shows that complex technical systems can exist side by side with simple ones, and that they are to a certain extent interdependent. Second, from a transfer of technology point of view it reflects an adaption of technology under local conditions. The production of coal on an industrial level does not lead to a sufficient supply for the poorest. In other words, the innovations introduced from the West enable ever higher production of coal, but do not solve the problem of distribution to broad sections of the population. Third, the role of the bicycle as an object of an exhibition: within this context it questions eurocentric narratives of coal and sets industrialized mining technology in contrast.

Berger, Stefan/Alexander Peter (Eds.): Making Sense of Mining History. Themes and Agendas, London/New York 2020.

Slotta, Rainer (Ed.): Schätze der Anden. Chiles Kupfer für die Welt, Katalog der Ausstellung des Deutschen Bergbau-Museums Bochum, 8. Mai 2011 bis 19. Februar 2012, Bochum 2012.

Steinberg, Swen: Material Knowledge between the Local and the Global. German Mine Models, Migration, and North American Mining Schools, 1860-1914, in: Farrenkopf, Michael/Siemer, Stefan (Eds.): Materielle Kulturen des Bergbaus/Material Cultures of Mining. Zugänge, Aspekte und Beispiele/Approaches, Aspects and Examples, Berlin/Boston 2022, S. 73-91.

Stottrop, Ulrike (Ed.): Kohle Global. Eine Reise in die Reviere der anderen, Katalog zur Ausstellung im Ruhr Museum vom 15. April bis 24. November 2013, Essen 2013.

Stefan Siemer studied history and literature in Bonn, Freiburg i. Br., and London. His doctoral thesis "Geselligkeit and Methode. Naturgeschichtliches Sammeln im 18. Jahrhundert" (2004) describe science and collection related networks in 18<sup>th</sup> century Europe. He worked for exhibitions at the Deutsches Museum in Munich and the Ruhr Museum in Essen. Since 2020 he works as deputy head of collections at the Montanhistorisches Dokumentationszentrum at the Deutsches Bergbau-Museum Bochum. He has published in the field of the history of technology, environmental studies and museology. Recent publications include „Das Materielle Erbe des Steinkohlenbergbaus in Deutschland. Eine Handreichung zur Dokumentation und Digitalisierung in kleinen Sammlungen“ (2020) and „Materielle Kulturen des Bergbaus/Material Cultures of Mining. Zugänge, Aspekte und Beispiele/Approaches, Aspects and Examples“ edited with Michael Farrenkopf (2022).

## The Behaim Globe as Digital Body – Challenges and Promises

The Behaim Globe is, without a doubt, one of the major icons of the Germanisches Nationalmuseum in Nuremberg. The painted globe was produced there, c. 1492/93, and is the oldest surviving terrestrial globe in history. It is part of the globe's "biography" that it was made just before the results of Columbus' first voyage to "India" were known. However, the globe compiles classical sources like Ptolemy, Strabon and Pliny, medieval travel accounts of Marco Polo and Jean de Mandeville, current nautical charts, and further information that Martin Behaim, a Nuremberg burger and Lissabon merchant, provided. As Behaim initiated the production of the globe, its encyclopedic qualities are further enriched by his merchant's perspective. Numerous inscriptions not only inform the reader about resources apparently available in Africa or Asia (gold, gems, ivory, silk, spices and many more). The Portuguese flags that accompany the coastline of West Africa until the very South make also clear that Europeans have already heavily reached out for possession. Commissioned by the City Council and exhibited in Nuremberg city hall, the globe was probably meant to invite Nuremberg merchants to invest in global trade. The globe can thus be interpreted as agent in changing configurations of globalization and power.

The globe experienced multiple transformations over the course of its life cycle. Most obviously, however, is its poor state of preservation due to age and delicate materials. In the course of a restauration in the 19<sup>th</sup> century, a linseed oil varnish was applied to the globe and, subsequently, its surface darkened. Furthermore, the body is heavily deformed. The globe is thus a „dynamic object“ not only in terms of scientific investigation and conservation, but also of its perception as distinguished object in culture history. It is a huge challenge for visitors today, to envision its former attraction and to immerse themselves into its encyclopedic imagery.

The contribution wants to outline the complex process of transforming the globe into a digital body for the purpose of preservation, research and education. The process is still ongoing, and some major questions are still unresolved. The talk will first recall the history of various imaging campaigns in order to get suitable photographic material and the globe's requirements that a campaign needs to meet today (Major challenges are the great fragility of the globe and the fact that the globe does not rotate freely in its stand). It will second turn over to three existing 3D-Models and present the current project using the so-called Cesium model to create a *GNM digital story*, an interactive screen presentation that will be available at media stations, smartphones and desktop (launch 2023). The digital story will invite visitors to retrace the global connections on the globe that Europeans have built until 1500, and to discover and to experience the globe as agent in the emerging attempt to economically and socially dominate other continents. At last, the project is still in search for transnational collaborations with other institutions in order to gain multiple perspectives on the globe and to enrich interpretation. The ARTEFACTS Conference 2022 will be the ideal setup to pursue that goal.

Susanne Thürigen

### **Curriculum Vitae (Short Version)**

Susanne Thürigen is curator for scientific instruments, history of medicine and pharmacy, and arms and armour at the Germanisches Nationalmuseum in Nuremberg. Thürigen studied at the Ludwig Maximilian University of Munich and Humboldt University of Berlin and, in 2018, received her PhD in art history from LMU Munich. The same year she started working at Dresden State Art Collections. In 2021, she was appointed curator at the GNM Nuremberg. Among others, she held a fellowship at the Max Planck Institute for the History of Science in 2015.

Thürigen's areas of research include scientific instruments, clocks and watches, gold- and silversmith's art, artistic knowledge, art and nature, and the history of collecting. Her first monograph "Tower, Mirror, Book. Astronomical Table Clocks in Southern Germany, 1450-1650" will be published in November 2022 (DeGruyter). She curated several exhibitions, for example "The Dresden Court Jeweler Johann Heinrich Köhler" (Grünes Gewölbe) in 2019 and "The Key to Life. 500 Years of Mechanical Amusement" (Mathematisch-Physikalischer Salon) in 2022.

*Session proposal for ARTEFACTS XXVII Conference 2022, "Objects of Science and Technology in Motion", Deutsches Museum, Munich, 16<sup>th</sup>-18<sup>th</sup> October 2022*

## **GUNS, GERMS AND STEEL: NEOLIBERAL SCIENCE AND MUSEOLOGY IN CONTEMPORARY SPAIN (1949-2022)**

Coordinated by Josep Simon (Institut interuniversitari López Piñero, Universitat de València, [josep.simon@uv.es](mailto:josep.simon@uv.es)) & Alfons Zarzoso (Museu d'Història de la Medicina de Catalunya, [alfzarzoso@gmail.com](mailto:alfzarzoso@gmail.com))

This session presents three case studies of objects and collections by considering their historical production and circulation, and their complex historical presence and museological interpretation in the framework of contemporary neoliberal science and museum work. It focuses on medical, technological, scientific, educational, and natural science museum objects in Spain across two contrasting political regimes (dictatorship and parliamentary monarchy) and their international connections. It reflects on the historical and historiographical dimension of the case studies presented, as well as on the museological challenges of their management and interpretation in the working place. It suggests particular approaches to the study of artefacts that could be applied to other national and international cases.

Naive accounts of globalization have considered that all that is good circulates and all that circulates is good; they have staged luxurious histories of commodity circulation through free trade in naturally-imperial networks, or have explained the unequal distribution of goods, knowledge and social rights by resorting to deterministic geographical and environmental arguments. In contrast, Marxist theories have contributed to problematize artefacts and their political mobilization, by highlighting the essentiality of social relations in the ontological production and circulation of objects in capitalist societies (through concepts such as reification and commodity fetishism). In the creed of neoliberalism characterizing our contemporary societies, the market – as the artefact supreme – drives knowledge economies, the mechanisms of democracy, the redefinition of property rights, the re-engineering of the state, and a moral framework marked by self-interest. The characteristic features of each particular regime of science, technology and museology developed through government and corporative policies, are essential to understand the meaning of artefacts, since they have a profound impact on the practical and intellectual business of the material culture of history and memory.

The first case study in this session analyses the entangled life of germs and machines through a media examination of the meaning of iron lungs and polio during the Spanish dictatorship, in combination with a contemporary reflection on the craft of the medical curator after the Covid-19 outbreak. The second case study discusses the meaning of remains of experimental science kits stored for decades in neglected university laboratories and warehouses, produced during the Spanish military regime as a project of autarkical subsistence, and subsequently exported abroad during the Transition to democracy. The third case study dissects the history of a private collection of taxidermied animals formed by a steel tycoon and trophy hunter aficionado thanks to his success in the transit from the Francoist autarkic to neoliberal regime, recently seized for contravening international animal trade conventions.

**1. *Mediatic Germs: Iron Lungs in Francoist Spain, Neoliberal Museology in Democratic Barcelona (1950-2022)*.** Alfons Zarzoso (Museu d'Història de la Medicina de Catalunya)

The technology of the iron lung allows us to trace the chronology of Franco's dictatorship and to understand what happened in the city of Barcelona in the polio decades of the 1950s-70s. The artificial respirator arrived to deal with the most severe forms of poliomyelitis - respiratory paralysis - that plagued post-civil war Spain. Philanthropic campaigns were instrumental in the purchase of new technical equipment and, in turn, to justify through autocratic media, a particular social and economic order. Those objects dazzled people from a technological perspective in the context of a growing and renewed trust in science as an engine of progress. In Barcelona, the municipal response even led to the creation in 1956 of an Anti-polio Centre in the Infectious Diseases Hospital. The formula was analogous in other large Spanish cities. The technological equipment for assisted respiration created teams of professionals who were experts in its knowledge and use. Interestingly, the progressive success of the later mass vaccination campaigns precipitated the transformation of artificial respirators from neuro-respiratory resuscitation methods to facilitators in the development of intensive care units in the 1970s. Since then, the material culture of polio, and the voices of the people affected with the disease in 1950-1960s' Spain (and those survivors that are now experiencing the drama of post-polio syndrome), are part of an evanescent memory. How is it possible to forget an epidemic disease so quickly, or how a large and key medical object can be transformed or even disappear leaving no traces at all? Why an acute disease is progressively forgotten when it becomes some kind of boring chronic problem, or what happens with the memories of those medical objects that change or vanish, once overtaken by new technologies and explanations? The recovery in Barcelona of two artificial respirators in 2015 allowed planning an exhibition that was never inaugurated. In 2021, under the push of COVID-19, artificial respirators have regained momentum. However, in times of neoliberal museology, these objects have become examples of the limits of research and exhibition as agents of social transformation, and as tools for the development of critical reflection and public scientific culture.

**2. *Autarkic Junk, Democratic Guns: ENOSA and the Internationalization of the Spanish Science Kit (1949-2022)*.** Josep Simon (Institut interuniversitari Lòpez Piñero, Universitat de València)

A series of sturdy metallic cases with plates identifying them as elementary equipments for several areas of physics (heat, optics, electricity, mechanics) and the trademark ENOSA, lie in an underground garage of an apartment building, which has successively housed the administrative offices of research institutes on robotics, traffic studies and urban infrastructure. The building has so far resisted attempts of auctioning as a way to restructure the university of Valencia budget by disposing of some of its estate. Most of the cases are empty and identified by misguided signatures; some of them are stuffed with junk, items and bits from the original experimental equipments, but also from other provenances. Their likely origin is the School of Education of the university, but their trajectory is a mystery shaped by the university's erratic management policies on its scientific heritage. ENOSA, the National Company of Optics, was established in 1949, as part of the Spanish government policy of import substitution after a civil war and the international isolation of the fascist regime. It established plans for the development of military optical technology in collaboration with German firms. By the 1960s, after the catastrophic failure of autarkical economic policies and the re-establishment of diplomatic relations with the US (leading to a rescue plan controlled by OEEC – later on, OECD), the firm had developed a major focus on educational technologies, especially science kits and experiment sets. As a state company, it had a captive clientele in the national schools and universities and sought to eliminate competition from existing private firms operating in the same sector. In parallel, the company developed further its interest in military weapons (automatic battle rifles and tanks) and planned other lines of production (petrol pumps, slot machines) in cooperation with companies from old ally countries (Germany, Italy). From the mid-1970s, transition to democracy in Spain supposed crisis for Francoist state companies



such as ENOSA, which lost some of their traditional national clientele, but endured in their process of production diversification and exportation, by managing contracts with Latin American, Middle East and African countries, well into the 1990s. In this presentation, I address the challenge of developing a complex museological outlook on the changing meanings of an artefact (ENOSA's science kit) enmeshed in troubled political, economic and social times.

**3. *The Nature of Steel: Ros Casares' Cabinet of Ignominies and the Spanish Conquest of Africa (1954-2022)*.** Lluís Pascual i Vidal (Independent scholar), Josep Simon (Institut interuniversitari López Piñero, Universitat de València) & Alfons Zarzoso (Museu d'Història de la Medicina de Catalunya)

In April 2022, SEPRONA, the department for protection of nature of the Guardia Civil (Spanish military police) seized a collection of natural specimens belonging to the Ros Casares family in an operation termed VALCITES. The collection, was found on private property (more than 50.000 m<sup>2</sup>) near València, and consisted of 1090 taxidermied specimens – 405 violated CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), and a number were extinct species – as well as hundreds of mounted elephant tusks and stools made from elephant feet. Francisco Ros Casares (1926-2014) – at times dubbed “King of Steel” – built his empire through financial ruses and profiteering, and an opportunistic readiness for the Francoist 1959 transition plan from autarky to internationally sponsored neoliberal economy. He raised to public prominence during the Spanish Transition to democracy, as a self-made entrepreneur in national economic and political circles, the president of València's major football club, and sponsor of a major European women basketball club. During his active life and retirement, he developed a major fondness for trophy hunting through countless trips to Africa and other parts of the world. His private cabinet constituted a major space of power display for the socio-political business of the Ros Casares family. In the late 1990s, television coverage presented it as an amazing cabinet of curiosities displaying the geniality and love for nature of the Valencian tycoon. A decade later the Ros Casares company declared bankruptcy due to miscalculation in real state investments and the crash of the Spanish property bubble stimulated by speculation and global financial crisis. Spanish citizens in the order of hundred thousands lost their jobs and homes, while Ros Casares' specimens remained safe in their private cabinet. Concurrently, Spanish public opinion was shaken by singular headlines unveiling that Spain's Head of State, king Juan Carlos I, spent his time hunting elephants in Africa in the company of one of his mistresses, while the country was devastated by economic and social crisis. Media coverage of the recent seizure of Ros Casares' collection has followed similar moral lines. However, the roots of the questions raised by such cases have not been tackled. Remarkably, other similar collections have been seized by SEPRONA in the last years, and Spain is European leader in lion trophy importation (followed by France and Germany and surpassed ten times by the US). Spanish ports such as València are considered privileged gateways for illicit animal traffic for their geostrategic connection with Africa and Latin America. Nonetheless, it is equally important to stress the particular combination of macho culture, cultural traditionalism, tax evasion, messianism, cynicism and corruption, professed by Spanish tycoon hunters. This characteristic cosmology has – like its associated collections – hitherto been happily exhibited by their holders and acolytes. Its roots are in the Francoist fascist regime and run across the Spanish new rich and aristocracy. Beyond its particularities, we argue, this case study can be useful to analyse other national cases and to develop a renovated enquiry on the socio-political roots of natural history collections, restitution of these type of collections (both to society and countries of origin), and the role of authoritarianism and neoliberal extractivism in the making of such collections and their future museological interpretation.

## CVs

**Josep Simon** ([josep.simon@uv.es](mailto:josep.simon@uv.es)) is Ramón y Cajal Research Fellow at the Institut interuniversitari López Piñero and Curator of the Museum of History of Medicine and Science of the Universitat de València (Spain). He has worked as a researcher, lecturer and teacher trainer in the UK, France, US, Mexico, Colombia and Brazil. He specializes on the history of physics, science education, material culture of science, museum studies and medical technology. He is currently leading two nationally funded projects: *Museums, Classrooms and Politics: Scientific and Technological Culture in the Spanish Transition to Democracy* (PID2019-104897GA-I00) and *Transnational Paradigm: Physics, Democracy and Educational Innovation in Europe and the Americas (1945-1975)* (RYC-2017-21763). More information: [www.josepsimon.com](http://www.josepsimon.com)

**Alfons Zarzoso** ([alfzarzoso@gmail.com](mailto:alfzarzoso@gmail.com)) is Director of the Museum of the History of Medicine of Catalonia, past President of the Catalan Society of History of Science and Technology, founding member and secretary of the Historical Health Heritage Commission of Catalonia, and corresponding member of the European Association of Museums of the History of Medical Sciences. Since 2001, he has curated a large number of exhibitions and developed an intense program of scientific and medical heritage rescue in Spain. He is an specialist in the social history of medicine, material and visual culture of science, museum studies, gender studies and anatomical collections. He teaches in history of science, technology and medicine master programs at the Universitat de València and Universitat Autònoma de Barcelona, and the medical anthropology master program of the Universitat Rovira i Virgili. He is currently a member of the *History of Work Institutions and Gender* Research Group of the Universitat de Barcelona and of project *Museums, Classrooms and Politics: Scientific and Technological Culture in the Spanish Transition to Democracy* (PID2019-104897GA-I00). More information:

<https://gabmusanablog.wordpress.com/acerca-de/alfonso-zarzoso-orellana/>

<https://musaupol.hypotheses.org/alfons-zarzoso>

<https://curatorial.academia.edu/AlfonsZarzoso>

**Lluís Pascual i Vidal** ([pasivi@alumni.uv.es](mailto:pasivi@alumni.uv.es)) is BA and PhD in Chemistry, and MA in History of Science and Science Communication (Universitat de València). He works as a cultural manager and science communicator in València, Spain. He is an independent scholar specializing on scientific, technological and medical heritage, and its communication, didactics and teaching. He is currently developing project *VALciÈNCIA: History of Science Tours in the City of València* (in collaboration with the Institut interuniversitari López Piñero and the Universitat de València), and contributes with research journalism to periodical *La Directa. Periodisme cooperatiu per a la transformació social* (<https://directa.cat>).

## **Moulages in motion: Making and circulating medical knowledge**

Eva Åhrén

The first international congress of dermatology and venerology took place inside the museum of wax moulages at the Hôpital Saint-Louis in Paris in 1889. Coinciding with the worlds fair, the congress attracted 210 participants from 29 countries. Dermatologists were in the process of establishing their discipline as a field of scientific medical research, and this congress was a crucial step in this effort. The published proceedings relate how the museum's moulages were used in individual presentations and the sometimes heated discussions that followed: moulages were compared with microscopic slides, drawings, prints, and live patients from the hospital clinics. Edward Welander, Swedish syphilis expert and professor at the Karolinska Institutet in Stockholm, attended the conference and was a member of the program committee. Like so many other participants, he was impressed by the thousands of moulages in the museum and proceeded to build up a collection of his own.

Moulages are extremely realistic three-dimensional representations of patients with skin lesions. A skilled artisan makes a plaster mold of a patient's diseased body part, makes a wax cast and then recreates rashes, bumps, and blisters using paints and resins. Facial and genital hairs are carefully inserted one by one, and the moulage is often finalized by a wrapping the edges with white cloth (effectively framing the lesion), and mounting it on a black wood board, that can be handled and displayed without damaging the fragile material. In their heyday, the decades around the year 1900, moulages were produced and displayed in medical schools around the world, with prominent centers in Paris, Vienna, and Berlin.

This paper presents and discusses moulages as mobile objects of medical knowledge within the context of a proliferating medical media landscape characterized by intermediality (moulages functioned as "plastic publications," and were often photographed and published in dermatological atlases and articles). It focuses on some of the more than 300 moulages that still exist in the collections of the Karolinska Institutet; traces their origin, circulation and how they were mobilized to support knowledge claims and epistemic authority. Some of the Stockholm moulages are unique, locally manufactured by moulage makers unknown to the existing international scholarship on moulage history. These objects are connected to other archival material, such as patient charts from the venerology clinic of Karolinska Institutet. Thus, I will be able to compare and connect moulages bought from international sources (eg documenting cases at the Charité hospital in Berlin) with local examples (eg the moulages of the chin and labia of a young single mother who presented with secondary syphilis in 1920).

Finally, I will discuss the "social life" and object biographies of the moulages, their trajectories as museum objects. I will argue that collaboration between scholars and museum professionals, eg conservators, are necessary in order to reach a deeper understanding of these artefacts and make informed decisions about how to handle them today and in the future.

Keywords: moulages, medical museums, circulation of knowledge, epistemic objects, intermediality

## Eva Åhrén, CV

### POSITIONS HELD

- Karolinska Institutet**, Unit for Medical History and Heritage & Hagströmer Medico-Historical Library: Director. 2013–present.
- National Institutes of Health**, Office of NIH History: Stetten Research Fellow, 2011–2013.
- Uppsala University**, Department of History of Science and Ideas: Research Fellow, Assistant Professor, 2008–2011.
- The Nobel Museum**, Stockholm: Senior Curator, Head of Research and Public Programming, 2003–2008.
- Yale University**, Section of the History of Medicine: Postdoctoral Fellow, 2005–2006.
- Uppsala University**, Science and Technology Studies Center & Center for the History of Science: Adjunct Professor, January– May 2005.
- Linköping University**, Program for Social and Cultural Studies: Adjunct professor, 1999–2003.

### EDUCATION

- Ph.D.** Linköping University, 2002: Program in Health and Society
- M.A.** Stockholm University, 1994: History of Science and Ideas
- B.A.** Stockholm University, 1988: Theater Studies, English, History of Science and Ideas

### SCHOLARSHIP

#### **Books and edited works**

- Death, Modernity, and the Body: Sweden 1870–1940*, Rochester: University of Rochester Press, 2009.
- Medicinhistoria idag: Perspektiv på det samtida svenska forskningsfältet* [Medical History Today: Contemporary Swedish Research Perspectives], *Nobel Museum Occasional Papers 4*, editor, Stockholm: Nobel Museum, 2007.
- Visuella spår: Bilder i kultur- och samhällsanalys* [Visual Traces: Images in Cultural and Social Studies (A Visual Culture Studies textbook)], co-editor with Anna Sparrman & Ulrika Torell, Lund: Studentlitteratur, 2003.
- Döden, kroppen och moderniteten* [Death, Modernity and the Body], *Linköping Studies in Arts and Science 249*, Stockholm: Carlssons, 2002.

#### **Academic articles and book chapters, selected**

- “Visualizing the Early Stages of Life: Embryology at Karolinska Institutet c. 1830-1930”, in *Medicine at the Borders of Life*, ed. Solveig Jülich (submitted).
- “Reviving a neglected collection through collaborative knowledge production: the case of the Stockholm moulages”, with Sabina Carraro, in *Ceroplastics: The science of wax*, eds. Roberta Balestrieri, Owen Burke & Fabio Zampieri, Rome: L’Erma di Bretschneider, 2022; 149–157.
- “Hud- och könssjukdomar i vax: Moulager i Stockholms Medicinhistoriska museums

- samlingar”, *Svensk medicinhistorisk tidskrift*, vol. 24, 2020; 135–161.
- “Ceroplastics in circulation: Medical models and moulages in early twentieth-century Stockholm,” in *Ceroplastics: The Art of Wax*, ed. Roberta Balestrieri, Rome: L’Erma di Bretschneider, 2019; 255–267.
- “Dermatological Mouflage Collections in the Nordic Countries,” with A.-M. Worm, H. Sinisalo, G. Eilertsen, I. Meyer, *Journal of the European Academy of Dermatology and Venerology*, 32/2018; 570–580.
- “Figuring Things Out: Visualizations in the Work of Swedish Anatomists Anders and Gustaf Retzius, 1829–1921”, *Nuncius. Journal of the material and Visual History of Science*, 32/2017; 166–211.
- “Making Space for Specimens: The Museums of the Karolinska Institute in Stockholm”, in *Medical Museums: Past, Present, Future*, eds. Samuel Alberti & Elizabeth Hallam, London: Royal College of Surgeons, 2013; 102–115.
- “Beautiful Brains: Axel Key and Gustav Retzius's Studies in the Anatomy of the Nervous System and Connective Tissue (1875–76)”, *Hidden Treasure*, ed. Michael Sappol, New York: Blast Books, 2012.
- “Museerna: Vetenskapshistoria i tre dimensioner” [The Museums: Science in Three Dimensions], *Medicinen blir till vetenskap: Karolinska Institutet under två århundraden* [Developing Medical Science: The Karolinska Institute Over Two Centuries], eds. Karin Johannisson, Ingemar Nilsson & Roger Qvarsell, Stockholm: Karolinska Institutet University Press, 2010; 126–169.
- ”Blickar och begär: Några reflexioner kring Karin Johannissons bildvärld” [Gazes and Desires: Some Reflections on Karin Johannisson’s Imagery], with Ulrika Nilsson, *In på bara huden: Medicinhistoriska studier tillägnade Karin Johannisson* [To the Very Skin: Studies in the History of Medicine, Dedicated to Karin Johannisson], eds. Maja Bondestam & Torbjörn Gustafsson Chorell, Nora: Nya Doxa, 2010.

#### PROFESSIONAL ASSIGNMENTS AND SERVICES, selected

- Head, Program to integrate culture and science at Karolinska Institutet, 2019–present.
- Member, Editorial Council, BMJ Medical Humanities, 2018–present.
- Head, Research Team in History of Medicine and Science, at the Center for Health Care Ethics, Karolinska Institutet, 2018–present.
- Member, Scientific Committee, *Nuncius Series: Studies and Sources in the Material and visual History of Science*, 2018–present.
- Member, Advisory Council for the Center for History of Science, Royal Swedish Academy of Sciences, 2017–present.
- Member, Culture Council of Karolinska Institutet, 2014–present.
- Member, Swedish National Committee on the History of Science and Technology, Royal Academy of Sciences, Sweden, 2005–2008; 2014–2020; VP 2017–2020.
- Board member, Friends of the Medical History Museum, Stockholm, 2014–19.
- Peer reviewer: *Nordic Museology*; *American Journal of Public Health*; *Cellular and Molecular Life Sciences*; *Science in Context*; *Journal of the History of Medicine and Allied Sciences*; *Dynamis: Acta Hispanica ad medicinae scientiarumque historiam illustrandam*; *Museum Worlds*

19 July 2022

## The *Relics of Lost Medical Civilizations* project

Michael Sappol, History of Science & Ideas, Uppsala University

The Karolinska Institute (KI) is one of the world's leading medical schools and biomedical research centers. Deep within its innards, amidst the laboratories and clinics, there stands a brilliant historical library, the Hagströmer Library. Which in 2013 was joined with KI's object collections as the Unit for Medical History and Heritage (MHH). MHH is a repository of valuable artefacts, rare, beautiful, eccentric, important, and sometimes difficult, a jewel. But keeps its holdings tucked away. Even in the age of social media, it is not well-known to the world, or Swedish public, or KI community, or even the cognoscenti. Comparable historical biomedical museums and libraries in the U.S., Britain, Germany, the Netherlands, Denmark, Austria and Italy are well attended, celebrated — but somehow Sweden's treasures have been overlooked.

The *Relics of Lost Medical Civilizations* book project wants to help change that. The volume will present a curated selection of brilliant significant and mostly obscure MHH materials — artfully photographed in a beautifully designed book, with text by members of the MHH staff, along with a select group of outside writers — media and art historians, clinicians, scientists, philosophers, epidemiologists, activists, and historians of medicine, science and technology. Our goal is to show off the breadth and depth of the objects, their universality and particularity, their brilliance, power, complexity, significance, and the vast open range of human experience they represent and exemplify: to tell their histories — and help put them into motion for future generations of viewers, readers, scholars.

The artefacts date from the 1400s to 1920s and come mostly from Europe — many from Scandinavia and KI itself — but also Asia, Africa, the Americas, Oceania. Many of them were painstakingly curated and collected, others haphazardly, through donation and accident (even rescued from the dumpster). Each has a unique history of production, circulation, and often long periods of storage and neglect. Today, with more than 100,000 volumes and thousands of manuscripts and objects, the collections continue to grow as a library, archive of KI research, and museum of instruments, laboratory equipment, field notes, paintings, taxidermied animals, sculptures, glass slides, therapeutic devices, wax moulages, dried botanicals, and anatomical models and specimens. In some ways, the collections themselves are archivable artefacts, collections nested within collections, starting with the Swedish Society of Medicine (founded 1807) and Karolinska Institute (1810). Which coalesced from the collections of professors, doctors and surgeons, who were themselves avid participants in a larger culture of collection.

The mission: keep the objects and collections safe, while opening them up for scholarly research and public contemplation. But resources are scarce, and KI administrators and stakeholders don't really know what they have — or what to make of materials that are now of vital interest to historians of gender, war, colonialism, agriculture, social class, race, consumer culture, print culture, state formation, etc., as well as artists, activists, students, and the Swedish and global public. To further complicate matters: many of the objects are “difficult” — refer back to human experiences of suffering, disease, disfigurement, death, racism, sexism, and other forms of oppression — and hard to manage. The danger: is that KI may decide it's not worth the cost and trouble, but also that scholars and the public will never have the chance to explore the rich lode of historical materials collected. Hence *Relics of Lost Medical Civilizations*, as a kind of advertisement and promotion looking inward to the KI community and outward to communities of scholars, stakeholders, and wider publics. This presentation discusses key aspects of the project — the politics, ethical conundrums, unique considerations and opportunities that attend object- and collection-oriented volumes.

# Michael Sappol, PhD

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## Education

Ph.D., history, Columbia University, awarded with "Distinction," 1997

## Thesis

"The cultural politics of anatomy in 19th-century America: Death, dissection, and embodied social identity" (Columbia University, 1997)

## Positions

Visiting researcher, Uppsala University, History of Science & Ideas, 2017 - present  
EURIAS senior research fellow: Swedish Collegium for Advanced Study, Uppsala, 2016-2017  
Historian, scholar-in-residence, exhibition curator: History of Medicine Division, National Library of Medicine, 1998-2016  
Scholar-in-residence: Francis Wood Institute for the History of Medicine, College of Physicians of Philadelphia, 1997-1998

## Current projects

*Relics of Lost Medical Civilizations: The Hagströmer Library and Karolinska Institutet Collections*  
Anatomy's photography: Objectivity, showmanship and the reinvention of the anatomical image, 1860-1940  
Queer anatomies: Medical illustration, perverse desire and the epistemology of the anatomical closet

## Publications

"Mr Joseph Maclise's queer anatomy: The epistemology of the anatomical closet," *British Art Studies* 20 (July 2021) <https://www.britishartstudies.ac.uk/issues/issue-index/issue-20/maclises-queer-anatomy>  
"On 'the use and abuse' of medical history 'for life'," in Solveig Jülich & Sven Widmalm, eds., *Communicating the History of Medicine* (University of Manchester Press, 2019)



## MICHAEL SAPPOL

- Body Modern: Fritz Kahn, Scientific Illustration and the Homuncular Subject* (University of Minnesota Press, 2017)
- “Anatomy’s photography: Objectivity, showmanship, and the reinvention of the anatomical image, 1860-1950,” *REMEDIA*, January 2017  
<https://remedianetwork.net/2017/01/23/anatomys-photography-objectivity-showmanship-and-the-reinvention-of-the-anatomical-image-1860-1950/>
- “Foreword: The afterlife of death,” in Ken Nystrom, ed., *The Bioarchaeology of Dissection* (Springer, 2016), vii-xi.
- with Stephen Rice, ed., *A Cultural History of the Human Body in the Age of Empire, 1800-1920* (Berg, 2010)
- “The odd case of Charles Knowlton: Anatomical performance, medical narrative and identity in antebellum America,” *Bulletin of the History of Medicine* 83 (Fall 2009): 460-98
- with Eva Åhrén, “The strange spaces of the body: Two dialogues,” in A. Lagerkvist & André Jansson, eds., *Strange Spaces: Explorations in Mediated Obscurity* (Ashgate, 2009)
- with Eva Åhrén, “Bone play,” *Cabinet* 28 (2007-08)  
*Dream Anatomy* (Washington, DC, 2006)
- “Anti-Bodies” (Visual AIDS Web Gallery, March 2006)
- “ ‘Morbid curiosity’: The decline and fall of the popular anatomical museum,” *Common-Place* 4.2 (January 2004) <http://www.common-place.org/vol-04/no-02/sappol>
- “The anatomical mission to Burma: How the anatomical body became our body,” *Science* (October 2003) <http://www.sciencemag.org/cgi/content/full/302/5643/232>
- “*A Traffic of Dead Bodies*”: *Anatomical dissection and embodied social identity in 19th-century America* (Princeton University Press, 2002)
- “Sammy Tubbs and Dr. Hubbs: Anatomical dissection, minstrelsy, and the technology of self-making in postbellum America,” *Configurations* 4.2 (1996): 131-83

### Exhibitions, websites, programs

- Curator: *Medical Movies on the Web: Films from the National Library of Medicine*  
<http://www.nlm.nih.gov/hmd/collections/films/medicalmoviesontheweb/> 2010-2016
- Co-curator, with Paul Theerman : *Rewriting the Book of Nature: Charles Darwin and the Rise of Evolutionary Theory*, National Library of Medicine, 2009-10  
<http://www.nlm.nih.gov/exhibition/darwin/>
- Curator: *An Iconography of Contagion*, National Academy of Sciences, Washington, DC, 2008 to 12-16-2008 <http://www.nlm.nih.gov/exhibition/iconographyofcontagion/index.html>
- Curator [exhibition & website]: *Horrible & Shocking Murders: Murder Pamphlets in the Collection of the National Library of Medicine*, National Library of Medicine, 3-2008 to 7-2008 <http://www.nlm.nih.gov/exhibition/murderpamphlets/index.html>
- Curator [film festival]: *The Cartoon Medicine Show: Historical Animated Medical Cartoons from the Collection of the National Library of Medicines*, National Academy of Sciences, Washington, DC, 10-2006 <http://www.nlm.nih.gov/hmd/cartoon.html>

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Curator [exhibition]: *Visible Proofs: Forensic Views of the Body*, National Library of Medicine, 2-16-2006 to 2-16-2008 <http://www.nlm.nih.gov/exhibition/visibleproofs/>

Curator [web exhibition]: *Anti-bodies*, Visual AIDS Web Gallery, 3-1-2006  
[http://www.thebody.com/visualaids/web\\_gallery/index.html](http://www.thebody.com/visualaids/web_gallery/index.html)

### Awards

Stipendium, Helge Ax:son Johnsons Stiftelse, 2021

Visiting Fellowship, Institute of Humanities, Birkbeck College, University of London, Spring 2019

Fellowship, Consortium for the History of Science, Technology & Medicine, Fall 2017

EURIAS Senior Fellow, 2016-17, Swedish Collegium for Advanced Study

Best Monograph 2013: *Hidden Treasure*, Archivists & Librarians in the History of Health Sciences (ALHSS) Award

Francine & Sterling Clark Art Institute, Research Fellowship, 2008

## First Products of 'The Congruence Engine'; Reflections on Museum-based Histories

Tim Boon, SMG Head of Research & Public History. Outline for paper at 2022 Artefacts meeting

*The Congruence Engine: Digital Tools for New Collections-Based Industrial Histories* is a major three-year research project, led by the Science Museum. Funded by the British Arts and Humanities Research Council under the 'Towards a National Collection' funding stream, it is an investigation of the means and affordances of working digitally across the UK's collections of all kinds. Taking industrial history as its topic, the project has amateur and professional historians and curators working in partnership with digital experts to use digital humanities and AI techniques to do new kinds of historical work. In turn, we are looking at three sectors: textiles, energy and communications, conducting dozens of mini-investigations of some of the kinds of history that can be done when different kinds of collection items – objects, moving and still images, archives, data – are brought together. The idea is that, whether the stimulus comes from a historian glimpsing a new kind of interpretation, or a digital expert can see a new application for programming technique, new ways will be opened-up to make collections useful to researchers of all kinds.

In this presentation I will discuss some initial findings of the project, which at its heart draws on the founding aims of the Artefacts Consortium to encourage high quality research into the collections of technical museums. Apart from simply describing the project, I plan to talk about distinctive museological forms of historical research, and how digital methods open-up new possibilities for these characteristic forms of practice.